THE MUSEUM

of

FAR EASTERN ANTIQUITIES

(Östasiatiska Museet)

STOCKHOLM

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Asia and Scandinavia – New perspectives on the Early Medieval Silk Roads

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The bronze Buddha figurine depicted on the cover comes from the collections of the Swedish History Museum (SHM 108115). It was found in 1956 during an excavation of an Iron Age building complex (in use ca. 200–900 CE) at Helgö, an island in Lake Mälaren, not far from Birka in eastern Sweden. Probably made in the sixth century in the Swat Valley of what is now north Pakistan, the figurine represents one of the earliest examples of its type. The figurine is thus an example of the many exotic Late-Iron-Age-finds from archaeological contexts in Sweden, raising questions regarding routes of contact and communication (see Bo Gyllensvärd, "The Buddha found at Helgö." *In Excavations at Helgö XVI. Exotic and Sacral Finds from Helgö.* Edited by Bo Gyllensvärd, Peter Harbinson, Morten Axboe, Jan Peder Lamm, Torun Zachrisson, and Synnöve Reisborg. Stockholm: Kungl. vitterhets-, historie- och antikvitetsakademien, 2004, 10–27. Photo courtesy SHM).

The dragon on the title page, the Museum's traditional logo, derives from a series of three dragons on the back of a bronze mirror of the Warring States period in ancient China, also in the collection of the MFEA (K10599: 550, see Bernhard Karlgren, "Early Chinese Mirrors," *BMFEA* 40, 1968, 85–86, plate 35).

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Asia and Scandinavia: New perspectives on the Early Medieval Silk Roads

by
Eva Myrdal

This volume of the Bulletin of the Museum of Far Eastern Antiquities (BMFEA) contains some of the papers presented at the symposium "Asia and Scandinavia: New perspectives on the Early Medieval Silk Roads" held at the Museum of Far Eastern Antiquities (MFEA) in Stockholm September 2015. The symposium was held in conjunction with the inauguration of the temporary exhibition "Cosmopolitan Metropolis Along the Silk Road: Luoyang During Tang Dynasty China" featuring archaeologically excavated objects on loan from Henan province in China, administered through the Henan Provincial Administration of Cultural Heritage and on display in the caverns below the MFEA.[1]

Entering the exhibition venue, visitors met a map featuring Eurasia and north-east Africa with communication routes likely to have been active some time during the first millennium CE marked.[2] In the northwest, one of the marked routes over the Baltic Sea from what is now Russia ended at the place name "Birka". Birka was the earliest east Scandinavian urban-like environment and a centre for trade and inhabited during the mid-eight to the second half of the tenth century CE, the early and middle part of the Viking Age.[3]

A map covering 'the Silk Roads' (though the name given was "Trade routes") in Asia has however met visitors in the MFEA itself since September 2007. It forms part of the permanent exhibition "The Middle Kingdom" where material coming from what is now China and dating from the Bronze Age up to the Qing dynasty is on display. Material produced and used in China during the Tang dynasty (618–907 CE) open questions of contact and

[1] Michel Lee, ed., *Staden vid Sidenvägen/ Cosmopolitan Metropolis Along the Silk Road: Luoyang During Tang Dynasty China* (Stockholm: National Museums of World Culture, 2015).
MFEA http://www.varldskulturmuseerna.se/utstallningar/tidigare-utstallningar/staden-vid-sidenvagen-ny-utstallning-i-bergrummet/

[2] Map template: Courtesy of the International Dunhuang Project. See Michel Lee, ed., *Cosmopolitan Metropolis*, inner front cover.

[3] Communication from the mid-east Scandinavian coast over the Åland islands to the Finnish and Baltic coast and further east is evidenced in the archaeological material from before the establishment of Birka, maybe already during the seventh century. See for example Johan Callmer, "The beginning of the East European trade connections of Scandinavia and the Baltic Region in the eighth and ninth centuries A.D.," in *International Conference on Early Middle Ages*, ed., Ferenc Vadas (A Wosinsky Mór Múzeum Évkönyve XV: Szekszárd, 1990), 19–51 (22–23).

communication. The material is organized in showcases discussing for example "Visitors from near and afar" (grave figurines representing foreigners from the west – i.e. West-Central- and South Asia – which for a Swedish viewer would be a person coming from the east), "Buddhism and Islam – from import of ideas to native representation" (two religions which developed in the west if seen from an East Asian perspective and were given native inflections materialized in e.g. porcelain), "Design from west and south" (stone- and earthenware with forms inspired by objects in other materials from South- and Central Asia and eastern Mediterranean but given, for example, a glazing and colour scheme to suit indigenous taste). Thus, these objects from the Tang Dynasty are examples of a long tradition of exchange and mutual influence between different parts of Asia.[4]

We needed a map for geographical visualisation – and the model selected in 2007 came from the Silkroadology Institute in Nara, Japan. The network of roads on the map does not include Europe other than the eastern Mediterranean region. Using this map as a basis for the one produced for the permanent exhibition was initially not problematic. The centre of gravity, when it came to population density, agricultural produce, social complexity, innovations, and exchange of products etc., was certainly Asia during this period. The MFEA gives a unique opportunity in Sweden to reflect on links between different regions in Asia with exhibitions focussing on China, Japan, Korea, and South Asia permanently on display. However, facts are stubborn things and the evidence from material culture could not be ignored. The idea of a network of communication roads functioning for a millennium without ever involving the western Eurasian periphery could not be maintained in light of this evidence. The Silkroadology map even leaves an empty void in the Asian north above the Central Asian 'highways'. Thus, the map excluded a visualisation of the importance of the inflow of goods and raw material from areas not involved in production and large-scale consumption of luxury products (and the fellow human beings living there). It featured an inherent geographical and social bias.

The idea of viewing the history of Scandinavia in relation to specific areas of Asia was born out of this work. The seminar series "Silk Roads" for the general public started in autumn 2007 shortly after the inauguration of "The Middle kingdom" in collaboration with the Museum of Mediterranean and Near Eastern Antiquities (MMNEA).[5] On 8th of March 2008 the seminar theme was "Birka going eastwards – luxury goods and technology imports" which focused on a Tang dynasty silk-fragment from a Birka burial discussed below (at the seminar it was presented by Margareta Nockert) and a thumb-ring, fragments

[4] Eva Myrdal, ed. *Mittens rike/The Middle kingdom*, Östasiatiska museets utställningskatalog nr 61/Museum of Far Eastern Antiquities Exhibition Catalogue No 61 (Stockholm: Östasiatiska museet, 2007). In Swedish, English, and Chinese.

[5] The MFEA and the MMNEA are together with the Museum of Ethnography in Stockholm and the Museum of World Culture in Gothenburg administered since 1999 by the government agency the National Museums of World Culture.

of a quiver, a composite bow[6] and lamellar armour[7] excavated from the Birka garrison (at the seminar presented by Charlotte Hedenstierna-Jonsson and Fredrik Lundström). The question that was opened here concerned the importance of knowledge obtained from researchers of other geographical areas and their contributions toward interpreting archaeological material found in Scandinavia.

But let us return to the map in the exhibition 2015. The decision to mark Birka on the map and to include the trade routes from eastern Scandinavia through what is now Russia and the Ukraine towards the rivers Volga and Dnieper and further east and south in the discussion of 'the Silk routes' was born out of my personal concern over a specific Swedish state of the art which will be discussed further below. As an introduction to the issue, it could be mentioned that for over a century a few Swedish archaeologists per generation have focused on late Iron Age (Viking Age) *exotica* excavated from elite burials and have worked to find out where it had been produced, through which groups of people the material passed and along which routes it travelled to reach the upper echelons of eighth to eleventh century polities in Scandinavia. Charlotte Hedenstierna-Jonson gives an overview of the source material and the historical research background in her article "With Asia as a neighbour" in this volume.

Among these Viking Age exotica are many fragments of silk and already in the 1930's the piece of silk from a rich tenth century burial at Birka mentioned above, was identified as having been produced within the weave-technical tradition of Tang dynasty China.[8] This piece of silk is discussed by Eva Andersson Strand and Annika Larsson in this volume and an additional find from a Viking Age burial in lake Mälaren valley which has a similar weave-technical background is presented by Annika Larsson.

When planning the exhibition, we approached our colleagues at the Swedish History Museum (SHM) in Stockholm, where the precious textile has been managed since it was excavated in the late nineteenth century. It had never been put on display before. Would it be possible to borrow the piece for the exhibition to accompany the map and an explanatory text related to Birka and Viking Age exotica? We ventured to ask about borrowing a sixth century bronze Buddha figurine produced in the Swat valley, in the area of present day Pakistan, and excavated from another Iron Age Mälaren site – Helgö – as well.[9] The Buddha figurine formed part of a permanent Viking Age exhibition at the museum at that time and so this could not be lent, understandably enough, but the Director of collections at SHM, Kent Andersson, gave approval for the loan of the Tang-dynasty piece of silk, thus making it available to the more than 300,000 visitors to the exhibition. We were also

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[6] Fredrik Lundström, Charlotte Hedenstierna-Jonson, and Lena Holmquist Olausson, "Eastern archery in Birka's Garrison," in *The martial society: aspects of warriors, fortifications and social change in Scandinavia*, ed., Lena Holmquist Olausson, and Michael Olausson (Stockholm: Archaeological Research Laboratory, Stockholm University, 2009), 105–116.

[7] Niklas Stjerna, "En stäppnomadisk rustning från Birka," *Fornvännen: Journal of Swedish Antiquarian Research* 99:1 (2004): 28–32.
http://samla.raa.se/xmlui/bitstream/handle/raa/3065/2004_027.pdf?sequence=1&isAllowed=y

[8] Agnes Geijer, *Birka III: Die Textilfunde aus den Gräbern* (Uppsala: Almqvist & Wiksell, 1938).

[9] Bo Gyllensvärd, "The Buddha found at Helgö," in *Excavations at Helgö XVI: Exotic and Sacral Finds from Helgö*, ed., Bo Gyllensvärd, Peter Harbinson, Morten Axboe, Jan Peder Lamm, Torun Zachrisson, and Synnöve Reisborg (Stockholm: Kungl. vitterhets-, historie- och antikvitetsakademien, 2004), 11–27.

allowed to use photographs of other types of Viking Age exotica managed by the SHM – e.g. cowrie shells (at home in the Indian Ocean and found in Birka among other sites in Sweden), Islamic silver dirhams (which have been found in graves and hoards in the area of what is now Sweden to the astonishing amount of more than 85,000 coins) and a finger ring with the inscription "Allah" in Arabic script[10] (found in the grave of a female at Birka, the ring is similar to one found in a female burial which also contains typical Norse/Scandinavian brooches discovered in the Timerëvo grave-field in the upper Volga region of present-day Russia[11]).

But then there was the question of the map. We found that no map including the route from what is now Russia over the Baltic Sea to Birka as part of the 'Silk Routes' existed. That the origins of the silk, cowrie shells, Islamic silver dirhams, carnelian beads etc. was from outside of Sweden has not been contested, of course, but the route? The West European focus is well established – couldn't the material have been brought from the south over the west European continent or along its coast instead of from the east? I had decided on the inclusion of this eastern route based on Swedish archaeologists' research though, and we were able to engage two senior researchers who have specifically contributed to the question of the route, to help us: Johan Callmer[12] and Ingmar Jansson.[13] Despite their deep knowledge of finds, sites and dates and that both of them were convinced about the existence of an easterly route of communication, they were a little hesitant to mark it out on a map as a definite statement that the goods had been taken along a specific route. When one discusses concrete questions with knowledgeable people, one is introduced to

[10] Sebastian K.T. S. Wärmländer, Linda Wåhlander, Ragnar Saage, Khodadad Rezakhani, Saied A. Hamid Hassan, and Michael Neiß, "Analysis and interpretation of a unique Arabic finger ring from the Viking Age town of Birka, Sweden," *Scanning* 17:2 (2015): 131–137. https://onlinelibrary.wiley.com/doi/full/10.1002/sca.21189

[11] Wladyslaw Duczko, *Viking Rus: Studies of the Presence of Scandinavians in Eastern Europe* (Leiden and Boston: Brill, 2004), 196.

[12] See for example Johan Callmer, "The beginning of the East European trade connections of Scandinavia and the Baltic Region in the eighth and ninth centuries A.D.," 27–29. Here the finds of different kinds of beads in terms of findspots and dates are discussed and three specific types are convincingly shown to indicate these easterly routes of communication – one type of Oriental millefiori glass bead, one plain glass bead-type of a rich amethyst violet colour and one spherical cornelian bead from eighth and early ninth century contexts. They have been found, with a very few exceptions, only in west and central Asia, in Russia and Ukraine and in eastern Scandinavia.

[13] Ingmar Jansson has been working for many years, and in communication with colleagues in the area, on the question of settlements and burials in Russia and Ukraine featuring typical Scandinavian Viking Age artefact material. He has broadened the question of the character of the presence of people from Scandinavia from mere plunder or trade and exchange to also focus on the agrarian potential of the area and the permanent settlements. See for example Ingmar Jansson, "Warfare, trade or colonisation? Some general remarks on the Eastern expansion of the Scandinavians in the Viking period," in *The Rural Viking in Russia and Sweden*. Conference 19–20 October 1996 in the Manor of Karlslund, Örebro, Sweden, ed., Pär Hansson (Örebro: Örebro kommuns bildningsförvaltning, 1997), 9–64. See also his updated catalogue of finds in what is now Sweden of Viking Age artefacts imported from the east following up on Ture J. Arne's work in the early twentieth century. Ingmar Jansson, "Wikingerzeitlicher orientalischer Import in Skandinavien," in *Oldenburg – Wolin – Staraja Ladoga – Novgorod – Kiev: Handel und Handelsverbindungen im Südlichen und östlichen Ostseeraum während des frühen Mittelalters*, Bericht der Römisch-Germanischen Kommission, Band 69, 1988 (Frankfurt am Main: Römisch-Germanische Kommission des Deutschen Archäologischen Instituts, 1989), 565–647.

well-founded source-critical aspects (a waterway may seem a natural route when viewed on a map – but ground-truth tells there is a rapid or some other obstacle for example). But even researchers such as Søren M. Sindbaek who has criticised the idea of transport by boats sailing along the rivers has presented the same basic geographical overview of routes for communication – the question of if they represent transport during the ice-free part of the year by boat or, as Sindbaek suggests, winter transport with sledges is a question for future research – not least regarding interpreting wooden remains from burials and settlements.[14]

The routes have also in this case been suggested based on the location of archaeological sites with specific finds and dates and with reference to historical sources. And, as our advisers pointed out, the rivers provided an opportunity for visitors to orient themselves and find the way regardless of the means of transport used. So, I take the responsibility for the decision to present a map featuring routes that connects to acknowledged 'Silk routes' in Central- and Western Asia – and I feel confident that this map was of as good quality, scientifically speaking, as the Silk routes marked on maps over Asia. Archaeological sites, inscriptions and historical sources combined with knowledge of the area's topography – that is how most of Silk Routes maps are compiled.

My concern referred to above was born out of the fact that Sweden, as a nation with a small population (10.3 million), today has no academic bases for studies of material culture (any time horizon) from outside Europe (apart from pharaonic Egypt which is always given a special treatment within Western scholarship) on par with the courses and PhD programs related to material culture that was produced within Scandinavia (or at the northern shores of the Mediterranean during the centuries just before and after the beginning of our era). This contrasts with some other European states, former colonial powers, and others (and the United States of America), where there are archaeological, art historical and ethnographical research institutions of material culture with a non-European focus and specialization. Some of us reared at "Nordic and comparative" archaeological institutions in Sweden have ventured outside Europe during the twentieth and twenty-first century – relying on our intellectual and scholarly support mainly from abroad.[15] This is

[14] Søren M. Sindbaek, "Varaegiske vinterruter: slaedetransport i Rusland og spørgsmålet om den tidlige vikingetids orientaliske import i Nordeuropa," *Fornvännen: Journal of Swedish Antiquarian Research* 98:3 (2003): 179–193. http://samla.raa.se/xmlui/bitstream/handle/raa/3052/2003_179.pdf?sequence=1&isAllowed=y

[15] The establishment of the MFEA was borne out of Johan Gunnar Andersson's archaeological fieldwork in China 1921–26 in collaboration with Chinese colleagues. See for example Magnus Fiskesjö, and Chen Xingcan, *China before China: Johan Gunnar Andersson, Ding Wenjiang, and the Discovery of China's Prehistory* (Stockholm: Museum of Far Eastern Antiquities, 2004), Bilingual edition, in English and Chinese. There were Swedish archaeologists who took an interest in Asian material and who formed the intellectual environment within Sweden e.g. for Johan Gunnar Andersson's subsequent work as Director of the MFEA and editor of the BMFEA, for example Ture J. Arne and Hanna Rydh. Both of whom conducted fieldwork in Sweden and in Asia and were interested in comparative perspectives of cultural history. See for example Ture J. Arne, *Excavations at Shah Tepé, Iran* (Stockholm: Statens etnografiska museum, 1945), and Hanna Rydh, *Rang Mahal: the Swedish Expedition to India 1952–1954*, Acta Archaeologica Lundensia Series 4:3 (Lund, Bonn & Bombay: C.W.K. Gleerup Publishers, Rudolf Habelt Verlag & The New Book Company, 1959). Arne worked for more than forty years as curator for the Iron Age collections at the Swedish History Museum and he was responsible for bringing together "comparative collections" (of which most were redistributed to the MFEA, the Ethnographic museum in Stockholm and the MMNEA when these specialised museums were founded in

not a startling situation for a small nation, but it needs to be taken into consideration when Viking Age exotica is to be discussed. There is a need to link up with colleagues for every step along the easterly route for calibration of ideas and interpretations.[16]

A parallel problem to being small, and hence having less manpower to start with, is a tendency within Scandinavian historical research today to equate a 'global perspective' with a focus on the westernmost periphery of Eurasia.[17] This has been noted by scholars from outside of Sweden as impeding research. Melanie Michailidis remarks in relation to the Scandinavian Viking Age Jelling and Mammen styles of art that are brought in to her comparative research on Samanid art: "It is interesting to note that the possibility of an origin outside of Europe is not suggested in the literature."[18] This narrow focus lingers on to some extent in spite of the fact that historians have pointed to the global context of the early Viking Age development in eastern Scandinavia, coinciding with the establishment of the economically booming Abbasid Caliphate in western Asia. The organisation of the symposium in 2015 is to be seen in the light of this Swedish context of research and the MFEA's potential of acting as an arena for discussions.

When my inward-looking bases for the decisions discussed above meet the outside world, I realize that linking Birka to the Silk Routes may be questioned also outside Swedish national borders, where other designations (if any, these routes of communication aren't noticed so often in relation to the Eurasian trade routes[19]) are in vogue. But how come, one may ask, that only people from areas where the population were organized in a state hierarchy within more or less fixed geographical boarders are said to be "on the Silk Road" (though it's often pointed out that silk formed only a minor part of the items on route[20]), whereas for example Scandinavian chieftains and commoners were on the "Fur route" to obtain – among other things – silk. Maybe borne out of a perspective from a centre: what

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the late 1920' and 1930'). See e.g. Eva Myrdal, "Publika rum för möte med världen/ Public spaces for the encounters with the World," in *Kungens gåva: Gustaf VI Adolfs gåva till svenska folket/the King's Gift: Gustaf VI Adolf's Gift to the People of Sweden*, ed., Eva Myrdal (Stockholm: Östasiatiska museet/Museum of Far Eastern Antiquities, 2013), 15–31, 173–179. Bilingual edition, Swedish and English.

[16] Sweden shares this state of the art with most non-European countries of course. Archaeology and history have a focus contained within the present national borders, making the need for communication between researchers across borders the more urgent, which the authors in this volume repeatedly emphasise. The articles relating to silk imported to Scandinavia exemplifies the future need to develop two lines of research. One concerning the area of production and which will require contact with research on China, Central Asia, Byzantium, and the West Asian area of the Abbasid Caliphate including Syria. One that concerns where the points of exchange were located, and in what form the silk was imported, keeping a focus on chronology.

[17] Sarah Croix exemplifies this tendency in relation to the scholarly discussion in northern Europe regarding the Viking Age in Sarah Croix, "The Vikings, victims of their own success? A selective view on Viking research and its dissemination," *Danish Journal of Archaeology* Volume 4 Issue 1 (2015): 82–96 (91–92). For a wider discussion of the phenomenon see Elisabeth Niklasson, *Funding matters: archaeology and the political economy of the past in the EU* (Stockholm: University of Stockholm, 2016).

[18] Melanie Michailidis, "Samanid Silver and Trade along the Fur Route," *Medieval Encounters* 18 (2012): 315–338 (326).

[19] However, see Susan Whitfield, *Life along the Silk Road* 2nd edition (Oakland: University of California Press, 2015), xii–xiii, 126–137, where "The Writer's tale" includes a story of the Scandinavian Rus fur traders.

[20] See for example Valerie Hansen, *The Silk Road: A New History with Documents* (New York and Oxford: Oxford University Press, 2017), 5; Susan Whitfield, *Life along the Silk Road*, 2.

the centre produced and what the centre obtained, in this case, from its periphery? This is not a rhetorical question asking for justice. After all, the definition (and usefulness) of the term 'Silk road' is vividly discussed today as mentioned by Susan Whitfield in this volume. From a scholarly point of view 'honorific designations' are not the goal. There may be good reason from a specific research point of view to talk, as for example Melanie Michailidis does, about a *Silk route* over East- and Central Asia, a *fur route* over what is now Russia and Ukraine over the Baltic Sea to Scandinavia, a *Mediterranean trading system* and a *route over the Indian Ocean* – where only the first mentioned route refers to silk – though this material at times formed part of the cargo along all these routes of transport.[21]

So, the decision to include the reference to 'Silk' in a Scandinavian context may open further questions – with global relevance – to be reflected upon. Here I will broaden the discussion of eastern Scandinavia and furthermore add archaeological field evidence from an Indian Ocean trading node (Sri Lanka) to further exemplify the proposed perspective. Almost the same geographical endpoints are found in Indian Ocean trade as on the Silkroadology map: West Asia/Eastern Mediterranean and Southeast- East Asia/China respectively but partly different goods are on route and there is a local history to unfold for every port of call and its hinterland.[22]

Each 'centre' has and had its 'periphery' without which it would not have existed. This is discussed by Eva Andersson Strand in this volume in relation to Birka regarding the requirements of raw material and man-hour investment e.g. to produce the woollen sails and the clothing and equipment required for a person on route during the Viking Age. In a global perspective, Birka was a small centre at the time – c. 1000 inhabitants at most – but it was the first urban-like environment in mid-eastern Scandinavia and as such is important to research in its own right when societal development and state formation in this part of the world is discussed. The macro-perspective of West Asian developments does not give a full picture of the societal development here. Further the 'periphery' may have its own networks bypassing the 'centre' and these networks are of interest to research in their own right as shown by Tong Tao in this volume in relation to types of silk found in western Tibet with parallels in Xinjiang.

Recent field research regarding another produce related to journeys in Scandinavia – tar – has been undertaken by Andreas Hennius. Tar was important, for example, for protecting wood used for boats and impregnating and sealing sails. Field evidence suggest that the organisation of tar production changed from being small-scale and located at the settlement site to becoming large-scale and located in the forested outlands during the eight century CE. Andreas Hennius concludes: "Intensified Viking Age maritime activities probably increased the demand for tar, which also became an important trade commodity. The transition to intensive tar manufacturing implies new ways of organising production, labour, forest management and transportation, which influenced the structure of Scandinavian society and connected forested outlands with the world economy."[23]

[21] M. Michailidis, "Samanid Silver and Trade along the Fur route," 317.

[22] The East African coast is included in discussions on Indian Ocean trade but not in the Silkroadology map. For the 'Trade routes map' at MFEA another published template was used to have the sea routes included.

[23] Andreas Hennius, "Viking Age tar production and outland exploitation," *Antiquity*, Volume 92, Issue 365 (2018): 1349–1361. This change from settlement located, small-scale production of forest related items to large-scale production sites located in the forested outlands during this period has been noted for other

Field research along a similar line was presented at the symposium by Karl-Johan Lindholm, who unfortunately did not have the possibility to contribute to this volume. However, the presentation of a research project that he leads at Uppsala university – C*ontesting Marginality: The Boreal Forest of Inland Scandinavia and the Worlds Outside, AD – 1500 AD* – can be quoted to indicate the research focus: "The project will challenge a prevailing view on the forested inland as marginal and situated outside the historical developments of Scandinavia. We forward the hypothesis that from early first millennium AD innovative, active and knowledgeable communities of the forested inland were socially and economically integrated into systems of trade and interaction with the worlds outside, which in turn became crucial components for Viking Age and early medieval state formation processes and early urbanisation."[24]

With this perspective in mind it might be easier to unfold, for example, the history behind the find of a millefiori (glass) bead of a specific, eastern, kind found in a Viking Age burial in the parish of Frösö, Jämtland situated in northern Sweden far from central places such as Birka.[25] Research in Sweden including outlaying lands can benefit from a long tradition of systematic archaeological surveys which has included both 'castle and cottage' and production sites. Linking up with the increased focus on archaeology of the primary fields of production in other parts of the world[26] could increase the potential for a more inclusive perspective on 'the Silk Routes' as that envisioned here.

One of the great potentials with a focus on the type of contact and communication that has been grouped under the term 'Silk Routes' is the possibility of switching perspective and becoming aware of how the world could have been perceived if one had ones base in a different geographical area. The first time I was introduced to the term as part of contemporary research was in 1990 in Sri Lanka. The Sri Lanka National Commission for UNESCO and the Central Cultural Fund (co-ordinating the archaeological and heritage work at five Sri Lankan World Heritage sites) had organised a "Maritime Silk Route seminar" and published the accompanying volume "Sri Lanka and the Silk Road of the Sea".[27]

The Silk Road as seen from a Sri Lankan perspective was a question of being 'right in the middle' as given by geography and as described by Senake Bandaranayke in the introductory note: "The 'Silk Road of the Sea' is a concept that refers to the main trade

types of forest related produce such as iron. As one of the first thoroughly treated field studies, see Eva Svensson, *Människor i utmark* [People in the Outland], Lund Studies in Medieval Archaeology 21 (Lund: Lund University, 1998).

[24] Karl-Johan Lindholm, C*ontesting Marginality: The Boreal Forest of Inland Scandinavia and the Worlds Outside, AD – 1500 AD* https://www.arkeologi.uu.se/Research/Projects/contesting-marginality/

[25] Johan Callmer, "The beginning of the East European trade connections of Scandinavia and the Baltic Region in the eighth and ninth centuries A.D.," 27 and map 4. Callmer shows that the area of production was the Abbasid Caliphate, probably south-west of the Caspian Sea/Persia and that this type of bead was transported along the Russian rivers.

[26] See for example Eva Myrdal, "Archaeological investigations, interpretations, and theories: The cases of Sri Lanka and Sweden compared," in *Methods in World History: A Critical Approach*, ed., Arne Jarrick, Janken Myrdal, and Maria Wallenberg Bondesson (Lund: Nordic Academic Press, 2016), 107–145. https://www.kriterium.se/site/chapters/10.21525/kriterium.2.e/

[27] Senake Bandaranayake, Lorna Dewaraja, Roland Silva, and K. D. G. Wimalaratne, eds. *Sri Lanka and the Silk road of the sea* (Colombo: The Sri Lanka National Commission for UNESCO and the Central Cultural Fund, 1990).

route or ocean highway – in fact, a network of transoceanic and costal maritime systems – extending from the Western Pacific rim (i.e. China, Korea and Japan) across Southeast Asia and the Indian Ocean, to the Arab World, to North and East Africa and the Eastern Mediterranean."[28]

Western historical sources combined with general references to finds of coins of foreign origin have long been used to sketch this broad picture, emphasizing the role of the Roman empire in initiating trade over the Indian Ocean. However, during the last thirty years archaeological field research has paid increasing attention to the issue and a different picture has emerged. Not surprisingly, it has been found, for example regarding Sri Lanka, that predating any evidence of contact with the Mediterranean world there was regional communication and exchange over the Indian Ocean, as well as communication from coastal to inland sites.[29]

Here, a short description of the ancient port site Mantai (Manthottam in Tamil sources, one of several identified coastal sites indicating communication over the Indian Ocean) on Sri Lanka's north-west coast will be given. As Birka it was an urban settlement used for import and export and for transhipment, though it was in use for a much longer period of time compared to Birka, from ca. 200 BCE and (according the ceramic evidence of Chinese and Middle Eastern ware) up to CE 1400, that is about a century before the Portuguese and other colonial powers obtained and defended their domination and control of oceanic trade. Recent archaeological research indicates that Mantai traded with the southern part of the Roman Empire, Western Asia and Afghanistan only through the intermediary of Indian ports such as Muziris in Kerala until ca 300 CE, but that a direct route seems to have developed from the fourth or fifth century. [30] The ceramic material shows communication with India (from the earliest levels),[31] China, Southeast Asia, and the area of present-day

[28] Senake Bandaranayake, "Introductory Note: Sri Lanka and the 'Silk Road' of the Sea," in *Sri Lanka and the Silk Road of the Sea*, ed., Bandaranayake et al, 9–10 (9).

[29] See for example Robin A. E. Coningham, Mark J. Manuel, and Jo Shoebridge, "Reconstructing networks of trade and exchange in the Indian Ocean during the Early Historic period: case studies from Anuradhapura (Sri Lanka)," in *Imperial Rome, Indian Ocean regions and Muziris. New perspectives on maritime trade*, ed., K. S. Mathew (London: Routledge, 2016), 31–52.

[30] See for example Ariane de Saxcé, "Local Networks and Long-distance Trade: The Role of the Exchanges between Sri Lanka and India during the Mediterranean Trade," in *Imperial Rome, Muziris and the Indian Ocean*, ed., K. S. Mathew (New Delhi: Manohar, 2015), 53–73; See also Eivind Heldaas Seland, "Archaeology of Trade in the Western Indian Ocean, 300 BC–AD 700," *Journal of Archaeological Research* 22:4 (2014): 367–402. https://www.academia.edu/6670046/Archaeology_of_Trade_in_the_Western_Indian_Ocean_300_BC_AD_700?email_work_card=view-paper; For the identification of Muziris in Kerala see for example K. P. Shajan, R. Tomber, V. Selvakumar, and P. J. Cherian, "Locating the ancient port of Muziris: fresh findings from Pattanam," *Journal of Roman Archaeology* 17 (2004): 312–320.

[31] The trade links between the Roman empire and Sri Lanka is mentioned in western historical sources and is attested to for example by the large amount of Roman coins (mainly from the fourth century CE and onwards) found in archaeological contexts in Sri Lanka, not least from Sigiriya. See for example Osmund Bopearachchi, "Some observations on Roman coins found in recent excavations at Sigiriya," *Ancient Ceylon Journal of the Archaeological Survey Department of Sri Lanka* 7:2 (1990): 20–37. For a critical review of the use of numismatics in Sri Lankan research on trade see Rebecca R. Darley, "'Implicit cosmopolitanism' and the commercial role of ancient Lanka," in *Sri Lanka at the Crossroads of History*, ed., Zoltán Biedermann, and Alan Strathern (London: UCL Press, 2017), 44–65. However, the ceramic finds from Mantai analysed up to now do not give evidence of contact with the Roman empire. There are finds of so-called Rouletted ware

Iran, Iraq and Arabia. [32] As Birka, Mantai had (at least partly) water-way access to its centre of political power and to its hinterland. In the case of Mantai it was through the Malwatu Oya (Aruvi Aru in Tamil) which flowed by the capital city of the Anuradhapura Kingdom[33] (500 BCE–CE 1017) to the coast near Mantai. As with Birka, one can follow imported items from the port to their site of consumption by elite groups outside. Innumerable examples can be given in the case of Sri Lanka but to give an example including research on raw materials and their source, the so-called torpedo jars[34] used for the transport of liquids can be mentioned. What they contained has not been identified, but wine has been suggested as one possibility. The jars were sealed by bitumen, and bitumen found on torpedo jars in the capital city of Anuradhapura (one of Asia's largest cities at the time) was identified as derived from what is now mid-west Iran, from Susa. [35]

Birka has its place in the history of the Christian church, mentioned in *Vita Anskarii*, the biography of Ansgar ("The Apostle of the North") by Bishop Rimbert in the ninth century.[36] In Mantai, Christianity was never a religion of the masses, but religions from the west were allowed to be practised as seen for example in the find of a Nestorian cross in Mantai,[37] and in Anuradhapura. [38] This reminds us of that Orthodox Christianity such as that from Byzantium and the church developing in Western Europe, were only two sects of the religion and that Christian faith at that time had a congregation of the Eastern Church

(found at many sites all over South and Southeast Asia), but previous claims for a Roman origin of this ware has been reconsidered in the light of more recent research. See e.g. Shahnaj Husne Jahan, "Rouletted Ware Links South and Southeast Asia," *SPAFA Journal* 20:3 (2010): 5–17. http://www.spafajournal.org/index.php/spafa1991journal/article/view/44/41

[32] Eleanor Kingwell-Banham, Wijerathne Bohingamuwa, Nimal Perera, Gamini Adikari, Alison Crowther, Dorian Q. Fuller, and Nicole L. Boivin, "Spice and rice: pepper, cloves and everyday cereal foods at the ancient port of Mantai, Sri Lanka," *Antiquity* Volume 92:366 December (2018): 1552–1570. https://www.cambridge.org/core/journals/antiquity/article/spice-and-rice-pepper-cloves-and-everyday-cereal-foods-at-the-ancient-port-of-mantai-sri-lanka/57A710C9438E73D78C21494A9E99A1E7

[33] C. W. Nicholas, "The Mannar district," in *Historical topography of Ancient and Medieval Ceylon*, Journal of the Ceylon Branch of the Royal Asiatic Society, New Series, Vol 4 Special Number rprt (1963): 74–82 (75). Archaeology has extensively widened the focus as compared to Nicholas' text which is based on Buddhist chronicles and inscriptions, thus emphasizing the political history of invasions and war.

[34] The area of origin of torpedo jars has been identified as Mesopotamia mainly during the Sasanian era and early Abbasid times. In Sri Lanka, this type of pottery has been found in e.g. Mantai, Anuradhapura, and Tissamaharama on the south coast of Sri Lankan. See for example Roberta Tomber, "Rome and Mesopotamia – importers into India in the first millennium AD," *Antiquity* 81:314 1 December (2007): 972–988 (980). https://www.cambridge.org/core/services/aop-cambridge-core/content/view/5C03182D74207F04BA23620DCB4F7B2C/S0003598X00096058a.pdf/rome_and_mesopotamia_importers_into_india_in_the_first_millennium_ad.pdf

[35] Robin Coningham, Mark Manuel, Christopher Davis, and Prishanta Gunawardhana, "Archaeology and cosmopolitanism in early historic and medieval Sri Lanka," in *Sri Lanka at the Crossroads of History*, ed., Zoltán Biedermann, and Alan Strathern (London: UCL Press, 2017), 19–43 (28). https://discovery.ucl.ac.uk/id/eprint/1557938/1/Sri-Lanka-at-the-Crossroads-of-History.pdf

[36] Charles H. Robinson, tr., *Anskar: the Apostle of the North 801–865, translated from the Vita Anskarii by Bishop Rimbert his fellow missionary and successor* (London: Society for Propagation of the Gospel in Foreign Parts, 1921), chapter xi. https://sourcebooks.fordham.edu/basis/anskar.asp

[37] John Carswell, "The excavation of Mantai," *Ancient Ceylon: Journal of the Archaeological Survey Department of Sri Lanka* 7:1 (1990): 17–28 (26).

[38] Robin Coningham et al, "Archaeology and cosmopolitanism in early historic and medieval Sri Lanka," 27.

as well, with its centre in Mesopotamia.[39]

Mantai was also a centre for production. There is evidence for large-scale manufacture of glass- and stone beads and shell-bangles at the site as well as remains of iron and iron slag. [40] The site awaits to be more thoroughly excavated, so this field of enquiry – what type of production, from where and through which groups did the raw-material reach Mantai, how the work was organized and who the expected consumers of the goods were (one must recall that inland trade was also conducted) – is a question for the future. Much of what the historical sources mention as export- or transhipment items in relation to Sri Lanka were perishable goods such as spices. Modern research has broadened the focus to include bulk shipments of food items such as grain. From Mantai there is now evidence of an abundance of botanical species representing import, maybe export and transhipment as well as the food culture on site: rice, millets, lentils, urd- and mung beans, wheat (imported), grapes (probably arriving as a dried product), cloves (*Syzygium aromaticum* for import or transhipment as it grow on the Maluku Islands, in Indonesia), and black pepper (*Piper nigrum* growing wild and gathered in the Malabar Ghats, India and later in history cultivated in India and Sri Lanka). [41] Research has just begun in South and Southeast Asia to understand the relationship between forest dwellers and peasants involved in gathering and production and the groups involved in trading the produce, and how this developed through history into the period of colonial occupation.[42] We recognize the issues from research on resource extraction in the Scandinavian forest areas as exemplified above.

To conclude my arguments for research along the inclusive Silk Routes, one more Sri Lankan example will be given. Between 1988 to 1994 a joint Sri Lankan-Swedish group of archaeologists and students worked in the Dry Zone north of the central highlands.[43] The task given was to put the fifth century CE Sigiriya palace, gardens and presumed urban area into context and we undertook inventories of settlement locations and production sites in the scrub-jungle-covered outlaying lands. At Sigiriya itself three different types of garden architecture had been documented, indicating an awareness among the Sri Lankan elite (maybe through their architects) at that time of both western garden traditions (not least the contemporaneous Sasanian) and eastern traditions of East Asia/China – but utilising also their engineers´ indigenously developed knowledge of hydraulic engineering in the execution of the work.[44]

[39] On loan from Henan, the exhibition "Cosmopolitan Metropolis" featured a Church-of-the-East Stele dated to 815 and unearthed from the Luoyang area. See Michel Lee, *Cosmopolitan Metropolis*, 97.

[40] John Carswell, "The excavation of Mantai," 27.

[41] Eleanor Kingwell-Banham et al, "Spice and rice," 1565–1566.

[42] See for example Eleanor Kingwell-Banham, and Dorian Q. Fuller, "Shifting cultivators in South Asia: Expansion, marginalisation and specialisation over the long term," *Quaternary International* 249, 6 February (2012): 84–95; Kathleen Morrison, "Pepper in the hills: Upland–lowland exchange and the intensification of the spice trade," in *Forager-Traders in South and Southeast Asia: Long-Term Histories*, ed., Kathleen Morrison, and L. Junker (Cambridge: Cambridge University Press, 2002), 105–128.

[43] Senake Bandaranayake, "Approaches to the Settlement Archaeology of the Sigiriya-Dambulla Region," in *The Settlement Archaeology of the Sigiriya-Dambulla Region*, ed., Senake Bandaranayake, Mats Mogren, and Seneviratne Epitawatte (Colombo: Postgraduate Institute of Archaeology, 1990), 15–38.

[44] Senake Bandaranayake, "Sri Lanka's contribution to Asian garden history: The Royal Gardens at Sigiriya and Anuradhapura," *Ancient Ceylon: Journal of the Archaeological Survey Department of Sri Lanka* 10:4 (1990): 41–58 (54). Mentioning parallels with early Egypt, Rome, and contemporaneous Persia, Bandaranayake em-

During the survey many large iron production sites were found, one of them later partly excavated and dated to between the second century BCE to the third century CE.[45] Iron and steel are known from west Asian sources to have been imported from Sri Lanka.[46] However, this field of production is not mentioned in the Buddhist chronicles or in inscriptions and as an archaeological feature it had been out of focus of research. Despite the spectacular amount of iron that had probably been produced, and the impact iron production at that scale must have had on the natural environment and the questions this raises regarding who controlled the resources and the labour and how the produce was distributed and made available for trade it seem to still not to be in the forefront of archaeological research in Sri Lanka. Two fields of enquiry related to archaeological remains in the area could be opened with a Silk Routes perspective: on the one hand how knowledge of the different traditions of garden culture (and also e.g. ceramics and beads and coins originating outside of the island) consumed by the elite reached the inland dry zone of Sri Lanka, and on the other the production of raw material such as iron and steel with the above mentioned questions in mind.

The vision I had for the *Asia and Scandinavia* symposium in 2015 was not the perspective of world history with its centre and periphery transformed into maps but disguised in the trendy term 'Silk routes'. With the examples given here and, above all, of what can be obtained from the articles in this volume one can discern that an inclusive type of historical research can develop when starting to cross present-day borders with a question of communication in mind, such as when trying to follow a specific type of raw-material to its source as in Guo Wu's paper on amber artifacts excavated in China or if the transmission of specific types of technology is being researched as exemplified by Janken Myrdal in relation to the plunge churn, the wheel-barrow and a very effective type of mouse-trap. All authors of this volume have crossed borders – but accompanied by specific source material related to space and time as the necessary basis, as well as acknowledging that humans in their specific social roles were always the agents. This is not least visible in Susan Whitfield's text on the history of the Silk Road-term itself and its contemporaneous wobble between actors with overarching interests, popular imagination, and research.

The initiative of connecting Viking Age Birka to the Silk Routes was born out of an inward-looking concern, mentioned above, but doing so also highlighted the fact that communication over the Eurasian continent during the eighth to tenth centuries CE didn't stop in the west at the river Volga, Constantinople, and Alexandria (as shown on the inside front

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phasises the indigenous perspective. For a more detailed description of the gardens see Senake Bandaranayake, "Sigiriya: City, Palace and Royal Gardens," in *The Cultural Triangle of Sri Lanka* (Colombo: UNESCO Publishing/CCF, 1993), 112–135. Osmund Bopearachchi has drawn parallels to the Achaemenid gardens of Cyrus in Pasargadae and the subsequent development in Sasanian time: Osmund Bopearachchi, *The pleasure gardens of Sigiriya: a new approach* (Colombo: Godage Book Emporium, 2006), 35–36.

[45] Svante Forenius, and Rose Solangaarachchi, "Dehigala-ela-kanda (KO. 14) at Alakolaväva: An Early Iron Production Site with a highly Developed Technology," in *Further Studies in the Settlement Archaeology of the Sigiriya-Dambulla Region*, ed., Senake Bandaranayake, and Mats Mogren (Colombo: Postgraduate Institute of Archaeology, 1994), 134–142.

[46] Gillian Juleff, *Early iron and steel in Sri Lanka: A study of the Samanalawewa area*, AVA Materialen, band 54 (Mainz am Rhein: Verlag Philipp von Zabern, 1998).

cover map of Valerie Hansen's up-to-date history of the Silk Road)[47] or the coast of the Italian peninsula as in the Silkroadology map. The fact that silk (produced mostly outside of China as exemplified in this volume) was imported to Scandinavia, as evidenced in the elite burials, was the clue. Though I do not argue for the *necessity* of using the designation 'Silk Routes' in a Scandinavian context, I note that research crossing borders, but keeping its human dimension of time and space and historical specificity, has been conducted all over Afro-Eurasia in recent decades under this heading (only a few examples have been given here). And the term 'Silk Routes' has covered a broader field of communication than 'trade' which has a focus on a specific form of communication. And accompanying this type of historical research is the linking up across borders in present time – no single researcher can acquire all the necessary specific knowledge of sites, source material and specific language skills. I therefore hope that the authors' extensive bibliographies will be of use for future research.

A few editorial notes should be added here at the end in relation to the articles of this volume. It is obvious that authors wish to go through papers presented several years before publication and they have been given this opportunity resulting, in some cases, in updated references and texts in the light of later research (apart from the initial reflections based on peer-reviewers' remarks). Regarding bibliographies we decided on including internet links to published and printed material that had subsequently been digitized along the reference in the bibliography itself (increasing the accessibility of the material globally) whereas material that has been published on the internet only is listed separately as "Online resources." We further decided to keep the order 'surname – given name' of Chinese, Japanese, and Korean authors also in the footnotes if this is how their names are usually referred to.

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[47] Valerie Hansen, *The Silk Road*, inside front cover.

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The Expanding Silk Road: UNESCO and BRI

by
Susan Whitfield

Generally — although mistakenly — first attributed to an 1877 publication by Baron Ferdinand von Richthofen (1833–1905), a German geographer with commercial interests in a proposed railway to connect Europe and China, the term 'Silk Road' is now commonly encountered both inside and outside academia.[1] Yet it was hardly known until a few decades ago. Like many abbreviations, it is not strictly descriptive—as James Millward points out, "neither silk nor a road." (I would be inclined to rephrase this as "not only silk and not only a road.")[2] Nor should it be interpreted as restricting the discussion to the relations between two points, China and Rome, East and West, though it is often popularly presented in this dichotomous way.[3] Lands (and seas and rivers) in between are just as much part of the story

[1] Matthias Mertens has recently shown that the term was used in German literature prior to this. See "Did Richthofen Really Coin 'the Silk Road'?" *The Silk Road* 17 (2019 [2020]). Chin discusses the adoption of the term by Sven Hedin and the start of its wider usage from the 1930s. See Tamara Chin, "The Invention of the Silk Road, 1877," *Critical Inquiry* 40.1 (Autumn 2013): 194–219. Also see Daniel C. Waugh, "Richthofen's 'Silk Roads': Toward the Archaeology of a Concept," *The Silk Road* 5.1 (2007): 1–10 and "Sven Hedin and the Invention of the Silk Road," (paper presented at the Sven Hedin and Eurasia symposium, Stockholm, Sweden, Nov. 10, 2007). The term started coming into general usage in Europe and the United States in the late 1980s, as I showed in a previous discussion, Susan Whitfield, "Was There a Silk Road?" *Asian Medicine* 2 (2007): 201–213.

[2] James A. Millward, *The Silk Road: A Very Short Introduction* (Oxford: University Press, 2013), 3. Bloom has argued for 'Paper Road' on the grounds of its influence, Jonathan M. Bloom, "Silk Road or Paper Road?" *The Silk Road* 3.2 (2005): 21–26. I have no problem with the term "road" or "roads," taking them in a broad sense to mean marked routes along which people and goods travel. But we have also to take into account routes across the steppe, which might not follow any single route, and routes across the sea.

[3] Dichotomies simplify our view of a complex world and are therefore always seductive, if inevitably misleading and distorting. See Victor Lieberman, "Transcending east-west dichotomies: State and culture formation in six ostensibly disparate areas," *Modern Asian Studies* 31:3 (1997): 463–546 and Susan Whitfield, "The Perils of Dichotomous Thinking: Ebb and Flow Rather than East and West," in *Marco Polo and the Encounter of East and West* (papers presented at a conference, University of Toronto Humanities Centre, May 2002), ed., Suzanne Akbari, and Amilcare A. Iannucci (Toronto: University of Toronto Press, 2008), 247–261. Chin discusses how Hedin stated this dichotomy in his vision of a new Silk Road: "It should unite two oceans, the Pacific and the Atlantic; two continents; two races, the yellow and the white; two cultures, the Chinese and the Western," Chin, *The Invention of the Silk Road*, 217, quoting Sven Hedin, *The Silk Road*, trans., F. H. Lyon (New York: E. P. Dutton 1938), 223, 233, 234. The background to the UNESCO interest in the Silk Road, discussed below, is firmly based within a dichotomous framework, as discussed by Laura Elizabeth Wong, "Relocating East and West: UNESCO's Major Project on the Mutual Appreciation of Eastern and

(Central Asia; South, Southeast, and West Asia; Africa), all involved in the interregional movement of goods and ideas.[4] The Silk Road story cannot be told without their involvement, yet, despite their geographical centrality, they have often been treated as peripheral to the empires on their borders.[5]

While the term 'Silk Road' has now become ubiquitous, some scholars have argued recently for its rejection because of these simplifications and because of its use in a more widespread popular context.[6] The adoption of the term, its original scope and challenges to it have been explored elsewhere and will not be repeated here.[7] If I had to give a short working definition it would be along the following lines:

'A system of substantial and persistent overlapping and evolving interregional trade networks across Afro-Eurasia by land and sea during the first millennium CE and beyond, trading in silk and many other raw materials and manufactured items — including, but not limited to, slaves, horses, semi-precious stones, metals, musk, medicines, glass, furs — resulting in movements and exchanges of peoples, ideas, technologies, faiths, music, dances, languages, scripts, iconographies, stories etc.'

At a conference concerning communication at two geographical extremes of the Afro-Eurasian land and sea routes, I want here to consider the background to the current scope of scholarship on the pre-modern 'Silk Road' — the term's expansion: that is, the trend for the term to be used to encompass more and more areas — geographic, chronological and thematic. An example of this is the conference which gave rise to this publication: "Asia and Scandinavia: New Perspectives on Early Medieval Silk Roads," which deliberately placed Scandinavia on the 'Silk Road'.[8] An important part of this background is the growing

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Western Cultural Values," *Journal of World History* 19.3 (2008): 353–358.

[4] Including silk, since it was only in the early centuries of Silk Road history that China maintained the monopoly on cultivated silk production. It had spread into Central Asia by the first few centuries CE. For a summary of the development of silk production along the Silk Road see Susan Whitfield, *Silk, Slaves and Stupas: Material Culture of the Silk Road* (Oakland: University of California Press, 2018), Chapter 8.

[5] There is also the issue of being labeled a 'peripheral' trading partner in the framework of World Systems Theory. This is not something I explore here but see the papers in Kristian Kristiansen, Thomas Lindkvist, and Janken Myrdal, eds., *Trade and Civilization in the Pre-Modern World* (Cambridge: Cambridge University Press, 2018), for discussion and alternative models. The issue with using 'periphery' is that it assumes a core and is, even if meant descriptively—as in geographical terms—a loaded term.

[6] In Warwick Ball's words, it has "become both a band wagon and a gravy train," in *The Monuments of Afghanistan: History, Archaeology and Architecture* (London: I. B. Tauris, 2007), 80. Hugh Pope calls it "a romantic deception," in "The Silk Road: A Romantic Deception?" *The Globalist* (24 November 2005). See also Khodadad Rezakhani, "The Road That Never Was: The Silk Road and Trans-Eurasian Exchange," *Comparative Studies of South Asia, Africa and The Middle East* 30.3 (2010): 420–433 and M. G. Raschke, "New Studies in Roman Commerce with the East," in *Aufstieg und Niedergang der Romanischen Welt* 2.9 (Berlin and New York: de Gruyter, 1978): 604–1378. Nagasawa Kazutoshi notes that it was used for "many vulgar books which offended academic people," in "Silk Road Studies in Japan: its history and present situation" (International Seminar for UNESCO Integral Study of the Silk Roads: Roads of Dialogue, Osaka, Japan, 1988).

[7] See Susan Whitfield, *Life Along the Silk Road* (Oakland: University of California Press, 2015), Introduction, for a recent discussion.

[8] I included a new chapter concerning the Volga, Don and Dneiper routes from Central Asia to northern Europe in the revised edition of my book *Life Along the Silk Road*, published in 2015 (as well as a chapter about the Indian Ocean routes from East Africa). This was a deliberate decision, in part made with the intentions to try to bring more general attention to these areas.

exploitation of the 'Silk Road' theme in the politico-cultural context, namely the adoption of the term by UNESCO. I concentrate here on the Japanese involvement in this agenda and their concern to make sure that the middle and the ends of this system are not neglected: namely, Central Asia and Japan.

I have neither space here nor expertise to explore in any detail the complexities of the interplay of culture, scholarship, politics and economics, but this paper takes such interplay as given. While scholars can roam beyond parameters set by political and economic agendas, it would be naïve to believe that politics and economics have no impact on scholarship. This holds both for countries closer to the ideal of an independent academe to those where academics are often in thrall to political whim. In terms of this interplay and the expanding Silk Road over the past half-century, the role of UNESCO is certainly relevant.[9]

Before turning to this, there are two points worth noting about the early use of the term. Both von Richthofen, an early coiner of the phrase, and Sven Hedin (1865–1952), its populariser, had concerns beyond the scholarly. Richthofen was funded by European and American corporations to undertake geological surveys to assess the most suitable route for a cross-Eurasian rail route.[10] His personal scholarship was tracing the routes from Balkh (present-day northern Afghanistan) to the old Chinese capital Chang'an (Xi'an) based on accounts in Ptolemy, Marinus of Tyre and the Chinese histories.[11] So from the start we have a potential tension between the economic and political concerns of two major powers — Europe and China — and the Central Asian focus of scholarship.

When the explorer Sven Hedin wrote the introduction to his book *The Silk Road* in the early 1930s, it was against a background where foreign exploration of north-western China was becoming increasingly difficult. One of his intentions was diplomatic, to persuade the Chinese authorities to let him continue his work. This was successful, certainly in large part because the work continued as a Sino-Swedish collaboration, the Chinese archaeologist, Huang Wenbi (1893–1966), joining the team. However, as Tamara Chin notes, this diplomatic need led Hedin to crediting the Chinese with opening of the 'Silk Roads' when he wrote:[12]

"In the year 138 B.C., the great Emperor [Wudi], of the older Han dynasty, sent an embassy of a hundred person, headed by [Zhang Qian], to modern Ferghana..."[13]

This has remained a persistent part of the narrative since this time.[14]

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[9] I use 'UNESCO' here advisedly as, of course, its decisions are those of its members. For general histories of UNESCO see Fernando Valderrama, *A History of UNESCO* (Paris: UNESCO, 1995) and J. P. Singh, *United Nations Educational, Scientific and Cultural Organization (UNESCO): Creating norms for a complex world* (London and New York: Routledge, 2011).

[10] He was prescient when he noted: "Little doubt can exist that, eventually, China will be connected with Europe by rail..." *Baron Richthofen's Letters, 1870–1872* (Shanghai: North China Herald Office, 1903), 151–152.

[11] See Chin, "The Invention of the Silk Road," for a detailed discussion of this.

[12] Ibid.

[13] Sven Anders Hedin, *The Silk Road*, trans., F. H. Lyon (New York: E. P. Dutton 1938, rpt. London and New York: Tauris Parke Paperbacks, 2009), 223.

[14] Any single episode such as this, even if a factor, cannot by itself account for the rise of a complex system such as the Silk Road and to ascribe it this role, as do most popular and even some academic books, is misleading and unhelpful.

UNESCO was founded a decade later, in 1946, and was from the start interested in the historic and cultural links across Afro-Eurasia, although framing this in dichotomous terms—East/West, Orient/Occident.[15] In 1951 it convened the Plenary Session of a symposium in New Delhi, entitled "Concept of Men and Philosophy of Education in East and West." In his closing address, Jawaharlal Nehru (1889–1964), then Prime Minister of India, expressed his dismay at the dichotomous nature in which this agenda was expressed: "I have always resisted this idea of dividing the world into the Orient and the Occident."

His opinion was not the consensus however and a ten-year major project followed in 1956 on the "Mutual Appreciation of Eastern and Western Values." The joint-declaration argued for an understanding of the exchanges between east and west based on history.[16] The project was promoted by the Indian and Japanese members, the Japanese remaining active.[17] In 1957 at the "International Symposium on the History of East West Cultural Contacts," the Japanese National Commission to UNESCO presented a survey of the extensive Japanese scholarship in this field. The term 'Silk Road' was noted in this report to name "the international route of ancient times that passed through this area [Central Asia] from east to west."[18] It credited the German geographer Albert Herrmann (1886–1945) with the name.

Herrmann had researched the course of the Silk Road for his doctoral degree in Germany, publishing this work in 1910 as *Die alten Seidenstrassen zwischen China und Syrien: beiträge zur alten geographie Asiens.*[19] This was translated into Japanese in 1944 using the term 古代絹街道 for 'Silk Road'. This was read as *Shiruku rōdo* (シルクロード) in its romanised (*katakana*) form.[20]

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[15] As Wong points out, this dichotomy was found in the 1946 publication of UNESCO's first Director General, "Relocating," 353.

[16] UNESCO General Conference Resolution 4.81, Ninth General Conference, 1956. For the political background leading to this and a fuller discussion see Wong, "Relocating". I am indebted to her work for this summary.

[17] Not so much the Indians who, as Wong notes, became distracted by border wars, "Relocating," 353.

[18] Japanese National Commission for UNESCO, *Research in Japan in History of Eastern and Western Cultural Contacts: its development and present situation* (Tokyo: UNESCO, 1957), 6.

[19] Albert Herrmann, *Die alte Seidenstrassen zwischen China und Syrien: beiträge zur alten geographie Asiens* (Berlin: Weidmannsche Buchhandlung, 1910). His supervisor was Hermann Wagner (1840–1929), who had corresponded with von Richthofen (archive of letters in the Leibniz-Institute für Läanderkunde, https://www.ifl-leipzig.de/fileadmin/user_upload/Bibliothek_Archiv/Archiv_Findb%C3%BCcher_PDF/Richthofen.pdf). Herrmann and Hedin also knew each other: Herrmann contributed to volume 8 of Hedin's series on the geography of Southern Tibet ("The Ts'ungling Mountains," *in Southern Tibet: discoveries in former times compared with my own researches in 1906–1908*, vol. 8, part 1 (Stockholm: Lithographical Institute of the General Staff of the Swedish Army, 1917). This term was picked up by others, including the contemporary explorer, Marc Aurel Stein (1862–1943), who used it in a letter to Herrmann in 1926: "As I have had occasion to turn my attention again to matters concerned with the ancient 'silk route' I should be very grateful if you could kindly let me know whether you have followed up your very useful publication of 1910..." (Dated 23 Aug. 1926, Bodleian Library, MSS. Stein 84). However, this is a rare use of the term by Stein.

[20] Translated by Yasutake Osamu and published as *古代絹街道：パミール高原ルートの研究 (Shiruku rōdo: pamīru kōgen rūto no kenkyū)* (Tokyo: Kasumigasekishobō, 1944). Thanks to Selçuk Esenbel who alerted me to this reading and to the reference in Katayama Akio, "Shiruku Rōdogaku no kyō," ("The Present day of the Silk Road Studies") in *Aija Yugaku (Intriguing Asia)*, Special Edition: *Shiryō ni miru saishin chūgokushi*, vol. 96 (Tokyo: Benseisha, Feb 2007): 63. For more detail see Selçuk Esenbel, ed., *Japan on the Silk Road: Encoun-*

This interest was not new: as the 1957 report makes clear, the desire to search for the roots of Japanese culture in China, India and Central Asia had driven the expeditions of Count Ōtani earlier in the century.[21] Post-war this interest revived.[22] Reports of European explorers contemporary with Ōtani, such as Sven Hedin, were translated into Japanese using various terms for 'Silk Road'.[23] By the 1960s, however, the transliterated term *Shiruku rōdo* had become the most common.

The Japanese report of 1957 made a division into three intercultural routes between east and west—steppe, oasis and maritime. It stressed the importance of Central Asia, noting that "it should not merely be interpreted as a 'corridor' between China and Western Asia."[24] Also, in a point possibly picked up from Herrmann's work, it argued that the contact with the steppe and the Tibetan plateau were "equally as, or even more remarkable, than contact with China." One of the stated aims of the report was to broaden the 'Silk Road' to challenge "the traditional self-superior attitude of the Chinese."[25] At this time China, represented by Taiwan, was not active in UNESCO.

UNESCO followed up the concerns on the lack of visibility of Central Asia with a pilot project in 1966 "to make better known the civilizations of the peoples living in the regions of Central Asia through studies of their archaeology, history, languages and literature."[26] In 1976 it agreed a major research and publication project, "History of the Civilisation of Central Asia". A committee was formed, and the first volume appeared in 1992. In his preface, the Director-General of UNESCO, Federico Mayor, noted that Central Asia "tended to be excluded from the main focus of historical attention."[27]

Following two decades when attention was elsewhere, UNESCO returned to the theme of intercultural dialogue across Eurasia with another ten-year project, "Integral Study of the Silk Roads: Roads of Dialogue", starting in 1988. Given the growth of the term 'Silk Road' in scholarship and literature by this time, especially in Japan and China, it is not

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ters and Perspectives of Politics and Culture in Eurasia (Leiden: Brill, 2018).

[21] For a summary of the Japanese expeditions see the International Dunhuang Project, "Japanese Collections: The Ōtani Explorations in Central Asia." http://idp.bl.uk/pages/collections_jp.a4d

[22] For a summary of Silk Road studies in Japan see Katayama, "Shiruku Rodagaku" and Nagasawa, "Silk Road Studies."

[23] Hedin's work was translated as early as 1939 by Takayama Yōkichi with the title: 赤色ルート踏破記. (Walking Along the Red Route), Tokyo: Ikuseisha, Shōwa 14. Incidentally, the term 'red route' was one used earlier in the century to refer to a proposed railway through British territory in Canada to link to routes to Asia, the 'red' referring to Britain in this case, see R. Douglas Francis, Richard Jones and Donald B. Smith, *Journeys: A History of Canada* (Boston: Cengage, 2009), 284. More pertinent perhaps is its use in the title of a Japanese book, published in 1938 by the political organisation Shinminkai (新民会) that had been founded in occupied North China with Japanese support (民衆把握戦ニ於ケル「支那赤色ルートノ概況」. (Beiping: Xin min hui zhong yang zhi dao bu diao cha ke, Minguo 27 [1938]).

[24] The term corridor continues to be used in UNESCO and is now commonly found in the discussions of China's 'Belt Road Initiative' (BRI). See below.

[25] Japanese National Commission, *Research*, 8.

[26] Approved at the fourteenth session of the UNESCO General Conference in November 1966. See Mohammad S. Asimov, "Description of the Project," in *History of the Civilizations of Central Asia: Volume 1: The Dawn of Civilization: Earliest Times to 700 B.C.*, ed., A. H. Dani, and B. M. Masson (Paris: UNESCO Publishing, 1992), 11.

[27] See Ibid., Frederico Mayor, 'Preface'.

surprising that this project used the term to replace the previous east-west dichotomy, but it retained the Japanese division into the three routes — steppe, oasis and maritime.[28]

Tourism to foreign countries in Japan, restricted in the post-war period, was fully liberalised from 1964 and grew throughout the 1970s.[29] But political events in China made travel there difficult at this time. However, by the 1980s Japanese had started travelling to sites in north-western China, many inspired by the ten-part documentary, "The Silk Road". This aired in 1980, jointly produced by the Japanese and Chinese national broadcasters. Among these early travellers was Hirayama Ikuo (1930–2009), a collector and painter of Silk Road themes. He became a UNESCO Goodwill Ambassador in 1989.

China started at this time to play a major role. Although they had been a founder member of UNESCO in 1946, Taiwan represented China at the UN from 1949 and it was only in 1971 that the People's Republic of China was declared the lawful representative. However, it did not engage in UNESCO cooperation until 1978. This followed a meeting between the UNESCO Director General and Deng Xiaoping.[30] Over the next decade China started cooperation on numerous projects, including the Silk Road documentary. When the Silk Roads Dialogue was established, China hosted its first conference and expedition and has remained active.[31]

The publication and 'Integral Studies' projects involved hundreds of scholars and conferences in nineteen countries, so further promoting the 'Silk Road' concept.[32] But a publication in 2004 of a report by UNESCO to assess the representation of World Heritage sites noted that "in spite of its remarkable historical background and numerous historic/cultural sites in the sub-region, Central Asia remain one of the most under-represented regions on the World Heritage List."[33] And it was during this period that the idea was raised of a transnational nomination inscription of the 'Silk Road' as a World Heritage

[28] Luce Boulnois's (1931–2009) book *The Silk Road* (first published in France in 1963 and translated into English in the same year) was translated into Chinese in 1982. (Interestingly, its 1964 German translation was entitled *Die Strassen der Seide* not *Die Seidenstrasse*). For a brief review of the terms used during this period see Whitfield "Was there a Silk Road?". Other routes were added by the time of the 1988 project, including the Buddhist route. The East-West dichotomy, unfortunately, continues to appear.

[29] Nobukiyo Eguchi, "A Brief Review of Tourism in Japan after World War II," *Journal of Ritsumeikan Social-Sciences and Humanities* 2 (March 2009): 141–153. www.ritsumei.ac.jp/acd/re/k-rsc/hss/book/pdf/vol02_10.pdf. The Olympic Flame for the 1964 Tokyo games was transported via the Silk Road.

[30] It was Deng Xiaoping's visit in 1978 to Japan that also led to the Sino-Japanese collaboration on the TV documentary, "The Silk Road." See NHK, "The Silk Road," 50 Years of NHK Television, 20. http://www.nhk.or.jp/digitalmuseum/nhk50years_en/history/p20/index.html

[31] The conference was held in Dunhuang in August 1990. The publication UNESCO, *Integral Study of the Silk Roads: Roads of Dialogue: Newsletter* started in 1991.

[32] The Silk Road project resulted in 429 academic papers being presented in nineteen countries, see Vadime Elisseeff, *The Silk Roads: Highways of Culture and Commerce* (New York and Oxford: Berghahn Books and UNESCO Publishing, 2000), 17.

[33] UNESCO, "UNESCO Sub-regional Workshop on the Serial World Heritage Nomination of the Silk Roads," 2–5 June 2008, http://whc.unesco.org/en/events/493/.

site.[34]Consultation meetings were held between 2005 and 2009.[35] The "Concept Document for the Serial Nomination of the Silk Roads in Central Asia and China" was adopted in Dushanbe in 2007, and an action plan was developed during the first meeting of the Coordinating Committee for the Silk Roads Serial Nomination in Xi'an (November 2009). This last meeting identified a need for a thematic study and this was commissioned by ICOMOS in June 2010, to "consider whether a case could be made for considering the Silk Roads as a collection of World Heritage properties, linked by a concept, rather than one World Heritage property."[36] This was funded by China, and published in 2014.[37] The report used the framework of nodes-corridors-sections, seeing "civilisation as territorial output of the flow of goods and people and the encounter of ideas" with sections of "nodes" linked by "corridors of movement".

The term 'corridor' had been criticised by the Japanese in their 1957 report as potentially distracting attention from the cultures along these 'corridors' in favour of the 'nodes' they joined. The authors of the 2014 report addressed this by stating that the corridor "takes a form of surface with its overall value outweighing the sum of the nodes".[38] These corridors "of movement and impact" could become the basis for serial nominations by two or more states.[39] In the same year, the first Silk Road serial nomination was inscribed, namely the Chang'an to Tianshan corridor, covering China, Kazakhstan and Kyrgyzistan.[40] Others are now under consideration and preparation.

Japan, which had been so active at the start of the process, continued to play a role. One of the signatories of the letter calling for the inscription of the 'Silk Road' as a World Heritage site was Hirayama. As well as travelling much of the Silk Road and using it to inspire his own paintings, he funded cultural heritage projects at Dunhuang, Bamiyan and elsewhere, as well as offering fellowships to Silk Road scholars. He established the "Institute for Silk Road Studies" in Kamakura 1990 which encouraged scholarship through research projects, conference and an academic journal. The Institute was closed in 2004 but Hirayama then opened the Silk Road Museum to display his collections and own paintings.[41]

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[34] F. Jing, and R. van Oers, *UNESCO Mission to the Chinese Silk Road as World Cultural Heritage Route. A systematic approach towards identification and nomination, from 21–31 August 2003* (Paris: UNESCO, 2004). For a more detailed summary of this background see Tim Williams, *The Silk Roads: an ICOMOS Thematic Study* (Paris: ICOMOS, 2014), 2–5.

[35] Almaty (November 2005, Kazakhstan), Turpan (August 2006, China), Samarkand (October 2006, Uzbekistan), Dushanbe (April 2007, Tajikistan), Xi'an (June 2008, China) and Almaty again (May 2009), Williams, *The Silk Roads*, 3.

[36] Tim Williams, "Mapping the Silk Roads: for the UNESCO transnational serial nomination project" (paper presented at Archaeology of the Southern Taklamakan: Hedin and Stein's Legacy and New Explorations, The British Library and SOAS, 8–10 November 2012).

[37] Williams, *The Silk Roads.*

[38] Ibid., 27–28. In the UNESCO Silk Road bids, everywhere is a corridor. But contrast this to the BRI discourse, which uses corridors in the old sense—simply as links between two places of importance, China always being one of these places.

[39] Fifty-four such 'corridors' have currently been identified. At present, these are land corridors—the maritime routes are not part of this initiative.

[40] UNESCO, "The Silk Roads: the Routes Network of the Chang'an-Tianshan Corridor," *World Heritage List* 1442 (2014). http://whc.unesco.org/en/list/1442

[41] Hirayama Ikuo, *Silk Road Museum.* http://www.silkroad-museum.jp/english/

As mentioned above, in their report of 1957, the Japanese had discussed the tendency for early scholarship in Japan to centre on China. The emphasis in the report on the importance of the steppe and of Central Asia was clearly an attempt to 'reorient' scholarship from what was seen as a Sino-centric bias. This concern continued. In 1989 the Japanese government deposited funds in UNESCO: "The Japanese Funds-in-Trust for the Preservation of the World Cultural Heritage." These have been used for various projects connected with the Silk Road, notably two to help Central Asian countries prepare the UNESCO documentation for their corridor bids.[42] In fact the 2003 Mission to China had considered a case study proposing that the initial nomination came from China alone.[43] However, after the 2006 Mission, the recommendation had changed to a transnational nomination within a timescale of two to three years. The nomination did not appear, and the first Japanese funding was given in 2011 to assist the Central Asian countries in this process, leading to the first transnational inscription in 2014.

However, Japan is not itself currently part of any of the proposed 'Silk Road corridors', despite its attempts to get Nara accepted as the eastern end.[44] It continues to try to stress Japan's role in the UNESCO activities seen for example, in a 2014 conference which included a keynote lecture on "Japan's Contribution to the Inscription of the Silk Roads as a World Heritage Site" and a panel discussion on "The Silk Roads and Japan."[45] It also continues a very active programme of scholarship to support this process.

China, meanwhile, has also embraced the Silk Road concept, realizing its political and economic potential for orienting itself as a modern world power. In 2013, the year before its Silk Road nomination was inscribed, China announced its own initiatives, "The New Silk Road Economic Belt" and "The 21st Century Maritime Silk Road." These are now known as the "Belt Road Initiative" (BRI).[46] China declared BRI a central focus of foreign

[42] UNESCO, "Silk Roads World Heritage Serial and Transnational Nomination in Central Asia: A UNESCO/Japanese Funds-in-Trust Project," http://whc.unesco.org/en/activities/825/ and a follow up, "Support for Silk Roads World Heritage Sites in Central Asia (Phase II)," http://whc.unesco.org/en/activities/870/

[43] See Jing and Oers, *UNESCO Mission*. Interestingly this considered the Xi'an to Kashgar route and proposed a conservation management plan for Kashgar. When China joined in a transnational nomination, the route nominated bypassed Kashgar, avoiding recent debate about its conservation. See Yan Haiming, "World Heritage and National Hegemony: The Discursive Formation of Chinese Political Authority," in *A Companion to Heritage Studies*, ed., William Logan, Miread Nic Craith, and Ullrich Kocel (London: John Wiley and Sons, 2015), 229–242 (235–8).

[44] The decision to make Xi'an in China the eastern end was made at the 2007 "International Symposium for the Serial Nomination for the Silk Roads to the World Heritage", held in Xi'an. A Japanese report notes "unfortunately, Nara was excluded from this Silk Roads in the nomination. From the side of Japan, it is considered quite essential to keep discussing, in the nomination process, the geographical and historical definitions of the Silk Roads." See Yamauchi Kazuya, "International Symposium for the Serial Nomination for the Silk Roads to the World Heritage," *Tobunken Monthly Report* 11 (2007). http://www.tobunken.go.jp/materials/ektauthor/yamauchi-kazuya. The 2014 ICOMOS report recommends further work on drawing in other areas, and includes "the eastern extent of the routes, into Korea and Japan" in this. See Williams, *The Silk Roads*, 63.

[45] Inouchi Chisa, "The Silk Roads as a World Heritage Site: Tracing the Origins of Japan's International Cooperation in Cultural Heritage," *Tobunken Monthly Report* 27 (September 2014). http://www.tobunken.go.jp/materials/ekatudo/205940.html?s=silk+road

[46] For a recent discussion of the initiative from a political and economic viewpoint see Balázs Sárvári, and Anna Szeidovitz, "The Political Economics of the New Silk Road," *Baltic Journal of European Studies* 6.1 (2016):

policy in 2015. The opening of train and other transport routes to Central Asia and Europe have already been subsumed under BRI. But, more importantly for this discussion, BRI has also been used to frame many academic conferences in China, proposals for research and cultural projects and scholarships.[47] This is certain to have an impact on Silk Road studies in coming years, and potentially to expand the area of study for example, more into the Arab world. It remains to be seen how much it will affect the continuing Sino-centric bias of much of Silk Road scholarship from which Japan, for one, tried to steer UNESCO away.

While UNESCO interest in the Silk Road and its sponsorship of events, including academic conferences, expeditions and publications, certainly has a role in the growing scholarly interest in Silk Road studies it is only part of the story. In turn, the greater interest in the Silk Road led other countries to see the potential for exploiting the idea of the Silk Road to raise their own economic and political profile in a modern Eurasia. These included the Central Asian countries, seeking a greater profile following their independence from Russia and supported by Japan in their endeavours. But it also includes countries on the edges of Eurasia. Japan, of course, was among the first of these but Korea has since embraced its position on the Silk Road, setting up its own UNESCO Funds-in-Trust which as of 2016 supported South Asian countries (including Nepal and Bhutan) in a serial nomination.[48]

Exhibitions and publications in Korea have stressed the steppe route connections between Korea and Central Asia/Iran, bypassing China and Japan and, to a lesser degree, the maritime links with the Islamic world.[49] Korea has also initiated its own fellowships for students from Silk Road countries.

3–27. Also see Tim Winter, "One Belt, One Road, One Heritage: Cultural Diplomacy and the Silk Road," *The Diplomat* 29 March (2016). http://thediplomat.com/2016/03/one-belt-one-road-one-heritage-cultural-diplomacy-and-the-silk-road/

[47] For example, the 2014 bi-annual conference on Turfan studies was branded under this and one of the presentations concerned a proposal to build an international Silk Road Museum in Turfan. Zhejiang University has established "The Collaborative Innovation Center for the Cooperation and Development of the Belt and Road" and, activities include a research project between Zhejiang and Peking University and a 2015 Silk Road conference. See The International Dunhuang Project, "Zhejiang University: Dunhuang and Silk Road Studies," *IDP News* 46 (Autumn 2015): http://idp.bl.uk/archives/news46/idpnews_46.a4d#section5. A scholarship scheme for students from BRI countries to study in China was announced in 2015, see Huaxia, "China to Provide 10,000 scholarships annually to Belt and Road Countries," *Xinhuanet* 28 (March 2015): http://news.xinhuanet.com/english/2015-03/28/c_134105304 htm. In 2016, it was announced that 10,000 places would be for students from Arab countries. See Alvin Cheng-hin Lim, "Middle East and China's 'Belt and Road': Xi Jinping's 2016 State Visits to Saudi Arabia, Egypt and Iran – Analysis," *Eurasia Review* 20 (January 2016). http://www.eurasiareview.com/30012016-middle-east-and-chinas-belt-and-road-xi-jinpings-2016-state-visits-to-saudi-arabia-egypt-and-iran-analysis/.

[48] UNESCO, "South Asia World Heritage Serial Nomination for the Silk Roads Project Launched with the Support of the UNESCO/Korea Funds in Trust," *UNESCO News* 11 (February 2014). http://whc.unesco.org/en/news/1104/

[49] For example, an exhibition at the National Museum of Korea in 2008, "The Glory of Persia" was held in partnership with Iran. It included objects discovered in Silla tombs which, the curators argued in their captions and catalogue, came directly to Korea from Sasanid Persia. For maritime links see Lee Hee-Soo, "Early Korea-Arabic Maritime relations based on Muslim sources" (paper presented at the International Seminar on the Korean Culture and the Silk Roads, 23-25 February 1991). http://en.unesco.org/silkroad/know-ledge-bank/economy-and-trade/early-korea-arabic-maritime-relations-based-muslim-sources.

Istanbul is listed at the other end of the UNESCO defined 'Silk Road'. Turkish and other European scholars were involved in the 1988–1997 UNESCO Silk Road project, but the emphasis for the nomination currently remains on the land routes of the central and eastern section.[50] But there is a growing interest in the 'Silk Road' from the Baltic and East European states.[51] While Japan's role was at least supported, if not actively led, by a foundation of scholarship, the interest from these European countries has been led rather by the perceived economic and political advantage of branding projects as part of a Silk Road to give them a higher profile in a new world order.[52] It had started by the 2000s, but has been re-energised with China's BRI.[53]

Although these initiatives have not been led by scholarship, there has nevertheless been significant modern research on the Baltic's role in pre-modern Eurasian networks. As early as the eighteenth-century, the historian Edward Gibbon (1737–1794) noted the effect of actions by the Mongol empire in Central Asia on the fish trade between the Baltic and England.[54] In the late nineteenth century many fragments of silk were discovered at the eighth–tenth century site of Birka in Sweden and, in 1954 a small bronze Buddha statue was excavated at Helgö, an island in Sweden.[55] Some of the silk fragments have subsequently been identified as Chinese while the bronze statue is believed to have come from the Swat valley in what is now Pakistan. During the 1970s significant scholarly attention turned to trading links between Northern Europe and Central Asia. Apart from the Helgö Buddha and Birka silks, many discoveries were made of coin hoards of silver Central Asian dirhams along the river routes from the Caspian and Caucasus to northern Europe. Historical sources attesting to these trade routes included those of tenth-century Arab and Per-

[50] The 2014 ICOMOS report notes this bias and gives a list of other countries/regions that might later be incorporated. These go as far as the Caucasus but do not extend to the Baltic.

[51] Russia's absence in this was noticeable, although see below.

[52] The proposed trade routes mainly avoid Russia, travelling through Minsk and Ukraine, see Vector News, "Ukraine Offers Alternative Transport Route to China Bypassing Russia," *Vector News* 6 January 2016. However, Russia has maintained an interest, with Vladimir Putin attending the 2017 BRI summit in Beijing ("Belt and Road International Forum," *President of Russia website* 14 May 2017. http://en.kremlin.ru/events/president/news/54491). In 2019 Russian finally started active development of its part of the China-Western Europe transport corridor, bypassing Ukraine. The route was opened a decade before taking goods from China into Central Asia. See Wade Shephard, "Silk Road Breakthrough: Russia to Begin Construction on the China-Western Transport Corridor," *Forbes* 23 July 2019. https://www.forbes.com/sites/wsadeshepard/2019/07/23/silk-road-breakthrough-russia-to-begin-construction-on-the-china-western-europe-transport-corridor/

[53] So, for example, Latvia and Lithuania signed several trade deals with China in 2015 and 2016. See Sárvári, and Szeidovitz, "Political Economics," for a recent very positive analysis of this trend. It is interesting that the train running between Lithuania and Ukraine since 2013 is called "Viking"!

[54] A point picked by Igor de Rachewiltz in his discussion of Papal envoys to the Mongol court: "Only in 1238 had the Mongol invasion briefly made itself felt in England, when the attack on the Russian cities threatened Novogorod's commercial enterprises in the Baltic and North Sea. As a result, the German fish merchants had not gone, as usual, to Yarmouth to buy herrings and that year England had a glut of fish which made history. Edward Gibbon, writing in the 18th century, was still amused by the fact that an order of the Mongol emperor living in the Far East should have lowered the price of herrings on the English market!" Igor De Rachewiltz, *Papal Envoys to the Great Khans* (London: Faber and Faber, 1971), 80.

[55] Bo Gyllensvärd, "The Buddha found at Helgö," in *Excavations at Helgö XVI. Exotic and Sacral Finds from Helgö* (Stockholm: Kungl. vitterhets-, historie- och antikvitets akademien, 2004), 10–27.

sian travellers and writers, such as Ibn Fadlan and Ibn Rustah.[56] They told of the 'Rus' trading furs, slaves and narwhal for silver coins. The coin hoards have resulted in a rich strand of scholarship, led by the numismatist, Thomas Noonan (1938–2001). He published over 60 articles, but the 'Silk Road' was only used in one of his last articles, "The Fur Road and the Silk Road: The Relations Between Central Asia and Northern Russia in the Early Middle Ages," published in 2001.[57] This acknowledged the link in Central Asia between the northern routes with the Silk Road, but did not seek to expand the Silk Road to include these.[58]

These north-south arteries were also mentioned by early historians of Eurasian links, such as Tomaschek (1889) and Warmington (1928), but were kept distinct by them from the east-west Silk Road.[59] Japanese scholars also noted the importance of the Volga routes—called the "Fur Route" by Shiratori in the 1940s (a term since adopted by others, such as Noonan).[60] In the introduction to the 2000 UNESCO publication pulling together some of the project papers, Elisseeff also mentions the Volga and Russia routes to Central Asia, but does not seek to include them in the Silk Road designation. This linking of the Volga and other routes with the Silk Road, while not subsuming them under its rubric, continued.

However, the textile historians working on the Birka silks went further, seen in the title of an article published in Swedish in 1988, which translates as "At the End of the Silk Road: Textiles from Palmyra to Birka".[61] This lead was followed by authors of both popular and academic articles, where the phrases 'Silk Road of the North' or 'northern silk roads' were used.[62] One small fragment of Birka silk was displayed at the start of an exhibition in Sweden which opened at the same time as this conference.[63] It reinforced the inclusion of

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[56] Whitfield, *Life*, Chapter 7.

[57] Thomas Noonan, "The Fur Road and the Silk Road: The Relations Between Central Asia and Northern Russia in the Early Middle Ages," in *Kontakte zwischen Iran, Byzanz und der Steppe im 6.-7. Jahrhundert*, ed., Csanád Bálint (Budapest: Publicationes Instituti Archaeologici Academiae Scientiarum Hungaricae, 2000), 285–302. However, I have not done a full text check of all his articles.

[58] Some scholars have called the northern route the 'Amber Route'. See the paper in this volume for a discussion on amber in China.

[59] Wilhelm Tomaschek, *Kritik der ältesten Nachrichten über den Skythischen Norden II. Die Nachrichten Herodot's über den skythischen Karawanenweg nach Innerasien*, in Sitzungsberichte der Philosophisch-Historischen Klasse der Kaiserlichen Akademie der Wissenschaften, Band 117 (Wien, 1889); E. H. Warmington, *The Commerce Between the Roman Empire and India* (Cambridge: Cambridge University Press, 1928). Also, for example, Raschke, "New Studies," 610.

[60] Shiratori Kurakichi, quoted in Japanese National Commission, *Research*, 23 (*西域史研究 Seiiki shi kenkyū* (Studies on Central Asian history), 2 vols. (Tokyo: Iwanami Shoten 1941–44). It is possible that the term was used prior to the 1940s as I have not done extensive research to verify this.

[61] M. Nockert, "Vid Sidenvägens ände: Textiler från Palmyra till Birka," in *Palmyra: öknens drottning*, ed., P. Hellström, M. Nockert, and S. Unge (Stockholm: Medelhavsmuseet, 1988), 77–105.

[62] Mary Schoeser, *Silk (*New Haven: Yale University Press, 2007), 32.

[63] "Cosmopolitan Metropolis Along the Silk Road — Luoyang During Tang Dynasty China," National Museums of World Culture, Stockholm, 12 September 2015 to 28 February 2016. This was produced in conjunction with the Henan Provincial Administration of Cultural Heritage in China and consisted exclusively of loans from Henan, except for a small fragment of silk discovered—with other fragments—at the 8th to 10th century Birka, Sweden, in the late 19th century, since identified as Chinese. See Michel Lee and Eva Myrdal eds., *Cosmopolitan Metropolis Along the Silk Road — Luoyang During Tang Dynasty China* (Stockholm: Världskulturmuseerna Bergrummet in cooperation with Henan Provincial Administration of Cultural Heritage, 2015).

these routes in the Silk Road by the map at the start of the exhibition and reproduced in the catalogue, which clearly showed the river routes north in some detail.

The inclusion of the northern routes into the Silk Road network again raises the importance of Central Asia in our understanding: at the centre of the network but often treated as peripheral in importance. Despite the efforts of the Japanese attempts in UNESCO to give Central Asian archaeology, art and history more prominence, some scholars still despair about this peripheralisation.[64] A recent case is that of Michailidis's study of the importance of the Samanids in the northern route where she noted:

"Yet even cursory examination of these connections shows that the Samanids were not peripheral at all, but instead at the center of several different trading systems ... they deserve to be studied as a topic of focus and in all their complexity rather than relegated to what is erroneously viewed as a remote and inconsequential area on the fringes. They were involved in economic exchange with ... China via the Silk Route and the Vikings via the Fur Route."[65]

Although the east European and Baltic states are now pushing for recognition of the northern routes in UNESCO discussions, the lack of involvement by Russia means there is a dissonance between the routes of the past and those being developed in the present.[66] While China has very successfully asserted its cultural, political and economic role — past and present — in the 'Silk Road', Russia has not been as quick to take advantage.[67] This is despite its rich tradition of exploration and scholarship on the routes to and in Central Asia. The "Second Great Silk Road International Cultural Forum" was held in Moscow in 2015, but the organizers and funding were dominated by Chinese.[68] In 2016, the address by Sergey Lavrov, Russian Foreign Minister, to the General Meeting of the Commission of

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[64] Their centrality in importance as well as geographical terms was argued by Andre Gunder Frank in his "The Centrality of Central Asia," *Studies in History* 8.1 (1992): 43–97. For links to discussions on this see http://journals.sagepub.com/doi/abs/10.1177/025764309200800103?journalCode=siha. However, others have argued that its very centrality, in terms of being in the middle of a landmass and thus far from the sea, is bound to have an adverse effect on its influence today, given the relative costs of moving goods by sea and land. See Levent Hekimoglu, "The Back of Beyond: Trade, Geography and Central Asia's Predicament," in *Traders and Trade Routes of Central and Inner Asia: The 'Silk Road', Then and Now,* ed., Michael Gervers, Uradyn E. Bulag, and Gillian Long (Toronto: Asian Institute, University of Toronto, 2007), 207–214.

[65] Melanie Michailidis, "Samanid Silver and Trade Along the Fur Route," in *Mechanisms of Exchange: Transmission in Medieval Art and Architecture of Mediterranean ca. 1000–1500*, ed., Heather E. Grossman, and Alicia Walker (Leiden and Boston: Brill, 2013), 17–40 (25).

[66] The UNESCO Silk Road Online Platform (http://en.unesco.org/silkroad/unesco-silk-road-online-platform), a site funded by the Chinese based Tang West Market Group, gives a summary of the geographic areas of modern Russia that are connected to the Silk Road, although it does not include the northern routes to the Baltic as part of the Silk Road. See "Russia" http://en.unesco.org/silkroad/countries-alongside-silk-road-routes/russian-federation.

[67] This might now be changing. See footnote 52 above.

[68] Chinese Foundation of Culture and Arts of Nations; the China's Silk Road Fund; the Fund of Spiritual Development of people of Kazakhstan; the Intergovernmental Foundation for Humanitarian Cooperation for Commonwealth of Independent States (CIS); the Gorchakov Public Diplomacy Fund with the support of the "Sin-ao" Corporation (People's Republic of China). See "The Great Silk Road Forum — platform for cultural cooperation of Eurasian countries," on The UNESCO Silk Road Online Platform, http://en.unesco.org/silkroad/content/great-silk-road-forum-platform-cultural-cooperation-eurasian-countries.

the Russian Federation to UNESCO made only one brief mention of the Silk Road project.[69] These initiatives have been primarily concerned with Russia's eastern links through Central Asia, and not the northern river routes. It remains to be seen how this will affect scholarship.

Ironically, as the Silk Road expands to include more regions, periods and themes, scholarship remains in its infancy. Like any global history, Silk Road studies are dependent on a foundation of 'big data': numerous detailed studies of the economics, politics, geography, history, archaeology, art, literature and linguistics of its geographical and chronological components. Without this, theories are castles in the sand: unsupportable and subject to the tides of scholarly fashion to be washed away and forgotten. However, despite the excellent foundations laid by nineteenth and early twentieth century geographers, explorers and scholars — the Japanese perhaps foremost among the latter — such detailed studies are still comparatively few. This is especially for the Central Asian region that lies at the heart of any narrative about the Silk Roads, whether the routes from Scandinavia, India, China or Persia. Michailidis again: "As a whole, the region of Central Asia is prone to being treated with sweeping generalizations and frequent inaccuracies."[70]

To take, as an example, the history of eastern part of Central Asia, the Tarim Basin in what is now north-western China: there are few general histories of this region and barely a monograph on any of the Tarim kingdoms.[71] Among these kingdoms is Khotan. It thrived for over a millennium and, as well as being a supplier of jade, was also a market for this and other gemstones and minerals, a centre of paper making and sericulture. Sources include thousands of Khotanese manuscripts, locally minted bi-lingual coins, significant and ongoing archaeology and references in the histories and texts of surrounding empires, particularly the Chinese and Tibetan. The Chinese sources were published in translation as early as 1820 and Teramoto considered the Tibetan sources in 1921.[72] Since then many of the Khotanese manuscripts have been discussed and catalogued and several detailed studies have appeared on these and on the archaeology and other archaeological artefacts.[73]

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[69] "As per the instructions of President of Russia Vladimir Putin on creating a permanent venue for Eurasian cultural cooperation, an international conference Intercultural Dialogue in the Eurasian Space will be held in the Republic of Bashkortostan in May. Its agenda includes discussion on intercultural cooperation in the framework of the UNESCO Silk Road project." In "Russian Foreign Minister Sergey Lavrov's address to the General meeting of the Commission of the Russian Federation for UNESCO," *Chronicle: Commission of the Russian Federation for UNESCO* (2016), 30–37 (35). http://docplayer.ru/39295247-Yunesko-komissiya-rossiyskoy-federacii-po-delam-commission-of-the-russian-federation-for-unesco.html

[70] Michailidis, *Samanid*, 25.

[71] Japanese scholars produced the earliest histories of the Tarim, among them Haneda in 1931 and Matsuda et al. 1935, both using Chinese records. See Haneda Tōru, *羽田亨 西域文明史概論 /Seiiki bunmeishi gairon* (A general history of civilisation in Central Asia), (Kyōto Köbund Shobō, 1931) and Matsuda Hisao et al., *Chūō Ajia shi, Indo shi 中央アジア史・印度史* (*The history of Central Asia and India*) (Heibonsha's Series of World History, vol. 10), (Tokyo: Heibonsha, 1935). Valerie Hansen's more recent *The Silk Road: A New History* (Oxford: Oxford University Press, 2012) is largely focused on this area, also using manuscript finds.

[72] J. P. Abel-Rémusat, ed., and trans., *Histoire de la ville de Khotan* (Paris: Doublet, 1820) and Teramoto Enga, *Uten kokushi 于闐國史* (*Khotan history*) (Kyōto: Chōjiya Shoten, 1921). See also R. E. Emmerick, *Tibetan Texts Concerning Khotan* (London, 1967).

[73] Skjaervø's detailed catalogue of the manuscripts in the British Library was published in 2002. See P. O. Skjærvø, *Khotanese Manuscripts from Chinese Turkestan in the British Library* (London: The British Library, 2002). Before this various scholars had discussed groups of Khotanese manuscripts in some details, for ex-

A collection of essays was published in Chinese in 1993 but it was only in 2006 that the first history—in Chinese—appeared.[74]

The situation is improving. Considering a broader Central Asia, the UNESCO publication provided a useful reference.[75] In 2013 a Russian scholar published the first detailed study of the Hephthalites based on his PhD.[76] A monograph devoted to the Huns across Eurasia appeared in 2016.[77] And one of the few studies to come out in recent years to fill this gap is La Vaissière's work on the Sogdian traders.[78] This calls on archaeological, manuscript, textual and art historical sources to trace the history and the influence of this group through much of the Silk Road, in time and place. The link to the Silk Road of the routes between Central Asia and the Baltic and Scandinavia might also help, as with Michailidis's study, to increase interest and scholarship in this area.

Vadime Elisseeff expressed the complexity of Silk Road scholarship by employing the mathematical model of fractals, "whose true harmony rests on a theory of chaos." It is hoped that the expansion of the Silk Road will draw in more scholars to add to this chaos until such time there is sufficient understanding for us to see the harmonies as they emerge.

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ample, H. W. Bailey, *Khotanese Texts*, 5 vols., (Cambridge: Cambridge University Press, 1945–63), Joe Cribb has made definitive studies of the coins, see "The Sino-Kharosthi Coins of Khotan. Their Attribution and Relevance to Kushan Chronology," *The Numismatic Chronicle* 144 (1984): 128–52; 145, (1985): 136–149, with Plates 20–23. A PhD thesis was published on Khotanese art, Joanna Williams, "Buddhist Wall Painting of Khotan" (Ph.D. diss., Harvard University, 1969).

[74] Zhang Guangda, and Rong Xinjiang, *Yutian-shi congkao* 玉田史从考 (Studies in the History of Khotan), (Shanghai, 1993). Li Yinping, *Hetian chunqiu* 和田春秋 (Annals of Khotan), (Urumqi: Xinjiang renmin chubanshe, 2006). There are also several recent chapters and articles: among the best is the article in *Encyclopædia Iranica*, http://www.iranicaonline.org/articles/khotan-i-pre-islamic-history. But, as far as I know, no detailed history in any other language.

[75] Williams, *Silk Roads*, also includes a bibliography.

[76] A. Kurbanov, *The Archaeology and History of the Hephthalites* (Bonn: Habelt, 2013).

[77] Hyun Jin Kim, *The Huns* (London and New York: Routledge, 2016).

[78] Etienne de la Vassière, *Sogdian Traders: A History* (Brill Academic Publishers: Leiden, 2005).

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With Asia as neighbour

Archaeological evidence of contacts between Scandinavia and Central Asia in the Viking Age and the Tang Dynasty

by

Charlotte Hedenstierna-Jonson

Introduction

To a modern-day Viking scholar, the regions of Central Asia may be perceived as both geographically and culturally distant from early medieval Northern Europe and are subsequently often left out of history writing. Although an extensive numismatic material testifying contacts between Scandinavia and the Islamic world is continuously being researched and published, other kinds of archaeological evidence of these long-distance contacts are less known.[1] The Scandinavian, and in particular Swedish, archaeological material includes several objects that appear exotic and out of place in the Viking-Age archaeological contexts in which they have been found. A general overview places their origins in a non-distinct "East" often referred to as "the Orient". The "Eastern" connections in Viking-Age archaeology have come to include everything from the eastern Mediterranean to various nomadic regions of the Eurasian Steppes. Research topics have focused on the interactions between Scandinavians and Khazars, Volga-Bulghars and Magyars,[2] but few recent archaeological studies go beyond the Ural Mountains and the Caspian Sea.

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[1] The over 85000 dirhems found just in present day Sweden, reflect the intense contacts between Scandinavia and various Islamic regions, particularly in the ninth – late tenth centuries. For a general overview see Gert Rispling, "Islamische Münzen in Schweden," *Der Islam* 64 (Berlin, 1987): 105–110; Thomas Noonan, *The Islamic World, Russia and the Vikings, 750–900: The Numismatic Evidence* (Aldershot, 1998); Brita Malmer, *Den svenska mynthistorien. Vikingatiden ca 995–1030* (Stockholm, 2010), 14–17; Roman Kovalev, "Dirham Mint Output of Samanid Samarqand and its Connection to the Beginnings of Trade with Northern Europe (10th century)," *Histoire & Mesure*, vol. XVII no. 3/4: *Monnaie et espace* (2002): 1–18 http://histoiremesure.revues.org/892#tocto1n1 ; James Graham-Campbell, and Gareth Williams, *Silver Economy in the Viking Age* (Walnut Creek, CA, 2007).

[2] Charlotte Hedenstierna-Jonson, and Lena Holmquist, *The Oriental Mounts from Birka's Garrison: an Expression of Warrior Rank and Status* (Stockholm Kungl. vitterhets-, historie- och antikvitetsakademien, 2006) and there cited references; Charlotte Hedenstierna-Jonson, "Traces of Contacts: Magyar Material Culture in the Swedish Viking Age Context of Birka," in *Die Archäologi der frühen Ungarn. Chronologie, Technologie und Methodik*, ed., Tobias Bendeguz (Mainz: RGZM Tagungen 17, 2012), 29–46.

Within other disciplines there is however a revived interest in Islamic-Scandinavian interactions during this time period. Proceeding from the other end of the network of contacts, art historian and Samanid specialist Melanie Michailidis traces the transmission of images and designs between Central Asia and the Viking World, and emphasises the interactions along the so-called Fur Route.[3] A similar approach can be seen in the extensive work performed by the Oxford based *Dirhams for Slaves* project, where the numismatic material deriving from the Islamic world is contextualised and discussed as a reflection of the slave trade.[4] Within medieval history and Arabic studies new translations and interpretations of the textual sources are being made, including the famous accounts of Arabic traveller Ibn Fadlan and his encounter with Rus' people on the Volga in the early tenth century.[5] In comparison with such eminent research the need for a renewed study of the archaeological material in Scandinavia becomes evident.

This paper aims to highlight the rather heterogeneous archaeological evidence found within present day Sweden, to show its potential and hopefully to reduce the perceived gap between Scandinavia and Central Asia during the Viking Age. For an archaeologist and Viking specialist this task is filled with challenges, as it touches upon several disciplines and encompasses vast geographical regions. The compilation of evidence is not complete and the conclusions drawn may at times be rudimentary, but I firmly believe that in order to develop this particular field of research a starting point is needed. To quote Melanie Michailidis, "Crossing area boundaries in this way is an exercise almost as fraught with danger as travelling along the Volga in the tenth century, since no one can possibly speak with equal authority on two regions as geographically distant as Central Asia and Scandinavia."[6]

Scandinavia in the Tang era

The Scandinavian time period consistent with the Chinese Tang dynasty (618–907 CE) corresponds to the end of the prehistoric Iron Age, covering the Merovingian/Vendel Period and the Viking Age. It was a time characterised by transition. Although gradually and archaeologically indistinct, the societal structure changed from a local power system with petty chieftains to a grander regional power structure with kings and greater power political ambitions. Power was exercised over people, but the changes in society included increased territoriality introducing power over land. Authority was upheld through personal bonds and loyalties, and in a structure of gift giving and rewards. In a society where there was limited or no organised form of taxation, the need to acquire suitable goods and

[3] Melanie Michailidis, "Samanid Silver and Trade along the Fur Route," in *Mechanisms of Exchange: Transmission in Medieval Art and Architecture of the Mediterranean ca. 1000–1500*, ed., Heather E. Grossman, and Alicia Walker (Leiden and Boston: Brill, 2013), 315–338.

[4] Dirhams for Slaves: Dirham hoards from Northern Europe, trade in Slavic slaves, and the emergence of Medieval Europe (800–1000). For a more detailed presentation see the project's website http://krc.orient.ox.ac.uk/dirhamsforslaves/index.php/en/; Marek Jankowiak, "Dirhams for slaves: investigating the Slavic slave trade in the tenth century," (paper presented at the Medieval Seminar, All Souls College, Oxford, February 2012).

[5] Ibn Fadlan, "Mission to the Volga," in *Two Arabic Travel Books*. Texts by Abu Zayd al-Sirafi, and Ahmad Ibn Fadlan, ed. and transl., Tim Mackintosh-Smith, and James Montgomery (New York University Press, 2015), 165–260.

[6] Michailidis, "Samanid Silver and Trade along the Fur Route," 316.

luxury items stimulated trade, advanced crafts and raiding. As a result, society became more specialised, with emerging urbanisation as one consequence and an increase in mobility as another. Scandinavians ventured out into the world on raids and campaigns, but also engaged in trade and settled down in foreign territories. The interest for, and relative openness to, other cultures is often mentioned as a characteristic of the Tang dynasty.[7] In a way this could also be true of contemporary Scandinavia. The late Iron Age was a time of expansion, violence and coercion, but also of contacts, networking and influences that inevitably had an impact on regional culture.

As Viking-Age society was predominantly non-literate and contemporary Scandinavian texts are rare, archaeology provides most of the available source material. However, runic inscriptions constitute a particular type of written evidence mainly dating to the period of Christian conversion in the eleventh century. The runic texts are of a brief and formulistic character, often dealing with family connections and inheritance. Even so, the texts provide valuable insights into the Viking-Age perception of the world as they, at times, refer to travels abroad. Scandinavians abroad are also mentioned in various texts originating in the literate societies with which the Scandinavians interacted.[8] The Scandinavian expansion into the region that is now European Russia and the Ukraine is primarily accounted for in the *Russian Primary Chronicle*, written by the monk Nestor in the eleventh century.[9] Some of the historical events that took place are however referred to in part already in the ninth-century Carolingian *Annals of the Abby of St Bertin* in France.[10]

Contacts with "the East"

The Scandinavian Viking-Age expansion into the East constitutes a vast research area with long scholarly traditions.[11] It was the Swedish archaeologist Ture Arne who first recognised the extensive contacts between Scandinavia and Eurasia, and even suggested early contacts

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[7] Samuel Adshead, *Tang China: The Rise of the East in World History* (New York: Palgrave Macmillan, 2004), 31, 168; Jonathan Skaff, *Sui-Tang China and Its Turko-Mongol Neighbors: Culture, Power, and Connections, 580–800* (Oxford Scholarship Online 2012), 290.

[8] Charlotte Hedenstierna-Jonson, *The Birka Warrior. The material culture of a martial society* (Stockholm, 2006), 20–21; and there cited references.

[9] Samuel Hazzard Cross, and Olgerd P. Sherbowitz-Wetzor, transl. and eds., *The Russian Primary Chronicle: Laurentian Text* (Cambridge, Mass.: The Medieval Academy of America 60, 1953).

[10] Janet Nelson, trans., *The Annals of St-Bertin* (Manchester: Manchester University Press, 1991).

[11] For a general overview on the topic please consult Ingmar Jansson, "Communication Between Scandinavia and Eastern Europe in the Viking Age: The Archaeological Evidence," in *Untersuchungen zu Handel und Verkehr der vor- und frühgeschichtlichen Zeit in Mittel- und Nordeuropa*, vol. 4, ed., Klaus Düwel, Herbert Jankuhn, Harald Siems, and Dieter Timpe (Göttingen, 1987), 773–807; Ingmar Jansson, "Warfare, trade or colonisation?" in *The Rural Viking in Russia and Sweden*, ed., Pär Hansson (Örebro, 1997), 9–64; Elena Melnikova, *The Eastern World of the Vikings* (Göteborg: Litteraturvetenskapliga institutionen, Göteborg Univ., 1996); Simon Franklin, and Jonathan Shephard, *The Emergence of Rus' 750–1200* (London: Longman, 1996); Charlotte Hedenstierna-Jonson, "Rus, Varangians and Birka warriors," in *The Martial Society: aspects of warriors, fortifications and social change in Scandinavia*, ed., Lena Holmquist Olausson, and Michael Olausson (Stockholm: Stockholm University, 2009), 159–178; Fedir Androshchuk, *Vikings in the East: Essays on Contacts along the Road to Byzantium (800–1100)*, ed., Fedir Androshchuk (Uppsala: Uppsala universitet, Studia Byzantina Upsaliensia 14, 2013).

with the Silk Roads. Arne had studied and published many of the finds kept in the archives of the Swedish History Museum that could be linked to different parts of Asia.[12] Arne's work *La Suède et l'Orient* still constitutes a valid catalogue of this particular archaeological material. Arne considered the rather widespread material to bear witness of contacts between Viking Age Scandinavia, European Russia and the Ukraine, the Eurasian steppes and what was at the time known as the Orient. To further confirm the contacts Arne even ventured on several field trips in Russia, the Ukraine and Turkmenistan.[13] Since Arne's compilation and discussion of the material, new additions have of course been made although these generally strengthen his interpretations. Arne's work divided the finds material into two categories: objects of "oriental origin" found in Swedish contexts and Scandinavian finds found in "Eastern" contexts – primarily in European Russia and the Ukraine.[14] Locating the region in which the Scandinavian – Eurasian contacts took place was one of the driving forces behind a small number of archaeological excavations that Arne and a handful of archaeologists undertook in Siberia, Persia and to some extent even in India.[15] Though these projects produced and published many interesting results, the question of locating the actual region of contacts remained unanswered. However difficult to prove, the archaeological evidence within modern day Sweden show that the interactions indeed existed and the character of the material also indicate regions where they most likely took place. Although slightly simplified, it is possible to discern three different regions or zones with which the Scandinavians had their main eastern interactions: European Russia and the Ukraine, the Byzantine Empire, and beyond the Ural Mountains down to the Caspian Sea. (Fig 1)

[12] Ture Arne, "Sveriges förbindelser med östern under vikingatiden: ett arkeologiskt bidrag," *Fornvännen* 6 (1911): 1–66; Ture Arne, *La Suède et l'orient: études archéologiques sur les relations de la Suède et de l'orient pendant l'âge des Vikings* (Uppsala: K.W. Appelberg, 1914).

[13] Fredrik Svanberg, "Sveriges historia, som den samlats," in *Ett museum måste irritera. Fyra röster om Historiska museet*, ed., Malin Grundberg, Johan Hegardt, Patrik Nordström, and Fredrik Svanberg (Stockholm: The Swedish History Museum, Studies 24, 2015), 169–176 and there cited references.

[14] Arne, *La Suède et l'orient*.

[15] Ture Arne, *Barosoff Gorodok: ein westsibirisches Gräberfeld aus der jüngeren Eisenzeit* (Stockholm: Kungl. vitterhets-, historie- och antikvitetsakademien, 1936); Ture Arne, *Excavations of Shah Tepé, Iran* (Stockholm: Statens etnografiska museum, 1945); Hanna Rydh, *Rang Mahal: the Swedish archaeological expedition to India 1952–1954* (Lund: Acta archaeologica Lundensia, Series in 4o, 3, 1959).

Figure 1.

Map (revised from: Androshchuk 2016)[16] *showing the different zones with which the Scandinavians had their main eastern interactions during the late eighth to early eleventh century.*

Austr i Garðum (*in the east in Garðar*)

Scandinavians, mainly from Eastern Sweden, entered into European Russia and the Ukraine on a more regular basis from the mid eighth century.[17] The prerequisites for an expansion in this geographical region were rather unlike the conditions of the European West. While the "Vikings" raiding and campaigning in the British Isles and along the coast of Western Europe entered into established kingdoms, the East was dominated by totally different and very dynamic societal structures based on various tribes, many of which were nomadic. In order to acquire wealth in the East, the Scandinavians had to organise a system to collect natural resources and channel the movement of goods in a region lacking towns or even central places. The expansion into the East was therefore characterised by the establishment of trading centres along the river routes. The trading centres became multi-ethnic urban centres for trade and crafts: towns or in Old Norse *garðar*. European Russia and the Ukraine, often referred to as Ancient Rus', was the "Land of towns" or *Garðariki*.[18]

[16] Fedir Androshchuk, "What does material evidence tell us about contacts between Byzantium and the Viking World c. 800–1000," in *Byzantium and the Viking World,* ed., Fedir Androshchuk, Jonathan Shepard, and Monica White (Uppsala: Uppsala Universitet, Studia Byzantina Upsaliensia 16, 2016), 91–116.

[17] The initial driving forces behind this expansion are being targeted in the ongoing research project *The Viking Phenomenon* at Uppsala University, a ten-year research project within the Distinguished Professor program of the Swedish Research Council (VR 2015-00466). The Viking Phenomenon, http://www.arkeologi.uu.se/Research/Projects/viking-phenomenon/

[18] Tatjana Jackson, "The Image of Old Rus in Old Norse Literature (a place name study)," *Middelalderforum. Tverrfaglig tidskrift for middelalderstudier* 1–2 (2003): 36–38; *cf.* Thomas Noonan, "Scandinavians in Europe-

A landscape of towns

Garðariki is mentioned on a number of rune stones, confirming that this was a well-known name and that it was linked to a perception of a particular region. Among the examples is the rune stone from Turinge, Södermanland (Sö 338). The stone was raised as a commemoration of Þorsteinn who died in battle in Garðar:

> *Ketill and Bjôrn, they raised this stone in memory of Þorsteinn, their father; Ônundr in memory of his brother and the housecarls in memory of the just(?) (and) Ketiley in memory of her husbandman. These brothers were the best of men in the land and abroad in the retinue, held their housecarls well. He fell in battle in the east in Garðar (Russia), commander of the retinue, the best of landholders.*[19]

In the short text Garðar is even given a geographical direction: in the east. *Austr*, 'east', is according to Tatjana Jackson a direction linked to the mental map of the world as the Norse travellers perceived it. It does not necessarily have to correspond accurately to a geographical direction, but places the location in a geographically defined region.[20] This is in many ways similar to how the West has divided and denominated the different regions of Asia as 'Far East', 'Middle East' and the 'Near East'.

At this point Garðariki was not a kingdom, but a landscape of routes and towns connecting the Baltic with the natural wealth of the interior such as furs, and soon enough with other markets further east along the Volga. Some of the most important places along these eastern routes – *Austrvegir* – had Old Norse names alluding to their function as garðar – towns: Holmgarðr (Novgorod) and Konugarðr, the king's town (Kiev). Constantinople was called Miklagarðr indicating that even the great city of the Byzantine Empire was included in the Norse conception of Garðariki. Contemporaries sometimes referred to the Byzantine sphere of influence as 'Greece', and as such we find it in the runic inscriptions. On the now lost stone Sm 46, there is mention of a Sveinn who died *austr i Grikkium* (east in Greece) again indicating the perception of geographical location. The text reads: *"...-vé made these monuments in memory of Sveinn, her son, who met his end in the east in Greece."*[21]

Colonialization, trade and warfare

The movement of Scandinavians into European Russia and the Ukraine was extensive. As noted by Fedir Androshchuk, "Far more Scandinavian Viking age artefacts have been found in Eastern Europe than in the West."[22] The material encompasses jewellery, weaponry and everyday objects but also profane and religious practices covering everything from crafts to burial traditions. The archaeology bears witness to a marked Scandinavian presence. There are two main approaches to the character of the drive behind it, one empha-

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an Russia," in *The Oxford Illustrated History of the Vikings*, ed., Peter Sawyer (Oxford, 1997), 134–155.

[19] Entry Sö 338 in Samnordisk runtextdatabas, http://www.nordiska.uu.se/forskn/samnord.htm

[20] Tatjana Jackson, "On the Old Norse System of Spatial Orientation," *Saga-Book* XXV (1998): 72–82.

[21] Entry Sm 46 in Samnordisk runtextdatabas, http://www.nordiska.uu.se/forskn/samnord.htm

[22] Fedir Androshchuk, "Byzantium and the Viking World: archaeological evidence for contacts (9th – 10th century)," in *Vikings in the East: Essays on Contacts along the Road to Byzantium (800–1100)*, ed., Fedir Androshchuk (Uppsala: Uppsala universitet, Studia Byzantina Upsaliensia 14, 2013), 11.

sising agriculture and colonisation, and the other a trade in furs and the search for silver.[23]

Þorsteinn, whom we already met in the runic inscription on the Turinge stone, died during a military campaign in the East. Although the stone represents the late Viking Age (eleventh century), warfare and violence in various forms were important features in the activities in the East even in earlier centuries. Slave taking and trafficking constituted an important part of the subsistence in this region, with the slave market at Bulghar as one major destination. Furs and slaves were the two major commodities traded along the Eastern route and the character of the trading operations required various levels of coercion and violence. Warfare and trade were in many ways connected, and warriors became active agents in the transfer of both material culture and cultural practices as reflected through imported weaponry, fighting techniques and martial dress accessories that eventually were integrated into local customs.[24]

Though there are archaeological indications of earlier interactions, the starting point for a more extensive expansion can be fixed to the mid eighth century, when several coinciding events took place. On both sides of the Baltic the first town-like settlements appeared, with Birka in present-day Sweden and Staraja Ladoga in Russia.[25] On the Estonian island of Saaremaa (Ösel), recent excavations have uncovered evidence of a Viking military venture with the spectacular burial of two ships containing more than forty warriors and their equipment.[26]

During the following centuries, the movement of Scandinavians within European Russia and the Ukraine increased, and the network of towns developed to shape the political geography of the Rus' culture.[27] As most of Europe entered into the Middle Ages, the Rus' were a new group of people without common ancestry and fixed geography.[28] While Scandinavians constituted a major element of the Rus' population in the initial phase, other groups soon became a prominent component. Between them they created a cultural

[23] E.g. Jansson, "Warfare, trade or colonisation?," 9–64; Johan Callmer, "The archaeology of the early Rus' c. A.D: 500–900," *Medieval Scandinavia* 13 (2000): 7 – 63; Nikolaj Makarov, "The fur trade in the economy of the Northern borderlands of medieval Russia," in *The Archaeology of Medieval Novgorod in Context*, ed., Mark Brisbane, Nikolaj Makarov, and Evgenij Nosov (Oxford: Oxbow Books, 2012), 381–390; Ingrid Gustin, "Trade and trust in the Baltic Sea area during the Viking Age," in *Maritime Societies of the Viking and Medieval World*, ed., James Barrett, and Sarah Gibbon (Leeds: Maney, 2015), 25–40.

[24] Hedenstierna-Jonson, *The Birka Warrior*; Hedenstierna-Jonson, "Traces of Contacts," 29–46; Fredrik Lundström et al., "Eastern archery in Birka's garrison," in *The Martial Society: aspects of warriors, fortifications and social change in Scandinavia*, ed., Lena Holmquist Olausson, and Michael Olausson (Stockholm: Stockholm University, 2009), 105–116.

[25] *Cf.* Björn Ambrosiani, *Birka 1680–2013: a Long-Term Research Project* (Stockholm: Paniba AB, 2013); Androshchuk, "Byzantium and the Viking World," 16–17.

[26] Marge Konsa et al., "Rescue excavations of a Vendel Era boat-grave in Salme, Saaremaa," *Archaeological Fieldwork in Estonia* (2008): 213–222; Raili Allmäe et al., "The Salme I Ship Burial: An Osteological View of a Unique Burial in Northern Europe," *IANSA*, Vol. II (2011.2): 109–124; Jüri Peets et al., "Archaeological investigations of pre-Viking Age burial boat in Salme village at Saaremaa," *Archaeological Fieldwork in Estonia* (2010): 29 – 48; Jüri Peets et al., "Research results of the Salme ship burials in 2011–2012," *Archaeological Fieldwork in Estonia* (2012): 43–60.

[27] Hedenstierna-Jonson, "Rus, Varangians and Birka warriors," 159–178.

[28] Simon Franklin, "The Invention of Rus(sia): some Remarks on Medieval and Modern Perceptions of Continuity and Discontinuity," in *Medieval Europeans*, ed., Alfred Smyth (Basingstoke: Macmillan, 1998), 187; Hedenstierna-Jonson, *The Birka Warrior*, 78–79.

expression of their own, blending and processing elements from different cultures and peoples active along the eastern routes.[29]

Sunnarla a Særklandi (*in the south in Serkland)*

Even though Ancient Rus' was the main destination for travels in the East, there is a variety of archaeological evidence indicating relatively frequent interactions with areas even further to the east and south-east. In the late ninth century, the trade along the Volga and the slave market at Bulghar was intensified, and settlements along the Upper Volga became involved in the furs, slaves and silver trades.[30] The great Byzantine Empire in the South was an increasing enticement for the Rus', as were the contacts with nomadic tribes from the Eurasian Steppes. Contacts with the latter in particular left visible traces in dress, as well as in weaponry and warfare techniques among the warriors travelling the route. The art of eastern archery, with its composite bow and battle quiver, together with imported belts of so called "oriental type" and caftan-style riding coats became a recurring feature in the martial context of tenth-century Birka.[31]

Interactions with Byzantium

The importance of Byzantium as a centre for trade is evident, but to date the start of these interactions have proven more difficult. The archaeological evidence reflecting Byzantine-Scandinavian contacts is relatively rare, making it difficult to ascertain variations in trends over time. Byzantine-related objects however constitute a part of the archaeological material from at least the Migration Period (app. 375–550 CE) and into the Middle Ages (from the mid eleventh century), and although the direct link is difficult to discern, one can safely say that Byzantium played a central and decisive role in both the production and distribution of exotic goods over a very long period of time. The earlier contacts are reflected in materials such as glass and amethyst beads, cameos and ivory rings.[32]

From the mid ninth century, the increasing number of Scandinavian-Rus' started to have an impact on the region and its people. In the so-called *Annals of St Bertin* there is mention of Rus' men travelling with an embassy from the Byzantine Empire to the Frankish court in 838–839 CE.[33] The men had been sent by their leader, the chaganus, possibly to declare the new political power of Rus'. Byzantine Emperor Theophilus responded to the increased threat from the North by creating a new military province to safeguard control

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[29] Hedenstierna-Jonson, "Rus, Varangians and Birka warriors"; Charlotte Hedenstierna-Jonson, "Creating a cultural expression: on Rus' identity and material culture," in *Identity Formation and Diversity in the Early Medieval Baltic and Beyond*, ed., Johan Callmer, Ingrid Gustin, and Mats Roslund (Leiden: Brill, 2017), 91–106.

[30] Veronica Murašëva, "The Viking Age monuments in the Jaroslavl' region on the upper Volga," in *The Rural Viking in Russia and Sweden*, ed., Pär Hansson (Örebro, 1997), 66; Hedenstierna-Jonson "Rus, Varangians and Birka warriors," 161; Androshchuk, "Byzantium and the Viking World," 24.

[31] Hedenstierna-Jonson, and Holmquist Olausson, *The Oriental Mounts from Birka's Garrison*; Lundström et al., "Eastern archery in Birka's garrison"; Hedenstierna-Jonson, "Traces of Contacts".

[32] John Ljungkvist, "Byzantine-related objects in Sweden and Scandinavia," in *Byzanz - das Römerreich im Mittelalter: Pracht und Alltag eines Weltreiches*, ed., Falko Daim, and Jörg Drauschke (Mainz: RGZM, Schnell & Steiner, 2010), 419–442.

[33] Nelson, trans., *The Annals of St-Bertin.*

over the Crimea.[34] Some twenty years later (in 860 CE) the Rus' raided Constantinople, thus confirming their military strength and ability.[35] The interactions between the Rus' and Byzantium were noted also by the neighbouring Muslim world. In the mid ninth century, the geographer Ibn Khurradadhbih included the Rus' in his work on the main trade routes within the Muslim world, and states that they sailed to Byzantium with their merchandise.[36]

Despite the various indications of earlier contacts, Rus' exploration of the route leading to Constantinople did not become significant until the early tenth century in what Fedir Androshchuk denominates "the big turn south".[37] The establishment and development of the town-like settlement of Gnezdovo close to present day Smolensk was most likely connected to the intensification of trade-connections with Byzantium. These trade connections were tenuous at times, with recurring attacks by Rus' forces followed by treaties regulating trade and the movement of merchants in Constantinople.[38] "Unresolved trade issues" were most likely the reasons behind the strained relations between Byzantium and Rus', but they were not typical of all such encounters, as Rus' warriors were recruited in relatively great numbers to participate both in military campaigns and as members of the Emperor's guard.[39]

Perhaps the most well-known of the Byzantine-Rus' treaties is that from 944/945 CE. Through the detailed account given by the *Russian Primary Chronicle* it is clear that one of the main commodities provided by the Rus' merchants to the Byzantine market was slaves, while their greatest trade interest in return was silk. The treaty regulates that a Rus' merchant is allowed to purchase silk up to the value of fifty gold pieces (bezants), while the compensation for a lost slave was set at two pieces of silk.[40] Considering the delicacy of silk as a material, and how easily it deteriorates in the soil, there are a vast number of archaeological finds in Scandinavia hinting at the extent of the silk import.[41]

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[34] Constantine Porphyrogenitus, *De Administrando Imperio*, ed., Gyula Moravcsik, trans., Richard Jenkins (Washington DC: Dumbarton Oaks, Center for Byzantine Studies, 1967), chapter 42, 182–184; *cf.* Warren Treadgold, "Three Byzantine Provinces and the First Byzantine Contacts with the Rus," *Harvard Ukrainian Studies* 12–13 (Cambridge, 1989): 133–134.

[35] Simon Franklin, and Jonathan Shepard, *The Emergence of Rus 750–1200*, 50; Hedenstierna-Jonson, "Rus, Varangians and Birka warriors".

[36] For an account of Ibn Khurradadhbih's *The Book of Roads and Kingdoms* see Thorir Jonsson Hraundal, "The Rus in Arabic Sources: Cultural Contacts and Identity" (Ph.D. diss., Centre for Medieval Studies, University of Bergen, 2013), 56.

[37] Androshchuk, "What does material evidence tell us about contacts between Byzantium and the Viking World c. 800–1000," 99.

[38] *Cf.* Franklin and Shepard, *The Emergence of Rus*, chapter 3; Androshchuk, "What does material evidence tell us about contacts between Byzantium and the Viking World," 99–101.

[39] Warren Treadgold, "The Army in the works of Constantine Porphyrogenitus," *Rivista di Studi Byzantini e Neoellinici* 29 (Rome, 1992): 112; Judith Herrin, *The Surprising Life of a Medieval Empire* (Princeton: Princeton University Press, 2007), 213–219; Hedenstierna-Jonson, "Rus, Varangians and Birka warriors," 168; Thorgunn Snædal, *Runinskrifterna på Pireuslejonet i Venedig* (Stockholm: Riksantikvarieämbetet, 2014); Androshchuk, "What does material evidence tell us about contacts between Byzantium and the Viking World," 101.

[40] Cross and Sherbowitz-Wetzor, *The Russian Primary Chronicle: Laurentian Text*, entry year 945.

[41] *Cf.* Marianne Vedeler, *Silk for the Vikings* (Oxford: Oxbow Books, 2014), chapter 4.

Figure 2.
Rune stone Sö 179 (photo: Charlotte Hedenstierna-Jonson).

"the land where silk was retrieved"

Returning to the runic inscriptions and their links to faraway places, as we have seen, Byzantium (Greece) was placed East on the mental map. Continuing further south we arrive at the enigmatic Serkland as described on runestone Sö 179: "*Tóla had this stone raised in memory of her son Haraldr, Ingvarr's brother. They travelled valiantly far for gold, and in the east gave (food) to the eagle. (They) died in the south in Serkland.*"[42] (Fig 2)

This inscription gives two different geographical directions: first the men fought in the East, but they apparently continued their journey and died in the South, in Serkland. It has long been debated what Serkland actually represents, with various interpretations of the etymology of *serk*. At times understood as meaning something akin to 'Saracen', it has also been suggested to describe the dress of the people living in Muslim areas (*serk* = gown). If we try to understand it through the location given in the inscription, it is suppos-

[42] Entry Sö 179 in Samnordisk runtextdatabas, http://www.nordiska.uu.se/forskn/samnord.htm

edly situated south of the East, leaving us with a great territory encompassing the regions surrounding the Caspian Sea and beyond. In 1947 Arne introduced another interpretation of the name Serkland, suggesting that it derived from the word *serica*, or *sericum*, that the Romans used for silk - and thus should be understood as the "Land from whence the silk was retrieved." In Roman times, silk came from China, later Persia and later still Byzantium. Possibly the name related to different regions over time.[43]

But did the contacts with China end with the Romans? The earliest piece of preserved silk in Scandinavia known so far was retrieved in a burial in Birka dated to the mid eighth century.[44] But indirect evidence of silk, i.e. gold thread from tablet-woven bands that also included silk, have been found in graves from the Vendel Period (550–750 CE), perhaps even as early as the Migration Period (375–550 CE). [45] The origin of these early examples of silk is still under consideration, but a recent study by Marianne Vedeler considers the majority of the early ninth-century silk fabrics from the ship burial in Oseberg, Norway to be produced in Central Asia.[46]

Austr i Karusm *(in the east in Karusum)*

Is it then possible that Scandinavians during the late Iron Age had direct contacts with sites along the Silk Road itself? As noted above, Vedeler considers some of the silk to have been produced within Central Asia, more particularly within the Samanid realm and what had previously been known as Sogdiana. According to Inga Hägg, this was also the region of origin for female tunics with silk applications found in some of Birka's burials.[47] Garments of this type were not restricted to Birka but were worn in eastern Scandinavia generally, and silk from Central Asia has been identified in other high-status graves such as the boat burials at Valsgärde.[48] There is even evidence of silk imported from China: in one of the most lavishly furnished graves from Birka (Bj 944), the deceased was buried in headgear made with patterned silk from the Tang dynasty.[49] (Fig 3)

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[43] Ture Arne, "Austr i Karusm och Särklandnamnet," *Fornvännen* 42 (1947): 290–305.

[44] Lena Holmquist Olausson, "Birkas befästningsverk – resultat från de senaste årens utgrävningar," in *Birkas krigare*, ed., Michael Olausson (Stockholm: Arkeologiska forskningslaboratoriet, Stockholms univ., 2001), 9–15. Anita Malmius, *Burial textiles. Textile bits and pieces in central Sweden, AD 500–800* (Stockholm: Arkeologiska forskningslaboratoriet, Stockholm Univ., 2020), 199.

[45] Ljungkvist, "Byzantine-related objects in Sweden and Scandinavia," tab.1.

[46] Vedeler, *Silk for the Vikings*, 58.

[47] Inga Hägg, "Silks at Birka," in *Byzantium and the Viking World*, ed., Fedir Androshchuk, Jonathan Shepard, and Monica White (Uppsala: Uppsala Universitet, Studia Byzantina Upsaliensia 16, 2016), 281–304; *cf.* Elfride Knauer, "A Man's Caftan and Leggings from the North Caucasus of the Eighth to Tenth Century: a Genealogical Study," *Metropolitan Museum Journal* vol. 36 (2001): 125–154; Annika Larsson, *Klädd krigare* (Uppsala: OPIA 39, 2004), 216–230; Annika Larsson, "Från dräkt till koppar och järn," in *Birka nu*, ed., Charlotte Hedenstierna-Jonson (Stockholm: The National Historical Museum, Stockholm, Studies 22, 2012), 129–140.

[48] *Cf.* Larsson, "Från dräkt till koppar och järn".

[49] Ulla Cyrus-Zetterström, "A monochrome patterend silk fabric among the finds from Birka," in *Opera textilia variorum temporum*, ed., Inger Estham, and Margareta Nockert (Stockholm: Statens historiska museum, 1988), 45–48.

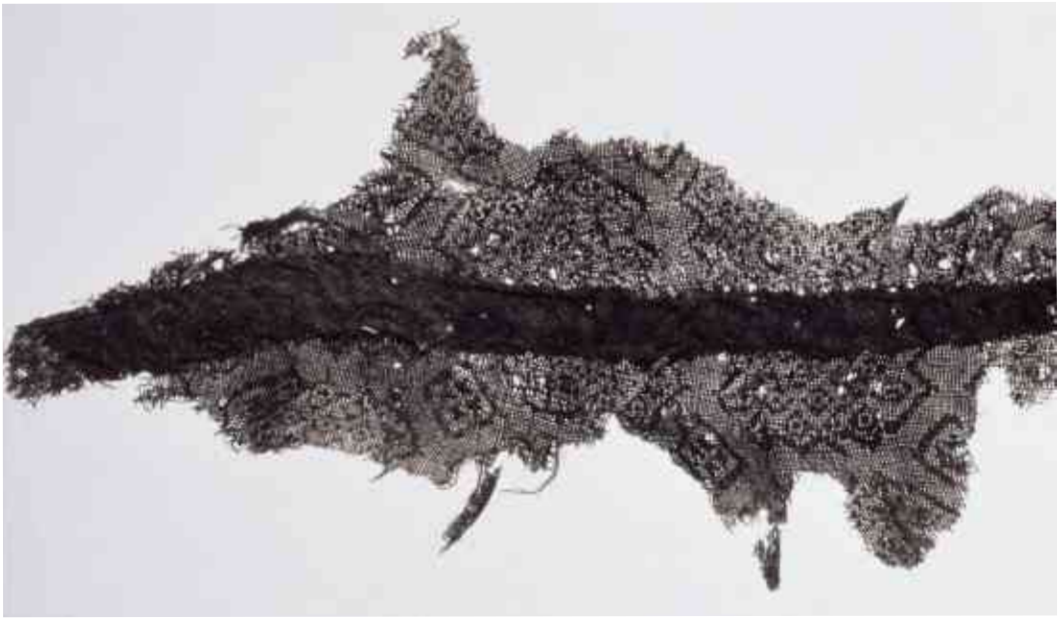

Figure 3. *Chinese Tang Dynasty silk from grave Bj 944 in Birka (photo: Swedish History Museum).*

The presence of silk in eastern Scandinavia does not necessarily imply direct contacts with Samanid markets and the Silk Road, as the place of production and point of purchase may well have been very different. But if other categories of objects originating from this region are taken into consideration, the indications of direct contacts become more secure. The most extensive archaeological material that bears witness of interactions between Scandinavia and Central Asia is the silver coins. The inflow of Islamic silver dirhams into the Scandinavian North took off during the ninth century. While at first in moderate amounts, and mainly minted in Baghdad and other Iraqi mints, the tenth century sees what can only be described as a "silver rush".[50] The overwhelming majority of the tenth-century dirhams derived from Tashkent, Samarkand and Bukhara, representing the influence and power of the Samanid dynasty.[51] For centuries this region had hosted the intense trade dominated by the Sogdian merchants that connected China with India, the Arab world and the nomadic peoples of the Eurasian Steppes. Although Sogdiana was ruled by the Samanid dynasty from the late ninth century, the region continued to be the great melting-pot of the Silk Roads and its traders acted as "intermediaries between sedentary empires and nomadic confederations."[52] With the Tang Dynasty came imperial protection and the patronage of the Silk Road, stimulating long-distance trade. Together with a more pragmatic take on the re-use of silk textiles, partly initiated by established bonds with various religious institutions on both ends of the Silk Road, this ensured an increased influx and accessibility of such tradable commodities.[53]

[50] *Cf.* Jankowiak, "Dirhams for slaves: investigating the Slavic slave trade in the tenth century," 3.

[51] Malmer, *Den svenska mynthistorien. Vikingatiden, ca 995–1030*, 15.

[52] Xinru Liu, *The Silk Road in world history* (Oxford: Oxford University Press, 2010), 69; Michaildis, "Samanid Silver and Trade along the Fur Route," 317–318.

[53] Liu, *The Silk Road in world history*, 87, 89–90.

As previously stated, the Persian geographer Ibn Khurradadhbih noted a Rus' presence in Byzantium. His work includes several references to the Rus', an indication that this group of people were rather well established in the Caspian Sea region already in the 840s CE: "Many trade routes connected the Islamic lands with the north on both sides of the Caspian Sea."[54] The region also appears in one of the runic texts on the so called Rytterne monument (Vs 1) in the Swedish province of Västmanland. It is a commemorative text commissioned by Guðleifr in memory of his son Slagvi, who met his end in the east in Karusm.[55]

The actual location of Karusm has been debated, but the most recent interpretation is that it represents the region of Chorezm, now Khwarezm, south of the Aral Sea and today divided between Turkmenistan, Uzbekistan and Kazakhstan.[56] The rune stone dates to the beginning of the eleventh century and thus represents the very last phase of these travels. Some thirty years later the political situation in the region affected the trade route, and made contacts between Scandinavia and Chorezm less likely.[57] Although journeys to Turkmenistan and the Samanid realm meant crossing the less chartered regions from Bulghar to the Aral Sea, the well-known account of Ibn Fadlan's journey from Baghdad to Bulghar shows that this route was known and possible to travel.[58]

Goods from the markets of the Samanid Realm

The archaeological finds from Sweden that could be interpreted as indications of contacts with Chorezm and other parts of the Samanid realm are heterogeneous, and as we have seen were often loosely characterised as being of "oriental" or eastern type. Despite their disparate places of origin, brought together they present a comprehensive picture of the networks converging at the Samanid markets. Samarkand, Bukhara and Merv were all hubs along the Silk Roads connecting China, India, the Eurasian Steppes and the Muslim world. These long-distance connections could well explain the piece of Chinese silk in Birka and even the spectacular Buddha found on Helgö, an island in Lake Mälaren not far from Birka. (Fig 4) The Buddha has its origins in the Swat Valley of what is now north Pakistan, as convincingly showed by Bo Gyllensvärd.[59] It is difficult to determine when the Buddha reached Scandinavia. The statuette represents one of the earliest examples of its type, probably sixth-century, but its archaeological context, in a group of buildings (Helgö husgrupp 2), is complex and the site was in use from the Roman Iron Age up into the Viking Age (200–900 CE). Helgö was a central place in the region that had important religious functions as well as hosting advanced workshops for metalworking.[60] Although it is unlikely

[54] Hraundal, "The Rus in Arabic Sources: Cultural Contacts and Identity," 54.

[55] Entry Vs 1 in Samnordisk runtextdatabas, http://www.nordiska.uu.se/forskn/samnord.htm

[56] Helmer Gustavson, "Runmonumentet i Rytterne," in *Nya anteckningar om Rytterns socken*, ed., Olle Ferm (Västerås: Västmanlands läns museum: Västmanlands läns fornminnesfören., 2002), 145–147 and there cited references.

[57] Arne, "Austr i Karusm och Särklandnamnet," 291–292; *cf.* Gustavson, "Runmonumentet i Rytterne".

[58] James Montgomery, "Ibn Fadlān and the Rūssiyah," *Journal of Arabic and Islamic Studies* 3 (2000): 1–25.

[59] Bo Gyllensvärd, "The Buddha found at Helgö," in *Excavations at Helgö* XVI. *Exotic and Sacral Finds from Helgö* (Stockholm: Kungl. vitterhets-, historie- och antikvitetsakad., 2004), 10–27.

[60] Wilhelm Holmqvist, ed. *Excavations at Helgö* I, *report for* 1954–56 (Stockholm: Kungl. vitterhets-, historie- och antikvitetsakad., 1961).

Figure 4.
Buddha from Helgö (photo: S. Hallgren, drawing by H. Faith Ell, Swedish History Museum).

that the residents of Helgö were knowledgeable about Buddhism, the presence of several highly potent religious symbols, representing different religious convictions, nevertheless indicates that they were aware of the power that the objects were thought to possess.[61]

Another example is the bronze incense burner found in Hamrånge, Gästrikland in Central Sweden. Unfortunately, the find context is unknown but it is thought to have originated from the region of Khorasan, more precisely Northern Iran, and dates to the early tenth century.[62]

Objects with documented find contexts tend to appear in elite burials or other high-status milieus. Examples of this are the five bronze flasks originating in western Central Asia that reached eastern Scandinavia in the tenth century. In their new context, two of the flasks contained silver treasures and the three others ended up as grave goods in elite female burials.[63] (Fig 5)

[61] *Cf.* Jan Peder Lamm, "Figural gold foils found in Sweden: a study based on the discoveries from Helgö," in *Excavations at Helgö* XVI. *Exotic and Sacral Finds from Helgö* (Stockholm: Kungl. Vitterhets historie och antikvitets akad., 2004), 50–52; Torun Zachrisson, "The holiness of Helgö," in *Excavations at Helgö* XVI. *Exotic and Sacral Finds from Helgö* (Stockholm: Kungl. vitterhets- historie- och antikvitetsakad., 2004), 143–175.

[62] Ture Arne, "Ett gästrikefynd från kalifen Harun-Ar-Rachids välde," *Från Gästrikland: Gästriklands kulturhistoriska förenings meddelanden* (1943): 7–24; Arne, "Austr i Karusm och Särklandnamnet"; Karin Ådahl, "Den praktfulla rökelsebrännaren," in *Sverige och den islamiska världen – ett svenskt kulturarv*, ed., Karin Ådahl, Suzanne Unge Sörling, and Viveca Wessel (Stockholm: Wahlström & Widstrand, 2002), 87–91.

[63] Ture Arne, "Ein bemerkenswerter Fund in Östergötland," *Acta Archaeologica*, vol. 3 (1932): 67–112 (105); Reinhold Odencrants, "Ett vikingatidsfynd med orientaliskt bronskärl," *Fornvännen* 29 (1934): 144–152. *cf.* Charlotte Hedenstierna-Jonson, "Särskilda kvinnor i Klinta," in *Grävda minnen: Från Skedemosse till Sandby borg*, ed., Kjell-Håkan Arnell, and Ludvig Papmehl-Dufay (Kalmar: Kalmar läns museum, 2016), 141–153, (143–145).

Figure 5.
Bronze flasks from western Central Asia, one containing silver treasure (1. Fölhagen, Gotland)[64] *and two deriving from elite female burials (2. Klinta, Öland and 3. Aska, Hagebyhöga, Östergötland) (photos: Swedish History Museum).*

Many of the objects imported from the Samanid markets could be considered luxury items, with an inherent significance related both to the material value of the object and the connotations of long distance trade and the allure of the exotic. Objects of an everyday nature do exist; these are however restricted to very particular sites. Pottery from the Middle East has for example been found on the island of Björkö/Birka, with few known exceptions elsewhere in Scandinavia.[65] The limited quantities of pottery imported from the Black Sea region and the Middle East suggests that these objects were personal belongings rather than objects of trade.[66]

A rather different type of evidence for direct links between Scandinavia and Central Asia is the spreading of diseases due to contacts between people along the routes from China to Europe. Recent studies have revealed that particular types and sub-types of leprosy appear in the Viking-Age and early medieval town of Sigtuna, that connect it with Central Asia and possibly the Silk Roads.[67]

[64] Arne, "Ein bemerkenswerter Fund in Östergötland".

[65] Mathias Bäck, "Birka and the archaeology of remotion: Early Medieval pottery from Byzantium and Beyond in Eastern Scandinavia," in *Byzantium and the Viking World*, ed., Fedir Androshchuk, Jonathan Shepard, and Monica White (Uppsala: Uppsala Universitet, Studia Byzantina Upsaliensia 16, 2016), 255–280 (259–260).

[66] Bäck, "Birka and the archaeology of remotion," 272.

[67] Christos Economou et al., "Ancient-DNA reveals an Asian type of Mycobacterium leprae in medieval Scandinavia," *Journal of Archaeological Science* 40 (2013): 465–470; Verena J. Schuenemann et al., "Genome-wide comparison of medieval and modern Mycobacterium leprae," *Science* 341, no. 6142 (2013): 179–183.

Import with a purpose

A particularly interesting feature with the traces of long-distance trade between Scandinavia and the Samanids is that at least some part of the imported goods had a purpose and a place within Scandinavian crafts. They were not merely exotic objects or personal belongings, but specific raw materials and semi-manufactures intended for a domestic industry. Silk was imported as cloth, and possibly also in the form of thread, at least as early as the ninth century. In Scandinavia, the threads were used for making tablet-woven bands in combination with wool and/or gold- and silver-thread or lan.[68]

Garnet gemstones were another item that reached Scandinavia in raw or semi-manufactured form, and their place of origin was as far away as present day Northern India and Sri Lanka. The garnets were processed and fitted into locally produced jewellery. Established trade routes had carried these, and other, precious stones into Europe from Central Asia since the Roman Period, but in the seventh century there is a gradual decline leaving part of Central Europe without imported garnets from this time. The decline seen in Europe was matched by an increase of use in Europe's peripheries. In Eastern Scandinavia, the seventh and eighth centuries (i.e. the Vendel Period) present the most extensive and elaborate examples of garnet-adorned objects. This may imply that the more peripheral regions of Europe used different networks of contacts than those of, for example, the Frankish Empire, and that Scandinavians possibly had contact with the markets of Central Asia earlier than previously thought.[69] Though not possible to archaeologically confirm, the dating of the Helgö Buddha and its origin in north Pakistan fits well into the more general picture of this early trade.

The import of raw or semi-manufactured materials for local and regional high-quality crafts could be regarded as an indication of a more long-term trade connection with a deliberate and planned import of goods. A possible reflection of this trade can be construed from a silver hoard found in the Viking-Age mercantile port of Birka. This particular hoard contains an unusual amount of coins from outside the Caliphate (36%), coins that derive from sites along the route from Eastern Scandinavia to the Caliphate and Samanid Bukhara: Byzantium, Volga-Bulgharia and Rus'.[70]

Another spectacular find is an Indian coin in a hoard on the island of Öland. Minted in Ohind, Northern Pakistan, in 980–1000 CE, it was part of the so-called Skedstads hoard on Öland. Although the coin is unique in a Scandinavian context, other rare examples have been found in Estonia, Poland and Russia – all representing possible stops along the Eastern trade route.[71]

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[68] *Cf.* Vedeler, *Silk for the Vikings*, 6.

[69] Jonna Sarén Lundahl, "Röd glöd: granaternas betydelse under yngre järnålder med fokus på Gamla Uppsala" (B. A. diss., Uppsala University, 2011); H. Albert Gilg, and Jaroslav Hyršl, "Garnet Mines in Europe," in *Rouges & Noirs. Rubis, grenat, onyx, obsidienne et autres minéraux rouges & noirs dans l'art et l'archéologie*, ed., Jacques Toussaint (Namur: Société Archéologique de Namur, 2014), 144–173.

[70] Gert Rispling, "16D. BJÖRKÖ: Svarta jorden. SHM-KMK 5208:7 (5208:B)," (unpubl. report 2016-05-02).

[71] Eeva Jonsson, *En rik handelsmans silverskatt* (Stockholm: Kungl. Myntkabinettet, 2013), 26.

Conclusions

With the establishing of crafts- and trade-centres along the rivers of European Russia and the Ukraine from the mid-eighth century and onwards, the contacts between Scandinavia and "the East" started to flourish. The trade routes of Asia came closer and desirable goods like silver, textiles, spices, and other prestige objects became more accessible. Although the Caliphate and the Byzantine Empire were primary destinations for these travels, a wealth of archaeological finds in present-day Sweden indicates that the situation was more complex. First observed by scholars in the early twentieth century, it is time to continue the discussion on the diversity and extent of Scandinavian-Asian contacts, and questions of chronology need to be revised. By looking at three geographical regions in which the interaction between Scandinavia and Asia took place, this paper aims at bringing forward the richness and variety of archaeological evidence that suggest that Asia was not perceived as especially distant in the geography of Viking-Age Scandinavia, but rather considered a neighbour.

The archaeological material indicating that Scandinavians had a direct contact with the Silk Roads in Central Asia can be characterised as disparate and ambiguous, at least at first glance. The evidence consists of a selection of objects found in various contexts and with rather enigmatic purposes. Viewed from another perspective, there is a consistency to the array of objects. Most of them derive from a distinct region where several important trade routes merged, a region well known for its eclectic display of cultures and religions, namely the realm of the Samanids in Central Asia. The purpose of this paper has been to show the spectrum of archaeological evidence in Swedish contexts that originate from Central Asia and to pose the question of whether or not direct contacts with the Silk Road were possible during the time of the Tang dynasty. To my mind, the archaeological material supports the idea that direct contacts not only were possible, but actually probable, and that this trade included goods ranging from exotic luxury items to raw materials.

Silk produced in Central Asia reached Scandinavia as early as the first decades of the ninth century, according to Vedeler.[72] This fits well into the picture given by other finds such as the Buddha and silver, along with the mention of Rus' in the Arabic texts from the same period. A route was established linking Central Asia with the North, while the markets of Samanid Central Asia provided goods and contacts from regions even further away, such as what is now India and China.

In light of the accounts of Rus' given in the Arabic sources, the core area of contacts and interactions was the Caspian Sea region and the area south of the Aral Sea. The archaeological evidence in Sweden corresponds very well to this region, although there are few or no archaeological traces of Scandinavians on site. The importance of Birka, with its preponderance of objects that can be linked to the Silk Road markets, defines this island town as the main point of departure for the merchant campaigns. It is however important to stress that Birka was not the only site that benefited from the trade connections. Silk and garnets, as well as luxury items, have been found in several regions of present-day Scandinavia, even though the eastern parts of Sweden dominate the picture.

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[72] Vedeler, *Silk for the Vikings*, 65.

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Travelling with textiles – production, consumption, and trade in the Viking Age

by

Eva Andersson Strand

Introduction

Textiles are essential for most societies. Thus, textile production, consumption, trade and exchange give important perspectives when investigated and integrated into the general discussion on society. The inhabitants of Scandinavia in the period 750–1050, their society and life, their travels, trading and raids have been the focus of much research over several decades. Although it is known that textiles and textile production were significant, this valuable perspective is yet to be more integrated into the general discussion on Scandinavian Viking Age society and the early medieval Silk Roads.[1] Textiles travel in many different ways, as clothes on travellers, as trading goods, as gifts, and loot from raids. Can we actually differentiate, for example between the trade of textiles, exchange of textiles as gifts, or the redistribution of textiles? The aim of this paper is thus to illuminate the complexity of travelling textiles and how this discussion can be integrated in a wider perspective.

In Viking Age societies, there was a need for a wide variety of textiles: textiles for clothing, ranging from the utilitarian, everyday dress to elite costumes, textiles for furnishing, such as bedding, wall-hangings, carpets and coverings, as well as textiles for a variety of other purposes, such as bags and sacks and, perhaps most importantly, textiles for sails and tents. Regrettably, no completely preserved costumes from the Viking Age have hitherto been found, and additionally, there are few depictions of people from this period.[2] However, in the archaeological record are finds of thousands of textile fragments from different burials holding information on raw material and weaving techniques and furthermore, thousands of preserved textile tools which can provide information on the types of textiles produced.[3] Moreover, old texts, such as the Icelandic Sagas, are an added

[1] Viking Age is generally defined as the time period AD 750–1050. However, the use of the term Viking is highly debated (e.g. Croix 2016) but even if criticised "Viking Age" is still used by both scholars and in dissemination e.g. exhibitions. I use the term "Viking Age" in this article to define the period of investigation.

[2] *Cf.* Agnes Geijer, *Die Textilfunde aus den Gräbern*, Birka III (Stockholm: Kungl. vitterhets-, historie-, och antikvitets akademien, 1938); Inga Hägg, *Textilien und Tracht in Haithabu und Schleswig* (Kiel/Hamburg: Wacholtz-Murmann Publishers, 2015); Ulla Mannering, *Iconic Costumes: Scandinavian Late Iron Age Costume Iconography*, Ancient Textiles Series 25 (Oxford: Oxbow Books, 2017).

[3] *Cf.* Geijer, *Die Textilfunde aus den Gräbern*; Lise Bender Jørgensen, *Forhistoriske tekstiler i Skandinavien*, Nordiske Fortidsminder serie B 9 (Copenhagen: Det kgl. Nordiske Oldskrifteselskab, 1986); Eva Andersson, *Tools for textile production from Birka and Hedeby*, Birka Studies vol. 8, ed., Björn Ambrosiani (Stockholm:

source of information, even if it is clear that these types of texts have to be interpreted with caution; the sagas generally describe and tell of people and various events which took place in the Viking Age, but they are written slightly later and are not contemporaneous with the period they describe.[4] However, the sagas mention that men and women wore different types of garments, such as shirts, cloaks, trousers, and gloves. Additionally, they tell of different people attired in various types of costumes indicating their status or military rank; simple clothing, including worn out dresses; and even magical garments; and textiles given as gifts and textiles for exchange and trade.[5]

Whether the settlement was large or small, textile manufacture for everyday use must have taken up a great deal of time in Viking Age society. Knowhow and ability to produce textiles must have been lodged in more than one person, and several people would have been involved in the production process, which included the harvesting of fibres, preparing them for spinning, weaving, the various finishing processes and finally sewing them into clothing and other products.

Birka, production centre and trading place

Birka, the Viking town on the island of Björkö in the Mälar Valley, is well known among textile scholars (Fig. 1). Here, *c.* 4800 preserved textile fragments were found. Some were analyzed by, for example Agnes Geijer and Inga Hägg, and yielded unique information on Viking Age costumes as well as textile raw materials, techniques and manufacture. The textiles from Birka are primarily found in burials like the rich chamber graves. [6] Although only a minor part of the preserved textiles have hitherto been analyzed, they represent an invaluable source of information about Viking Age textiles in Scandinavia. Thus, the analyses have demonstrated textiles made using various techniques and in qualities ranging from very coarse to exclusive fabrics created using complex techniques, and with many threads per centimetre. The wool textiles from Birka have been separated in different groups.[7]

Birka Project for Riksantikvarieämbetet, 2003).

[4] Hjalmar Falk, *Altwestnordische Kleiderkunde. Mit besonderer Berücksichtigung der Terminologie* (Kristiania: Videnskapsselsk., 1919); Annika Larsson, *Klädd Krigare. Skifte i skandinaviskt dräktskick kring år 1000*, Occational papers in archaeology 39 (Uppsala: Institutionen för Arkeologi och Antik Historia, Uppsala Universitet, 2007).

[5] *Cf.* Karl G. Johansson, trans., *Nordiska Kungasagor 1* (Stockholm: Fabel bokförlag, 1991); Karl G. Johansson, trans., *Nordiska Kungasagor 2*, (Stockholm: Fabel bokförlag, 1992).

[6] Geijer, *Die Textilfunde aus den Gräbern*; Inga Hägg, *Kvinnodräkten i Birka: livplaggens rekonstruktion på grundval av det arkeologiska materialet*, AUN 2 (Uppsala: Institutionen för arkeologi Gustavianum, 1974); Inga Hägg, "Birkas orientaliska praktplagg," *Fornvännen* 78 (1984): 204–233; Inga Hägg, "Die Tracht," in *Birka II:2*, ed., Greta Arwidsson (Stockholm: Kungl. vitterhets-, historie-, och antikvitets akademien, 1986), 51–72; Bender Jørgensen, *Forhistoriske tekstiler i Skandinavien.*

[7] Geijer, *Die Textilfunde aus den Gräbern*; Andersson, *Tools for textile production from Birka and Hedeby.*

Figure 1.
Hemlandet, one of several grave fields on Björkö, outside the Viking town of Birka, Sweden (Photo: Courtesy of Björn Ambrosiani).

The materials used were primarily wool and plant fibre, plausibly flax, but other materials like silk, gold and silver threads were also utilized. The analyses of the Birka textiles demonstrate that the textiles in general are of a high quality and that they have a uniform standard in regard to material and manufacture.[8] In textile research, professional production is defined by the criterion of a homogeneous product of a high and uniform standard. The production is organized, the wool of a specific high fibre quality, and it should be, cut, sorted, cleaned, if necessary dyed, and combed. The yarn then has to be spun evenly, woven, and finished.[9]

It was previously believed among textile scholars that no organized textile production had taken place in Birka.[10] Where the textiles were produced and imported from has been subject to scholarly debate over the years.[11] Based on the fibre, weaving technique and standardisation, Agnes Geijer divided the wool textiles into four different groups.[12]

[8] Geijer, *Die Textilfunde aus den Gräbern*; Hägg, *Kvinnodräkten i Birka: livplaggens rekonstruktion på grundval av det arkeologiska materialet*; Inga Hägg, "Birkas orientaliska praktplagg," 204–233; Hägg, "Die Tracht"; Bender Jørgensen, *Forhistoriske tekstiler i Skandinavien.*

[9] *Cf.* Marta Hoffmann, *The warp-weighted loom* (Oslo: Universitetsforlaget, 1964); Geijer, *Die Textilfunde aus den Gräbern*; Bender Jørgensen, *Forhistoriske tekstiler i Skandinavien.*

[10] *Cf.* Geijer, *Die Textilfunde aus den Gräbern*; Hägg, *Kvinnodräkten i Birka: livplaggens rekonstruktion på grundval av det arkeologiska materialet*; Hägg, "Birkas orientaliska praktplagg"; Hägg, "Die Tracht"; See also discussion in Bender Jørgensen, *Forhistoriske tekstiler i Skandinavien*, 164–180.

[11] *Cf.* Geijer, *Die Textilfunde aus den Gräbern*; Agnes Geijer, "Var järnålderns 'frisiska kläde' tillverkat i Syrien? Reflektioner i anslutning till ett arbete om tyngdvävstolen," *Fornvännen* 60 (1965): 112–132; Hoffmann, *The warp-weighted loom*; Hägg, *Kvinnodräkten i Birka: livplaggens rekonstruktion på grundval av det arkeologiska materialet*; Hägg, "Birkas orientaliska praktplagg"; Hägg, "Die Tracht"; Anne Stine Ingstad, "Frisisk klede? En diskusjon omkring noen fine tekstiler fra yngre jernalder," *Viking* 43 (1980): 81–95; Bender Jørgensen, *Forhistoriske tekstiler i Skandinavien.*

[12] Geijer, *Die Textilfunde aus den Gräbern.*

I	Coarse tabbies with 5–7/3–5 threads/cm
II	Exclusive patterned twill fabrics of high quality between 24/15 threads/cm and 55–60/17 threads/cm
III	Ribbed fabrics and other tabby weaves of fine quality thread count varies between 14 and 25 threads/cm but is on average around 18–22 threads/cm. The weft ranges from 8 to 12 threads/cm
IV	2/2 twills with 11/8 threads/cm and 20–22 threads/cm. This group of textiles is also the largest

She compared some textile types from the Birka graves (group IV), with modern tweed or homespun, and she suggests that these fabrics, like the fine worsted, are imported as these textiles have a standardized, craftsman-like quality and seem to have been dyed and finished and sometimes pressed or lightly fulled.[13] Lise Bender Jørgensen later named this group of textiles *the Hessens/Elisenhof type*, and suggested that Friesland could be the provenance for the production of this type of textiles. Her arguments are based on the high number of similar textiles and also loom weights and large quantities of sheep bones from this region.[14]

Another type of textile whose provenance is debated is a broken twill/diamond twill, called *the Birka type*, by Lise Bender Jørgensen, (group II by Agnes Geijer).[15] In Geijer's work from 1938, she proposed that this textile type was imported from Friesland, but later she suggested Syria.[16] In 1969 Carus-Wilson wrote that, it was most likely that these textiles were manufactured in England, and in 1986 Bender Jørgensen suggested that, western Norway could be a possible origin of the Birka type. Bender Jørgensen based her arguments on the number of similar textiles and that "... a great many of the Norwegian women's graves contain weaving implements: loom weights, sword beater and wool combs. These objects could be interpreted as symbols of the women's status as producers of an important trade commodity".[17] Furthermore, there is a group of linen textiles woven in tabby, with a thread count varying between 15 and 20 threads/cm but even those textiles, have been considered to be imports.[18] The conclusion according to these findings was therefore that only the coarsest of wool fabrics were produced in Birka while all other textiles had been imported.

[13] Geijer, *Die Textilfunde aus den Gräbern*; Agnes Geijer, "The textile finds from Birka," *Acta Archaeologica* 50 (1980): 209–222.

[14] Geijer, *Die Textilfunde aus den Gräbern*; Bender Jørgensen, *Forhistoriske tekstiler i Skandinavien*, 179.

[15] Geijer, *Die Textilfunde aus den Gräbern*; Bender Jørgensen, *Forhistoriske tekstiler i Skandinavien*.

[16] Geijer, *Die Textilfunde aus den Gräbern*; Geijer, "Var järnålderns 'frisiska kläde' tillverkat i Syrien? Reflektioner i anslutning till ett arbete om tyngdvävstolen".

[17] Bender Jørgensen, *Forhistoriske tekstiler i Skandinavien*, 360.

[18] See also Hägg, *Kvinnodräkten i Birka: livplaggens rekonstruktion på grundval av det arkeologiska materialet*. However, the provenance of the tablet-woven bands, if they are local or produced else-where has been debated, for more information see also Lise Ræder Knudsen, "Brocaded tablet-woven bands: Same appearance, different weaving technique, Hørning, Hvilhøj and Mammen," in *Northern Archaeological Textiles NESAT VII*, ed., Frances Pritchard, and John Peter Wild (Oxford: Oxbow books, 2005), 36–43.

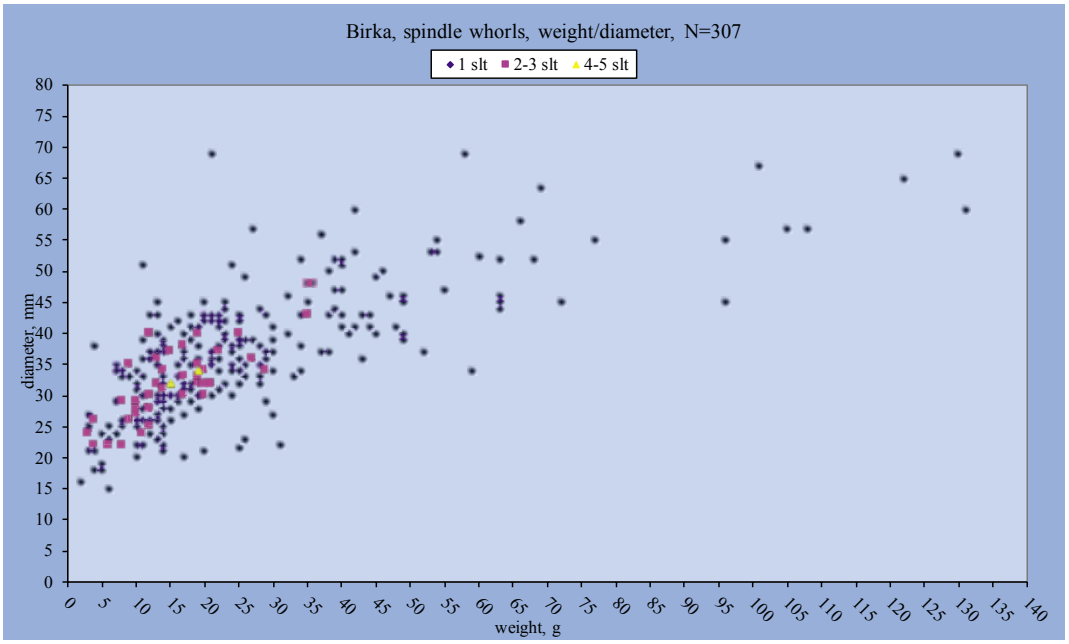

Figure 2. *Birka, spindle whorls' weight and diameter. The range of spindle whorls' weight and diameter clearly demonstrate an extensive and varied production of yarn from very thin to coarse.*

However, the present author's study of the c. 2500 preserved textile tools, primarily from the settlement area (also called the Black Earth) in Birka contradicts these assumptions. Besides the spindle whorls, loom weights, bone needles, and needle boxes, also metal needles and many more, demonstrating a varied production which goes beyond a household production only for everyday use.[19] Furthermore, textile tools studies are even more informative when used in combination with experimental archaeology, as an important part of experimental archaeology is the testing of function and efficiency of textile tools and equipment. As such, experimental archaeology forms a link between textiles and textile tools and contributes to a better understanding of textile production and its complexity. Therefore, several spinning and weaving experiments have been conducted, with reconstructed textile tools and selected raw materials, by skilled textile craft people. The tests have been designed after specific guidelines and the textile produced analysed as archaeological textiles.[20] Via these experiments, one can, for example, conclude that a light spindle is used when spinning a thin and fine thread and heavier spindle is used when spinning a coarse yarn. It is possible, by recording the spindle whorls weight and diameter to get an overview of the range of threads that might have been spun. Important is, however, to also include the fibre material used and of course the spinners skill (Fig. 2).

[19] Andersson, *Tools for textile production from Birka and Hedeby*.

[20] Andersson, *Tools for textile production from Birka and Hedeby*; Linda Mårtensson, Marie-Louise Nosch, and Eva Andersson Strand, "Shape of Things: Understanding a Loom Weight," *Oxford Journal of Archaeology* 28:4 (2009): 373–398; Linda Olofsson, Marie-Louise Nosch, and Eva Andersson Strand, "Experimental testing of Bronze Age textile tools," in *Tools, Textiles and Contexts. Investigating Textile Production in the Aegean and Eastern Mediterranean Bronze Age*, ed., Eva Andersson Strand, and Marie-Louise Nosch (Oxford: Oxbow Books, 2015), 75–100.

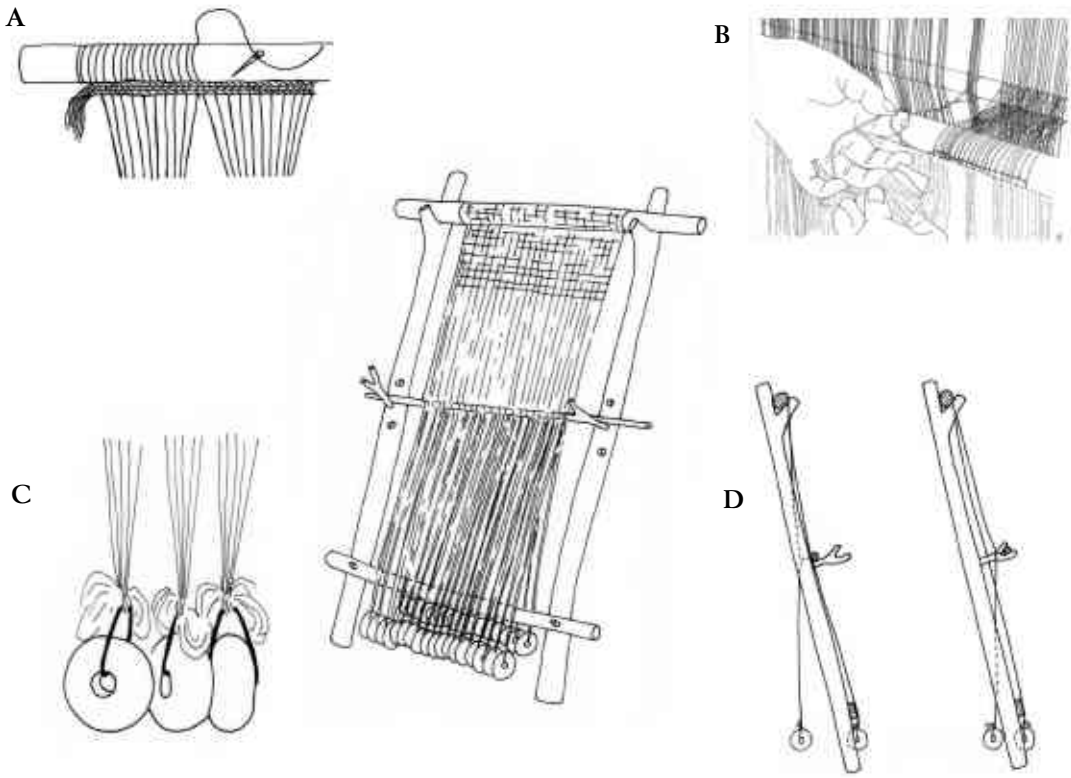

Figure 3. *A warp-weighted loom and the different processes. A. Attaching the warp, B. Heddeling, C. Loom weights attached to the warp, D. Changing shed. (drawing Annika Jeppsson © Annika Jeppsson and Eva Andersson Strand).*

The loom used in Viking Age Scandinavia was in general the warp weighted loom (Fig. 3). Additionally, tests with different types of loom weights have been made. The loom weights are used to hold the vertically hanging warp threads taut in the warp weighted loom. In general, a thin thread needs less tension than a thick thread. In one weaving test, for example, a thread with an average diameter of c. 0.3 mm required a tension of 13 g and a thread with an average diameter of 0.5 mm needed a tension of 18 g. It is also important that the warp threads hang straight in the set up and not to add to many threads per loom weight (not more than 25 threads according to the weavers). Weaving experiments clearly demonstrate that:

- The WEIGHT of a loom weight dictates the number of threads of a particular type that can be fastened to it.
- The THICKNESS of a loom weight determines how closely threads of a particular type will be spaced in the finished fabric.

Thus, by recording and analyse a loom weight's weight and thickness it is therefore possible to calculate the range of textiles that any given loom weight may have been used to produce.[21]

[21] Andersson, *Tools for textile production from Birka and Hedeby*; Eva Andersson Strand, "Tools and Textiles – Production and Organization in Birka and Hedeby," in *Viking Settlements and Viking Society: Papers from the proceedings of the Sixteenth Viking Congress, Reykjavik and Reykholt, 16–23 August 2009*, ed., Svavar

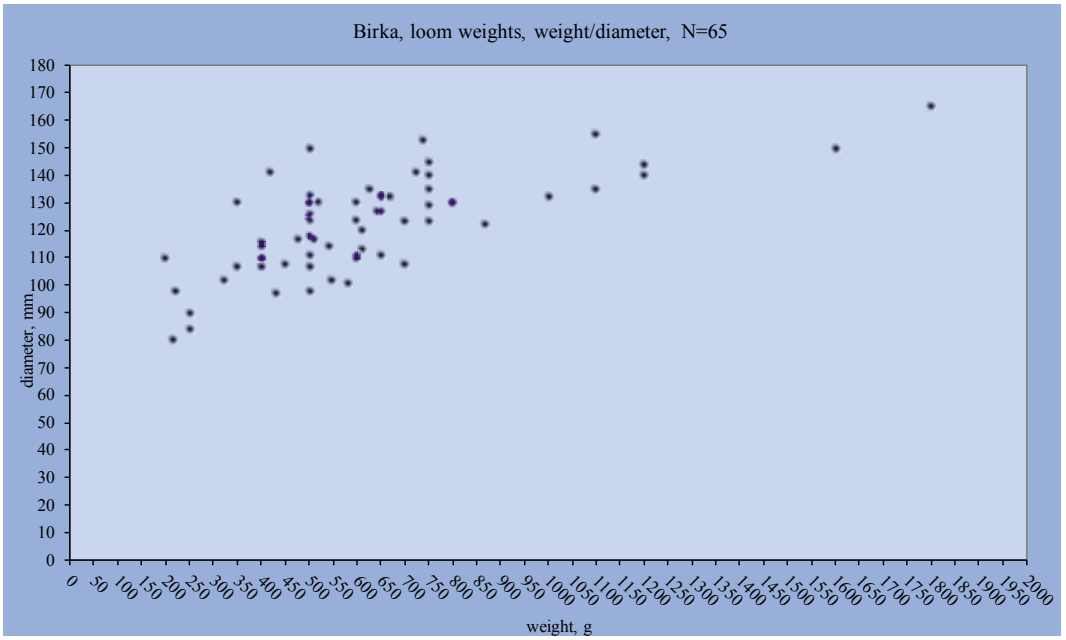

Figure 4. *Birka, loom weights' weight and thickness. The range of loom weights' weight and thickness clearly demonstrate extensive and varied production of fabrics.*

The analyses of the textile tools, e.g. spindle whorls, loom weights and needles in combination with the results from the experimental testing clearly indicate that textile production in Birka was extensive and varied. The inhabitants of Birka produced many different types of textiles, from the exclusive textiles with many thin threads per centimetre to coarser fabrics.[22] It is also noteworthy that the majority of tools are, according to the results from the spinning and weaving tests, suitable for producing the type of textile which is most commonly found, 2/2 twill (group IV according to Geijer, Hessen/Elisenhof type according to Lise Bender Jørgensen).[23]

These findings clearly contradict the previous assumption that indigenous textile production in Birka comprised only coarse wool cloth of poor quality, and it is evident that the inhabitants of Birka possessed tools for making most of the types of wool, specially group I, III and IV and the linen cloth found in the graves. However, it cannot be concluded that all the recovered textiles were produced in Birka and many questions remain: which textiles/raw material were imported, and was long or short distance trade the most likely? How can the early medieval textile trade be defined? Textiles travel in many different ways as clothes on travellers, as trading goods, and as gifts, and loot from raids. Can we actually differentiate, for example between the trade of textiles, exchange of textiles as gifts, or the redistribution of textiles? Which textiles travelled, how and with whom?

Sigmundsson (Reykjavik: University of Iceland Press, 2011), 1–17.

[22] Andersson, *Tools for textile production from Birka and Hedeby*; Andersson Strand, "Tools and Textiles – Production and Organization in Birka and Hedeby".

[23] Andersson, "Tools and Textiles – Production and Organization in Birka and Hedeby"; for group division please also see Geijer, *Die Textilfunde aus den Gräbern* and Bender Jørgensen, *Forhistoriske tekstiler i Skandinavien.*

Figure 5. *Detailed photo of a samite silk from Birka, grave 944, box 11. (photo © Lise Ræder Knudsen and Eva Andersson Strand).*

Textile trade, gifts and exchange

Ingrid Gustin has argued that the towns, Birka and Hedeby can not only be regarded as centres for politically controlled and administered trade, she also emphasizes that, ports of trade are sites where several different types of exchange, both politically motivated and controlled commodity exchange, and trade for personal profit, take place, and furthermore, that the principles of exchange that occurred at Birka and other Viking ports of trade were interlinked.[24] As mentioned previously, scholars have argued that textiles were imported to places like Birka, and even if it is plausible with our current findings that textiles, also exclusive qualities, had been produced here, this does not exclude the trade and exchange of textiles. With these two perspectives in mind, the first question to be asked then is why textiles were imported, was it, for example because of a lack of skill or raw material and/or a desire for something new and luxurious. Another question is which textiles were considered as valuable during this period. How can we, today, separate an exclusive and valuable textile from one that was not considered valuable for a person during this time period? Was it, for example only exclusive textiles, such as silk fabrics, that circulated within the known and visible/detectable exchange/trade systems, or could standardized, everyday textiles, such as a sail-cloth, also be a part of these trading networks?

Exclusive textiles – Silk trade and exchange

A complete survey of most silk from Scandinavian Viking Age graves, discussing their provenance and further, trade and exchange has been done by Marianne Vedeler in her publication *Silk for the Vikings.*[25] According to her, the Scandinavian silk finds can be divided into three different categories, the largest group is *woven silk fabrics* made in either samite or tabby, the second group is *tablet-woven bands* and the third group includes *embroidery* made with silk yarn/and or lamellae, a spun gold or silver thread around a core of silk. In actual fact, the widest variety of different samite fabrics in Scandinavia is to be found in Birka (Fig. 5).[26]

[24] Ingrid Gustin, *Mellan Gåva och Marknad, Handel, Tillit och Materiell Kultur under Vikingatid* (Lund: Almqvist & Wiksell, 2004).

[25] Marianne Vedeler, *Silk for the Vikings,* Ancient Textile Series vol.15 (Oxford: Oxbow books, 2014).

[26] Geijer, *Die Textilfunde aus den Gräbern*; Vedeler, *Silk for the Vikings.*

Silk was produced in many places in Central Asia during this period. According to written sources and archaeological evidence, the cities of Samarkand and Bukhara played a key role in both the production and distribution of silk, despite the difficult political situation. Furthermore, it has been suggested that the inhabitants of Sogdiana dominated the caravan trade along the northern Silk Road.[27] Marianne Vedeler has compared Sogdian silks now kept at the State Hermitage Museum in St Petersburg and observed that technically, they have a great deal in common with the most common type of silk recovered in Birka. They are a type of samite silk with z-spun main warps and weft with no traces of spinning. Furthermore, during the tenth century, silk fabrics were also produced in Constantinople, while most of the raw material, too, could have come from the empire's western provinces, for example the Peloponnese.[28]

The relation between silks trade, exchange, and gifts has been investigated by, for example Anthony Cutler and Marianne Vedeler and their findings clearly demonstrate the complexity of this discussion.[29] Especially silk fabrics and also brocade and embroidery are often mentioned in, for example, contemporary Arabic and Byzantine texts. According to the results of their research, it is evident that Rus merchants, who had a strong connection to Scandinavia traded silk in Constantinople in the tenth century.[30]

However, the quality system was carefully controlled by the Byzantine Empire, and while silk was made in different qualities, it may not always be the best quality that was made available for trade. Marianne Vedeler convincingly argues that trade and gift exchange were most likely not separate spheres but rather interlinked. She also suggests that from this perspective, the merchant could play a key role in both the exchange of goods and in the diffusion of new ideas and fashion.[31] Gift giving played an important role within society, and silk and other valuable goods in Byzantium were ranked as diplomatic gifts. Furthermore, wedding gifts and dowries could be included in this discussion. [32] Vedeler writes "*Gifts were not only used to strengthen ties between friends and allies. Gifts given as sweeteners in negotiations, as instruments used in processes of prisoner exchange and as part of peace treaties and in marriage alliances, are all documented parts of Byzantine and Islamic societies in the Viking Age*".[33] This interpretation allows several different levels of textile mobility, e.g. textiles could have been given as gifts, traded and exchanged, or used as payment for services rendered. It is likely that silks from the Byzantine Empire were not

[27] Vedeler, *Silk for the Vikings*, 75.

[28] Vedeler, *Silk for the Vikings*.

[29] Anthony Cutler, "Gifts and Gift Exchange as aspects of the Byzantine, Arab, and Related Economies," in *Image Making in Byzantium, Sasanian Persia and the Early Muslim World* (Farnham: Ashgate/Variorum Collected Papers, 2009); Vedeler, *Silk for the Vikings*.

[30] David Jacoby, "Silk Economies and Cross-Cultural Artistic Interaction: Byzantium, the Muslim World and the Christian West," *Dumbarton Oaks Papers 58* (2004): 205–206, for a more elaborated discussion see also Vedeler, *Silk for the Vikings*.

[31] Vedeler, *Silk for the Vikings*, 59.

[32] Anna Muthesius, "Silken Diplomacy. Textiles in Trade," in *Proceedings of The Textile Society of America Biennial Symposium, September 14–16 1990*, ed., Maribelle Gittinger and Rita J. Adrosko (Washington DC: Textile Society of America, 1992), 237, 237; Vedeler, *Silk for the Vikings*, 60.

[33] Vedeler, *Silk for the Vikings*, 61; see also Cutler, "Gifts and Gift Exchange as aspects of the Byzantine, Arab, and Related Economies".

merely traded but also given to the Rus as payment for various services and to make political alliances, thus perhaps, it was some of these textiles that reached Birka.

Some of the textiles produced in the imperial workshops, too, could have been given as gifts, for example at negotiations during military expeditions. However, and, in this perspective, it is interesting to note that, the majority of silks in Scandinavia are from female burials. This contradicts the interpretations that the silk was only used by men as symbols to denote military rank since the use of silk stripes is the same in female as in male burials.[34]

Textiles for everyday use

The focus of import, trade, gifts and exchange has thus far been on the textiles that are considered to be of a high quality and exclusive raw materials and not on the demand for textiles as such. When including the everyday use of textiles shirts, cloaks, and trousers, one gains new insights and perspectives.

The sail has been utterly important in the Viking Age, without the sails the people would not have been able to travel as far as they have done, and the production of sails also has to be included in the discussion. Of course, not all people had their own sail as they did not have their own ship but, still it is important to include sailcloth in the discussion. It is generally assumed that the sails were made of wool, there is no archaeobotanical material which support a large-scale cultivation of flax or hemp. Wool sails have also been used in medieval and early modern Scandinavia and in some places as late as the twentieth century.[35]

The results from analyses of textile tools demonstrate that, it is primarily in the Viking towns such as Birka and Hedeby that a production of high quality textiles took place.[36] The tool analyses, as mentioned previously, further demonstrate a production of textiles of many different qualities, including textiles for everyday use.[37] This production is also confirmed by the analyses of textiles in Hedeby from graves as well as the settlement and harbour areas. The analyses show that the textiles from the graves were similar to the textiles from Birka.[38] However, even if the Hedeby textiles from the settlement and harbour area are generally of the same types, they are slightly coarser than those from the graves, demonstrating that more ordinary textiles perhaps for everyday use were indeed produced. Another difference is that textiles from the Hedeby settlement area often are mended in opposite to the textiles from both the harbour area and the graves.[39]

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[34] Vedeler, *Silk for the Vikings*, 115.

[35] Morten Ravn, Lone Gebauer Thomsen, Eva Andersson Strand, and Henriette Lyngstrøm, eds., *Vikingtidens sejl* (Copenhagen: Arkeologiska skrifter, 2016).

[36] Eva Andersson, *Textilproduktion i arkeologisk kontext, en metodstudie av yngre järnåldersboplatser i Skåne*, Institute of Archaeology Report series no. 58 (Lund: Arkeologiska institutionen och Historiska Museet, 1996); Andersson, *Tools for textile production from Birka and Hedeby*.

[37] Andersson, *Tools for textile production from Birka and Hedeby*.

[38] Ibid.

[39] Inga Hägg, *Die Textilfunde aus dem Hafen von Haithabu*, mit Beiträgen von G. Grenander Nyberg und H. Schweppe. Berichte über die Ausgrabungen in Haithabu 20 (Neumünster: Karl Wachholtz Verlag, 1984); Inga Hägg, *Textilfunde aus der Siedlung und aus den Gräbern von Haithabu. Beschreibung und Gliederung*, Berichte über die Ausgrabungen in Haithabu, herausgegeben von K. Schietzel, 29 (Neumünster: Karl Wachholtz Verlag, 1991), 276.

Our knowledge of the relationship between Birka and the hinterland is crucial for the interpretation of craft production and trade in Birka. A precondition for the existence of Birka is that the place or the inhabitants attracted merchants and craftspeople on the one hand, and the population of the hinterland on the other. It is not likely that there was room in a traditional agrarian society for a large, 'non-food-producing' population in one and the same place. Although the inhabitants of Birka were in contact with, for example contemporary west and north European towns and further southeast to Novgorod, Constantinople and to the Caliphate, they would have been highly dependent on the hinterland for satisfying their needs of food, timber, firewood, and raw materials. The goods discussed are generally staple goods such as grain and meat, firewood, timber, and raw materials such as furs and iron.

It has been estimated, based on archaeological finds of textiles and reconstructed costumes that to produce one male and one female complete dress in a coarse quality one needed c. 6.5 kg raw material. Furthermore, it has been suggested that c. 1500 people lived in Birka in the tenth century and if they all needed simple everyday clothing, at least c. 4875 kg of raw material would have been needed.[40] If on average, c. 1.5 kg of spinning wool can be derived per sheep, thus 3250 sheep would have been required to fulfil this demand.[41] Based on modern calculations of the yield from a flax field, one would obtain 6 kg of flax fibres in different qualities from a field of 100 m^2 thus requiring 812.5 fields worth of fibre.[42] If one also includes other everyday textiles, such as sacks, bags and furnishing textiles as well as the production of a couple of sails, it is evident that the inhabitants of Birka on the small island Björkö were not self-sufficient in textile raw material. It is therefore important that in Birka there was a great demand for raw materials for textile production. Large quantities of wool, and possibly flax and hemp were needed merely to cover production for household requirements. Moreover, sailcloth and ropes were required for ships both in the hinterland and in Birka.

Thus, it is likely that textiles, and more importantly the raw material for textile production, too, were traded or exchanged for valuable goods by the inhabitants of the towns and/or the adjacent regions. The analyses of textile tools from the Birka hinterland, in contrast to the results from the analyses of the tools from Birka, do not support a larger production of the types of textiles recovered in Birka. The tools from settlement in the hinterland are in relation to the settlement size (how many people who lived there) fewer indicating a smaller scale production. Furthermore, the analyses of the tools from those sites, do not demonstrate a manufacture of more exclusive textiles with very thin spun thread and fabrics woven with many threads per centimetre.[43] Additionally, the osteolog-

[40] Andersson, *Tools for textile production from Birka and Hedeby*.

[41] Sheep in the Late Iron Age were probably smaller than today's sheep, and it is difficult to determine how much wool could be obtained from one animal. Icelandic sources from the early nineteenth century state that an ewe could yield 1.0–1.25 kg of washed wool and a wether between 1.75 and 2.5 kg of wool. S. Adalsteinsson, "Importance of sheep in early Icelandic agriculture," in *The Norse of the North Atlantic, Acta Archaeologica* 61, ed., Gerald F. Bigelow (København: Munksgaard, 1991).

[42] Eva Andersson Strand, "The textile *chaîne opératoire*: Using a multidisciplinary approach to textile archaeology with a focus on the Ancient Near East," *Préhistoire des Textiles au Proche-Orient/ Prehistory of Textiles in the Near East, Paléorient* 38 (2012): 21–40.

[43] Andersson, *Tools for textile production from Birka and Hedeby*.

ical analyses of the material from Birka, by Bengt Wigh, demonstrate that sheep products were partly imported to Birka from its hinterland. This show that the wool has to come separate, since wool from parts of dead sheep is not usable in the production of textiles. It is further noteworthy that the proportion of sheep bones declines while the proportion of textile tools in Birka increases radically during the tenth century when the population was largest.[44] This confirms that textile raw materials have been imported to the island like other staple goods especially during this later phase.[45]

We may therefore conclude that it is generally the raw material for the production of textiles which had been imported to Birka. A key question is whether the raw materials were traded within a short distance or formed part of a long-distance trade/exchange. As mentioned earlier, different places have been suggested for the import of textiles, primarily from a long distance, and primarily the more exclusive textiles and not the raw material. Only Bender Jørgensen has suggested a short distance trade, but her argument of the high number of similar textiles, textile tools and quantities of sheep bones could also partly be used for, for example Birka.[46] It is, however, plausible that not merely textiles but also wool could have been traded or exchanged from other regions such as Norway and Friesland, a wool of a very high quality suitable for the production of high quality textiles as well as wool from the closer hinterland. There is further evidence for flax and hemp cultivation in the hinterland from where the plant fibres could have been imported.[47]

The textile production in Birka may have been organized in different modes such as household production, basic and advanced, attached textile production but also in a household industry or in a putting out system (Table 1).[48] Who had the ability and know-how to produce standardized and high-quality textiles? According to written sources, north-western Europe, and in particular Frisia was an important textile producing region. Inga Hägg has suggested that the textile craftspeople who left the Frisia Dorestad after its destruction established workshops in new places for example in Hedeby in the ninth century.[49] If so, it is highly plausible that some artisans also came to Birka, perhaps as slaves or attached to the service of the elite. However, textile finds from previous periods clearly

[44] Bengt Wigh, "Animal Husbandry in the Viking Age Town of Birka and its Hinterland. Excavations in the Black Earth, 1990–1995," *Birka Studies*, vol. 7 (Stockholm: Birka Project for Riksantikvarieämbetet, 2001); Andersson, *Tools for textile production from Birka and Hedeby*.

[45] Andersson, *Tools for textile production from Birka and Hedeby*.

[46] Bender Jørgensen, *Forhistoriske tekstiler i Skandinavien*; Andersson, *Tools for textile production from Birka and Hedeby*.

[47] Ann-Marie Hansson, and James Dickson, "Plant remains in sediment from the Björkö Strait outside the Black Earth at the Viking Age town of Birka, eastern central Sweden," in *Environment and Vikings with special reference to Birka*, PACT 52, Birka Studies 4, ed., Urve Miller et al. (Rixensart and Stockholm, 1997), 205–216; Ellen Anne Pedersen, and Mats Widgren, "Del 2 Järnålder 500 f. Kr–100 e. Kr," in *Jordbrukets första femtusen år, 4000 f. Kr.–1000 e. Kr.*, ed., Stig Welinder, Ellen Anne Pedersen, and Mats Widgren (Stockholm: Natur och Kultur/LT, 1998).

[48] Eva Andersson Strand, "Segelduk och segelduksproduktion i arkeologisk kontext," in *Vikingtidens sejl*, ed., Morten Ravn, Lone Gebauer Thomsen, Henriette Lyngstrøm, and Eva Andersson Strand (Copenhagen: Arkeologiska skrifter, 2016); Eva Andersson Strand, and S.-G. Heller "Production and Distribution," in *Fashion in the Medieval Age (500–1450) A Cultural History of Dress and Fashion*, vol. 2, ed., S.-G. Heller (Berg: Bloomsbury, 2017), 29–52.

[49] Hägg, *Textilien und Tracht in Haithabu und Schleswig*, 322.

Production mode	Production scale	Skill level	Raw materials	Time devoted
Household production basic	solely household's own needs	general knowledge and skills	raw materials commonly accessible	part-time
Household industry	beyond producers' needs	general knowledge and skills	surplus of raw material	part-time
Household production advanced	household's own needs or gifts/exchange	special knowledge and skills	raw material of better/higher quality, e.g. imported silk	part-time
Putting out system	beyond producers' needs	general knowledge and skills	buyer supplied raw material, perhaps also tools	part-time
Attached specialist production	high quality products, e.g. desirable gifts	crafts specialists, skills enhanced by full time occupation	raw material of better/higher quality, e.g. imported silk	full-time
Workshops	for direct market; standardized items; great demand for products	crafts specialists, skills enhanced by full time occupation	varying quality according to supply/demand	full-time

Table 1. *Model of different levels of production modes.*

demonstrate the ability to produce high quality textiles in different twill techniques. This production does not indicate new know-how or skill, for instance, the Birka type has been identified from the sixth to eighth century cemetery Nørre Sandgård Vest, Bornholm, Denmark.[50] Additionally, even if many textile tools are preserved, we have no clear indications of textile workshops in Birka. Though, it is certainly plausible that skilled and trained craftspeople came to Birka and influenced the local production in some way.

Despite whoever may have controlled the trade/exchange and the production, the textiles produced in Birka were for everyday use, even if some textiles may also have been utilized in a trade or exchange system, given as gifts and supplied the elite with exclusive textiles.[51]

In order to deepen the discussion, in the following case study (Birka grave 944), I explore how textiles were integrated in the production and exchange systems and how travelling textiles can provide new perspectives, also on the early medieval Silk Roads.

Birka Grave 944, a case study

Grave 944 was a large chamber grave, 2.4 x 1.75 m, located in the largest grave field, Hemlanden, on Björkö (Fig.1).[52] The majority of the graves were situated outside the rampart, but this grave was placed inside the rampart among a group of chamber graves dated to Birka's later phase.

[50] Ulla Mannering, "The Textiles from Nørre Sandegaard Vest," in *Archaeological textiles, report from the 6th NESAT symposium in Borås*, ed., Lise Bender Jørgensen, and Christina Rinaldo (Göteborg: Göteborg University, Dept. of Archaeology, 1998), 107–114.

[51] Andersson, *Tools for textile production from Birka and Hedeby.*

[52] Holger Arbman, *Birka: Untersuchungen und Studien. 1, Die Gräber: Text* (Stockholm: Kungl. vitterhets-, historie- och antikvitetsakad., 1943).

The chamber was oriented in a W. + 10° - S. + E. +10° N direction, and the grave was archaeologically dated to the tenth century CE. The grave was excavated by Hjalmar Stolpe in the second half of the nineteenth century, and according to his notes, there were no visible marks above ground at the time of the excavation. It is interpreted as a male grave based on the archaeological artefacts from the grave, the deceased is buried with several exclusive items, for example a sword, a shield and furthermore, a horse and horse gear.[53] Several of the objects demonstrate clear travelling and or trading connections to the south-east, for example the falcon sword-chapes and the long knife, silk textiles and passementerie work, together with a find of a weight and a dirham.[54] In the grave, at least three different types of silk fabric, tablet-woven bands with silver and silk threads and passementerie were found. Furthermore, a fragment of a plant fibre textile, most likely linen was recovered as well, along with a number of buttons that are interpreted as buttons for a caftan. No wool textiles were preserved in this grave. The textiles preserved, even if very exclusive, are all highly fragmented and the costume can regrettably not be reconstructed. [55]

Silk, tablet- woven bands, passementerie and their origin

Of special interest in the discussion on trade/exchange is indeed the silk fabrics, the passamenterie and the tablet-woven bands from grave 944.[56] At least four fragments have z-spun double main warps and weft with no traces of spinning, which is also the most common type, samite, in Birka. However, the most spectacular silk of all, hitherto, the only one of its kind known from Viking Age Scandinavia, is a piece woven with unspun silk threads with the bottom weaving in tabby with geometrical patterns with stars and dots.[57] Agnes Geijer suggested China as the provenance, basing her conclusion on the pattern and analogous finds of silk textiles, which was later supported by Cyrus-Zetterström (Fig. 6).[58] Additionally, what is striking is that, it is not only the silk itself that is unique, but on the silk fabric there is clear evidence of gold foil (Fig. 7a and b). The silk fabric is sewn together and a clear seam with needle-holes is visible, and on top of the seam passementerie, made of silver rings ca. 0.75 mm thick (Fig. 8). Thus, the question is when the gold foil was added to the silk, and when the passementerie was sewn onto the textiles.

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[53] The author has decided in this paper to refer to the deceased as a man, however, it should be noted that only the teeth are preserved, and as far as is known no biological sex analyses have been done.

[54] Björn Ambrosiani, "The Birka Falcon," in *Eastern Connections Part One: The falcon Motif, excavations in the Black Earth, 1990–1995, Birka Studies* vol. 8, ed., Björn Ambrosiani (Stockholm: Birka Project for Riksantikvarieämbetet, 2003); Charlotte Hedenstierna-Jonson, "A group of Viking Age sword chapes reflecting the political geography of the time," *Journal of Nordic Archaeological Science* 13 (2002): 103–112. See also Charlotte Hedenstierna-Jonson, *The Birka Warrior, the material culture of a martial society.* Theses and Papers in Scientific Archaeology 8 (Stockholm: Stockholm University, 2006).

[55] The textiles have been partly analyzed by Agnes Geijer and in 2013 studied by Lise Ræder Knudsen. However, the textiles were kept in their glass boxes which limited the possibilities for analyses. For reconstruction of costumes *cf.* Mannering, *Iconic Costumes: Scandinavian Late Iron Age Costume Iconography.*

[56] Vedeler, *Silk for the Vikings*, 34.

[57] Geijer, *Die Textilfunde aus den Gräbern.*

[58] Geijer, *Die Textilfunde aus den Gräbern*; Ulla Cyrus-Zetterström, *Opera Textilia Variorum Temporum: to honour Agnes Geijer on her ninetieth birthday 26th October 1988*, ed., Inger Estham, and Margareta Nockert (Stockholm: Statens historiska museum, 1988).

Figure 6. *Detailed photo of Chinese silk from Birka, grave 944, box 20. (photo © Lise Ræder Knudsen and Eva Andersson Strand).*

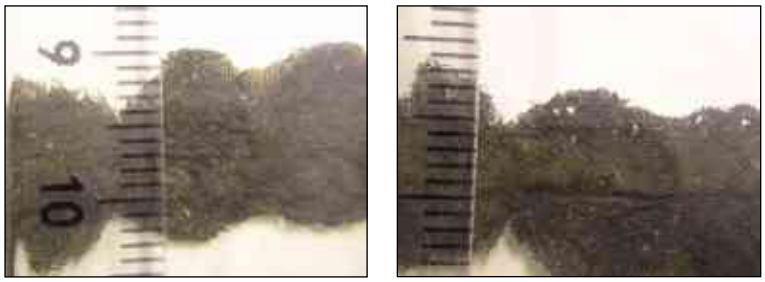

Figure 7. *Detailed photo of Chinese silk from Birka, grave 944, box 20. A. obverse (please note the gold foil) B. reverse (photo © Lise Ræder Knudsen and Eva Andersson Strand).*

Figure 8. *Detailed photo of Chinese silk from Birka, grave 944, box 20 Obverse with passementerie (photo and © Lise Ræder Knudsen and Eva Andersson Strand).*

Figure 9. *Detailed photo of passementerie and silk from Birka, grave 944, box 21a (photo and © Lise Ræder Knudsen and Eva Andersson Strand).*

Could the deceased have been a merchant, as indicated by the weight in his grave? And could he have travelled to Bulgar, or perhaps even further to Baghdad? This is mere speculation, as there were of course merchants in Constantinople from other places in central Asia. However, one can only speculate from where he (or those who placed them in his grave) acquired these unique pieces of silk, and one has to remember that, it might be thousands of kilometres from where it was produced and from where it was traded or given as a gift.

In grave 944, is also found passementerie sewn onto some of the other silk fabrics, and these too, are of the highest quality and made of extremely fine silver rings (Fig. 9). They are sewn onto silks and sometimes the stitches are visible. An instrument to draw metal threads was found in Birka.[59] Thus, it cannot be excluded that some passementerie could have been produced here and sewn onto the costumes in Birka.

Furthermore, there are at least three different types of tablet-woven bands, all made of 2-plied silk yarn lightly z-spun and silver threads.[60] It is known that the silk came both

[59] Birgit Arrhenius, "Ett tråddragningsinstrument från Birka," *Fornvännen* 63 (1968): 288–293.

[60] Ræder Knudsen, "Brocaded tablet-woven bands: Same appearance, different weaving technique, Hørning,

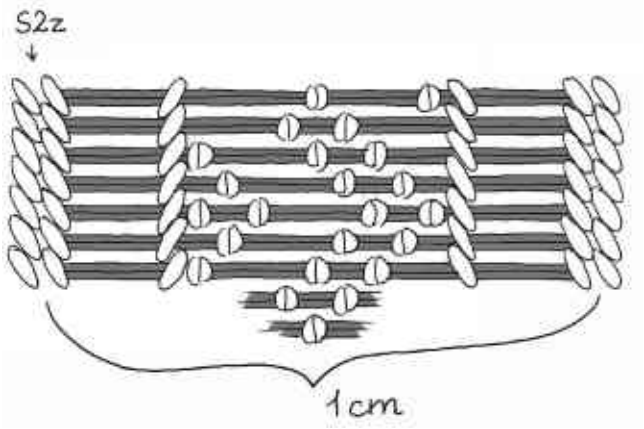

Figure 10. *Detailed photo and drawing of a tablet woven band from Birka, grave 944, box 15 (photo and © Lise Ræder Knudsen and Eva Andersson Strand).*

in the forms of fabrics and in the form of silk threads.[61] Lise Ræder Knudsen, a leading expert on tablet weaving, has argued convincingly that the tablet-woven bands are generally produced locally in Scandinavia and in Birka. This is also supported by the findings of tablets (even if we only have one from Birka) but also the set-up of tablet weaving in the well-known ninth-century burial in Oseberg, Norway.[62] Still, even if the passementerie and the tablet-woven bands were produced in Birka, the raw material is imported, both silk and silver since neither silk or silver was produced in Scandinavia at this time.

There are, as previously mentioned, no other parts of the clothing preserved, and it is not possible to ascertain if the silks and tablet-woven bands were sewn onto another textile as a decoration, if it was a complete silk garment or merely a piece of silk fabric. However, the seams of needle holes on the silks indicate that these functioned as decoration on the costume. Who had the sufficient knowhow and skills? Very thin sewing needles, like today's finest sewing needles, were found, often in metal needle boxes (in sixty-seven female and two male graves) and another one hundred and forty needles boxes, generally made of bone, were from the Black Earth, demonstrating an ability in Birka to sew in very fine fabrics.[63] The craftsperson that made this type of work must have been highly skilled and further had access to exclusive textiles and raw materials.

Textiles for everyday use and travelling – hypothetical calculations

As mentioned previously, the silks and the tablet-woven bands are, except for one small possible plant fibre fragment, the only textiles preserved in this burial. However, it is evident that the man buried here would have required a great deal more clothes in his lifetime. Based on textile analyses from other burials and settlements, an overview of the amount of textiles he would have needed and the time it would take to produce them is provided in the following.

Hvilhøj and Mammen".

[61] Vedeler, *Silk for the Vikings*.

[62] Sigurd Grieg, "Kongsgaarden," in *Osebergfundet* 2, ed., Anton Wilhelm Brøgger, and Haakon Schetelig (Oslo: Den Norske stat, 1928), 1–286; Arne M. Christensen, and Margareta Nockert, *Osebergfunnet bind IV, Tekstilene* (Oslo: Museum of Cultural History and University of Oslo, 2006).

[63] Andersson, *Tools for textile production from Birka and Hedeby*, 88.

Figure 11.

Viking costume reconstructions based on textiles documented in Hedeby.[64]

Based on the texts, both sagas and descriptions in various chronicles, and also iconography, one can suggest that, the man had at least a mantle, over-tunic, tunic, trousers and leggings (Fig. 11).[65] In the Lejre Experimental Centre in Denmark, a male costume was reconstructed based on analyses of textile fragments (techniques, threads per cm and so forth) from the Viking town of Hedeby.

Hypothetically, one calculates that more than four kg of fibre material were needed, and that one costume took approximately one hundred and fifty-five days (if working eight hours a day) to produce, of which eighty-two days alone would have been required for the spinning (Table 2). Moreover, it is likely that more than one set of clothes was needed when travelling.

	Weight, g	Weaving technique	Threads/cm	Yarn needed warp+weft	Time to prepare the fibres	Time to spinn	Tim to set up the loom		Time to weave	Total
Mantel	1400	2/2 twill	9/9 thr	8235	11	20	1	6.8 m2 fabric	13,5	45,5
Over-tunic	880	2/2 twill	19/11 thr	8642	7	22	2	2,9 m2 fabric	6	37
Under-tunic	440	2/2 twill	8/8 thr	5176	3,5	13	1	2,9 m2 fabric	6	23,5
Trousers	1300	diamond	12/12 thr	9285	10	23	1	3,75 m2 fabric	8	42
Leggings 3.6 m	135	chevron	22/11 thr	1330	1	3,5	2	0,4 m2 fabric	1	7,5
Total	4155 g			32 668 m	32,5 days	81,5 days	7 days	17 m2 fabric	34,5 days	155,5 days

Table 2.

Time calculation on the production of a male Viking Age costume for one person working 8 hours a day. The time estimation is based on the outcome of experimental archaeology and ancient written sources.[66]

[64] Graphics: Sidsel Frisch after Andersson, 2003, p. 42, fig. 11. Drawing by Tina Borstam after I. Hägg, *Die Textilfunde aus dem Haafen von Haithabu*; Inga Hägg, *Textilfunde aus der Siedlung und aus den Gräbern von Haithabu. Beschriebung und Gliederung*, and Hägg's reconstruction drawing in Hildegard Elsner, *Wikinger Museum Haithabu: Schaufester einer frühen Stadt*, Schleswig, 1992.

[65] *Cf.* Hägg, *Textilien und Tracht in Haithabu und Schleswig*; Hägg, *Textilfunde aus der Siedlung und aus den Gräbern von Haithabu. Beschreibung und Gliederung*, 268–273; Mannering, *Iconic Costumes.*

[66] *Cf.* Linda Olofsson, Marie-Louise Nosch, and Eva Andersson Strand, "Experimental testing of Bronze Age textile tools," 75–100.

Additionally, if this man were travelling on a ship, he would also need warm, water-repellent clothing and bedding to survive, and wool is highly suitable for this. It does of course differ according to where you are sailing, if sailing on the North Sea or if you are travelling on the large rivers to the east, however, warm clothes are certainly needed. From later period, it is known that traditionally, in Norway each fisherman brought a chest with clothes: three changes of underwear, a wool shirt, five pairs of sea mittens and two pairs of ordinary mittens and most important of all, a rug which could weigh up to six kg.[67]

It is also likely that the ship used for travelling to the east had a sail and perhaps also a spare sail. Several reconstructions of wool sails, and recently also of linen sails have been made.[68] Based on experiments, it is calculated that, to produce one large single sail of 120 sq. m, wool from 150 sheep would have been required, and that it would take more than four years for one person to produce this sail-cloth.[69] The time needed does, of course, also depend on the size of the sails, and it has been suggested that, the sails on the ships travelling to the east were smaller than the sails on the ships travelling in the west. Yet, even so, it would still require a considerable amount of raw material and time to produce. [70]

It is not merely the sail which is a textile on a ship, textiles were also utilized for caulking and as wrapping material for valuable goods, and perhaps the man in question would have needed a tent as well.[71]

To conclude, many different types of textiles were needed when travelling and it is not likely that all are represented in a burial context. It is clear that more and other types of textiles than the ones from grave 944, for example warm and waterproof trousers or the sail. If this is because of bad preservation conditions or that some textiles were not placed in the graves is not possible to judge.

Travelling textiles

Today, it is not possible to know if the man in grave 944 actually travelled. Nevertheless, the objects placed in the burials by those who mourned him tell us that this was an important person with a large network. It is, according to the present author, highly likely that this person travelled and that his need of textiles was substantial. Likely, he did not travel with all his textiles at the same time, he could have left some at home or his sail could shift owner. Some of the textiles he might have got as gifts or traded. It is however

[67] Lise Bender Jørgensen, "The introduction of sails to Scandinavia: Raw materials, labour and land," in *N-TAG TEN, proceedings of the 10th Nordic TAG conference at Stiklestad, Norway 2009*, ed., R. Berge, M. E. Jasinski, and K. Sognnes (Oxford: BAR International Series 2399, 2012) , 173–181.

[68] See also Erik Andersen, "Woolen material for sails," in *Shipshape. Essays for Ole Crumlin-Pedersen*, ed., Olaf Olsen, Jan. S. Madsen, and Flemming Rieck (Roskilde: Viking ship museum, 1995), 249270; E. Andersen, and A. Nørgård, *Et uldsejl til Oselven*, Arbejdsrapport (Roskilde: Vikingeskibsmuseet, 2009); Andersson, Strand, "Segelduk och segelduksproduktion i arkeologisk kontext"; Anna Nørgaard, "Store og små sejl – tidsforbrug ved spinding og vævning," in *Vikingtidens sejl*, ed., Morten Ravn, Lone Gebauer Thomsen, Henriette Lyngstrøm, and Eva Andersson Strand (Copenhagen: Arkeologiska skrifter, 2016).

[69] Andersson Strand, "Segelduk och segelduksproduktion i arkeologisk kontext".

[70] Andersen, "Woolen material for sails"; Nørgaard, "Store og små sejl – tidsforbrug ved spinding og vævning".

[71] Susan Möller-Wiering, *Segeltuch und Emballage, Textilien im mittelalterlichen Warentransport auf Nord- und Ostsee*, Internationale Archäologie 70 (Rahden Westf.: Leidorf, 2002).

clear that when discussing textiles needed for travellers it is essential to assume from his needs which are much more than the textiles from the grave can tell. However, the silk, passementerie and the tablet woven bands were only a small part, but might have been of high significance demonstrating his identity and status. When travelling he would need a ship and most likely a sail, and further, other textiles such as a tent and bags and sacks for storing valuable goods. Moreover, he would require clothing, both to show his rank and status, but also wind- and water-proof clothes against the elements. To produce his costume and other needed textiles, some of the raw material could have been imported, and the costume made by skilled craftspeople in Birka. The most exclusive silk from China with gold and passementerie could have been given as a diplomatic gift in Constantinople and the other silks were perhaps traded. He may also have brought some silk yarn with which a skilled tablet-weaver in Birka made the exclusive bands. And perhaps he played a key role in both the exchange of goods and in the diffusion of new ideas and fashion.

The analyses of the silk textiles demonstrated that it cannot be excluded, rather it is highly plausible that, the silk originated from different places across Eastern Europe, Central Asia and further east, even if several of the other finds clearly indicate a strong connection to Byzantine. An essential question is also if all the objects were the deceased's own items and, in that case, did he obtain them from the same place and at the same time? These questions cannot be answered. However, it is evident that some objects from grave 944 point to the Byzantine Empire and perhaps directly to Constantinople, still, this does of course not exclude that he also has been in contact with or travelled in other regions, further east. It can however, be suggested that the deceased was part of the imperial guard, one of the Varangians, while the silks also indicate that he may have had a role as a diplomat and merchant.[72]

Further remarks

How and why the textiles moved from their place of production to the grave is still an open question that needs to be further explored, but it is important to consider that all types of textiles travelled, not merely the most exclusive. All textiles are a result of complex interactions between resources, technology and society. The catalysts for this interaction are buried in human needs and desires, but also the choices of his society, which in turn influence the exploitation of resources, the development of technology and trading and gift/exchange networks. Conversely, the availability of resources and the state of technology condition the choices of individuals and society. The totality of these interactions is expressed through textile production and in textile trade/exchange and perhaps this is also what we find in grave 944, even if most of the textiles are invisible today and only the most exclusive are preserved.

By integrating both established and new innovative methods of textile analysis, such as isotope analyses within a theoretical framework, the results may in the near future better illuminate the complexity and variety in textile trade, exchange and production and provide us with new and important insights into Viking Age society. The results could

[72] *Cf.* Arbman, *Birka: Untersuchungen und Studien. 1, Die Gräber: Text*; Hedenstierna-Jonson, *Birka Warrior, the material culture of a martial society.*

also provide insight into how the inhabitants of Scandinavia understood identity in their own region but also in other regions and communities. And finally, it is plausible that the findings will give us more secure indications that some of the Scandinavians travelled and traded with textiles on the early Medieval Silk Road.

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Ancient Silks from Western Tibet

by

Tong Tao

Introduction

Through the Silk Roads networks, which bridged the Eurasian continent, Chinese silks reached as far as Hohmichele in Germany, Kerameikos in Greece, Chiusi in Italy, Sardis in Turkey, Palmyra in Syria, and Qustul in Egypt[1] in the Han to Jin periods (second century BCE to fourth century CE), and even earlier, showing its huge enticement to the Mediterranean world, and becoming a cultural carrier between the East and West. New evidence shows that the eastern sections of the networks, the Tibetan Plateau located relative near the silk producing centers, was not an entirely detached area as experts have previously thought. Recent archaeological evidence indicates that the high altitude did not limit the thirst for this luminous good in ancient times. Some portions of the Plateau, especially its northern and western edges, have been involved in the Silk Roads networks during the Han to Jin periods which brought significant effects on the development of the local civilizations.

As recorded in texts[2], the Tibetan Kingdom (Tubo) started to import Chinese silks in large quantity from the mid-seventh century after the Tibetan King Srong-btsan sgampo married the Tang princess Wencheng, who first brought into Tibet silks from the Tang Dynasty. To cater the Princess' pleasure with silks, the King set an example to abandon leather as material for clothing and started to wear silks. Thereafter Chinese silk became a fashion in the whole Kingdom. However, the first time Tibetans heard about silks was not from the Princess Wencheng. Its neighboring kingdom Tuyuhun, located at the northern Plateau and centering the lake Kokonor, dominated the Silk Road trading and exchanges between the core areas of China and Central Asia from the fifth to the seventh centuries.[3] The silk had been the dominant merchandise along the northern portion of the Plateau. The interaction between the Tibetan and Tuyuhun kingdoms was so intimate that the Tibetans could have been introduced to silk stuff by them.

[1] Irene Good, "The Archaeology of Early Silk," *Proceedings of the 8th Biennial Symposium of the Textile Society of America* (Northampton, Massachusetts, September 26–28, 2002). https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1387&context=tsaconf

[2] Liu Xu 劉昫 et al., *Jiu Tangshu, Tubo zhuan 舊唐書: 吐蕃傳* [*Old History of the Tang: On Tubo*] (Beijing, 1975).

[3] Tong Tao, *The Silk Roads of the Northern Tibetan Plateau during the Early Middle Age (from the Han to Tang Dynasty): as Reconstructed from Archaeological and Written Sources* (Oxford: BAR international series 2521, 2013), 13–17.

Since the 1980s a great deal of silk fragments has been unearthed from tombs of the Tibetan Kingdom period (seventh-ninth century CE) in Dulan County, Qinghai Province, located in the southwest of the Tsaidam Basin (outside of the Tibet region of today). It was reported that a total of 350 pieces of silk textiles have been collected, which fall into over 130 different pattern types, among which 112 types are identified as Chinese products, and the others are considered to originate from the region of Central Asia and western Asia.[4] These finds suggest a close contact between the Tibetan Kingdom and Tang Dynasty and the western world. Some silks dated to the Tuyuhun period (fifth to seventh century CE), have survived from long-term repeated usage, and have finally been buried into the Tibetan Kingdom period tombs.[5] It is highly possible that the Tibetans first encountered silks through the intermediary Tuyuhun people at a much earlier time than the Tang dynasty.

However, this is only a reasonable conjecture based on an analysis of the texts. During the seventh to ninth centuries, as recorded in both Chinese and Tibetan texts,[6] a great deal of silks was presented to Tibetan royal families and high-ranking officers by the Tang government to enhance the bilateral political mutual trust, or as a disguised way of trading. Tibetan historical books also mention that the merchants from Kashmir sold silks in the market in front of the Jokhang Temple.[7] However, until recently no ancient silk material had been found in what is today the Tibet region, neither from Tubo tombs, nor in collections.

Since 2012, archaeological work in western Tibet has made a great advance. Archaeologists from the Institute of Archaeology, CASS and Cultural Relics Conservation Institute of Tibet Autonomous Region have found rich amount of silks in some pre-Tibet-Kingdom-period tombs.[8] It is the first discovery in formal excavations in Tibet, and the earliest silks to date on the whole Plateau. The new findings shocked the academia, encouraging them to reappraise the process of how the Tibetans introduced the use of silk, and the significant role that western Tibet has played in Tibetan history.

The Han-Jin period silk textiles found in western Tibet

The vast region of west Tibet, Ngari Prefecture, averagely 4,500 m above sea level, is neighboring Qiangthang in northern Tibet. The resources of life are extremely scarce even today and given the terrain and lack of roads transportation was quite difficult in the ancient past. Before being conquered by the Tibet Kingdom in the mid-seventh century, it was

[4] Xu Xinguo, 许新国, "Zhongguo Qinghai sheng Dulan Tubo muqun de faxian, fajue yu yanjiu," "中国青海省都兰吐蕃墓群 的发现、发掘与研究," ["The discovery, excavation and research of the Tubo tombs in Dulan, Qinghai Province, China,"] in Xu Xinguo, 许新国, *Xichui zhi di yu dongxifang wenming 西陲之地與東西方文明* [*Western China and east-west civilizations*] (Beijing: Beijing Yanshan Press 2006), 132–141.

[5] Xu Xinguo, 许新国, and Zhao Feng 赵丰, "Dulan chutu sizhipin chutan," "都兰出土丝织品初探," ["Preliminary Investigation of silks discovered in Dulan,"] *Zhongguo lishi bowuguan guankan 中国历史博物馆馆刊* 15/16 (1991): 63–81.

[6] Wang Qinruo, 王欽若 et al., *Cefu Yuangui 冊府元龜*, vol. 980. Taibei, 1967.

[7] bSod-names-rgyal-mtshan, *Xizang wangtong ji 西藏王統記* [*The clean mirror of the Royal Genealogies*], *Rgyal rabs gsal bai me long*, transl., Liu Liqian 刘立千 (Beijing: Minzu chubanshe, 2000), 120.

[8] Institute of Archaeology, CASS and Cultural Relics Conservation Institute of TibetAutonomous Region, "2012 Xizang Ali diqu Gar xian Gurugyam mudi fajue jianbao,""西藏阿里地区噶尔县故如甲木墓地 2012 年发掘报告," ["A short report on the 2012 archaeological excavation of the Gurugyam cemetery, Gar County, Ngari PrefectureTibet,"] *Kaogu xuebao 考古学报* 4 (2014): 563–587.

under the rule of a kingdom named Shangshung (Yangtong in Chinese). The area with the densest distribution of population and archaeological sites in Ngari is the upper reaches of the Xiangquan River (Sutlej river in India). It is considered to have been the political centre in both the Shangshung and the Guge periods (tenth to seventeenth century).

In 2006 a tomb was accidentally found by locals in front of the Gurugyam Monastery in Moincer Township, Gar County. Many pieces of silk from the tomb were salvaged by the monks to the Monastery. From 2012 to 2015, archaeologists conducted a series of excavations and investigations at the Gurugyam cemetery, the Chuvthag (Quta) cemetery in the Zanda County and peripheral sites. They found silk material in at least three tombs.

The majority of the silk pieces were found in tomb 2012M1 in Gurugyam cemetery. The tomb is a shaft with a stone chamber at the bottom, which was sealed with logs and then covered with stones. The tomb measures 3.40 m in length, 2.40 m in width and 3.00 m in depth. A wooden coffin with a skeleton wrapped in silk cloth was placed in the stone chamber. The burial objects included bronze containers, a small gold mask, an iron sword, glass beads, wooden objects, and plenty of animal bones. Judging from the tomb's size, structure and rich variety of burial objects, the tomb occupant was probably of high social status. According the C14-dating (AMS) and comparative researches, the tomb is dated to the third to fourth century CE.

The silk material is in a poor state of preservation due to natural and human factors. Only some fragments are relatively complete, but their functions are still not very clear. The preliminary analyses and preservation measures were carried out by the textile laboratory at the Institute of Archaeology, CASS. According to weaving structure they fall into three distinct categories: tabby, gauze, and plain weave silk. Linen tabby was also found. Most of the silk fragments are plain, but some of them are decorated. The colour is fresh, and the weaving technique is quite complicated. Most silks are manufactured using mulberry silk. Some of them are made of tussah silk.

Figure 1. *Figured brocade with the Chinese characters* "Wang Hou". *Reproduced from Institute of Archaeology, CASS and Cultural Relics Conservation Institute of Tibet Autonomous Region, 2014, pl. 6.1.*

Figured brocade with the Chinese characters "*Wang Hou*"

This is a rectangular piece of cloth. The monks who unearthed the material said that it had been used to wrap the deceased's head. This is a practice resembling burial facial covers which are found in southern Xinjiang. The cloth is a typical Han-manufacture, a warp-faced patterned silk with a dark blue ground and beige designs (Fig. 1).

The pattern is quite complex. It has three horizontal registers of figures, each of which features different sets of zoomorphic ornamentation. There are also remains of a border with a more abstract design. In the top register is a series of paired winged tigers, with mouths agape. A typical Han period *ding* tripod and the Chinese character *yi* (appropriate) can be seen above the tigers. The middle register is comprised of four fully intact compartments separated with vertical columns. Each compartment contains a pair of peacocks and a pair of what may be carnivores along a central axis. They are framed by a pair of turtles and a pair of dragons. Altogether this probably represents images of the Four Supernatural Beings (*sishen*) – Vermillion Bird, White Tiger, Black Turtle and Blue Dragon which in ancient China symbolized the four cardinal points. Two Chinese seal script characters "*Wang Hou*" (King and Marquess) and their mirror images are symmetrically placed in the in-between space. The lower register is dominated by a wavy pattern containing in each wave crest a pair of opposing waterfowls. At the bottom, there is a row of masks. The figures and the Chinese characters provide a basis for establishing a dating of the tomb.

Full size: 44 cm x 25 cm; weave: 1:3 warp-faced compound tabby; pattern repeated: 4 cm in warp direction; threads per unit length: 27 x 15 /cm^2; width of warp thread: 0.15–0.25 mm, untwisted; width of weft thread: 0.25 mm, untwisted.

Brocades with geometric patterns

There are two items decorated with geometric design. One is in roughly square shape. It is decorated with ochre meandering grass and dots pattern and parallel dark reddish bands against yellow ground. The bands are in horizontal direction and at different distance (Fig. 2, Fig. 3, Fig. 4).

Figure 2. *Brocade with geometric patterns. Reproduced from Institute of Archaeology, CASS and Cultural Relics Conservation Institute of Tibet Autonomous Region, 2014, pl. 6.2.*

Figure 3. *Fabric construction of the brocade with geometric pattern. Photograph courtesy of Institute of Archaeology, CASS and Cultural Relics Conservation Institute of Tibet Autonomous Region.*

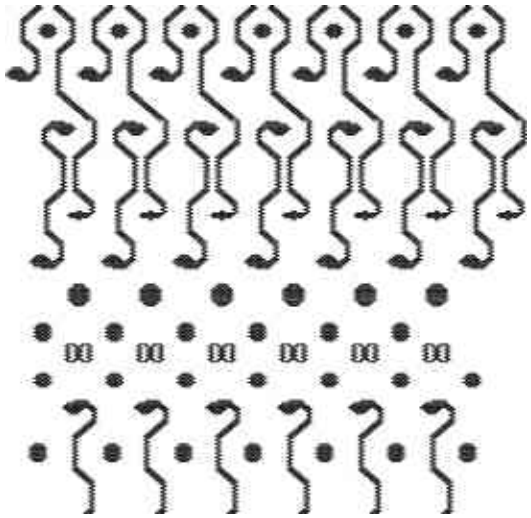

Figure 4. *Geometric patterns of the brocade. Drawing courtesy of Institute of Archaeology, CASS and Cultural Relics Conservation Institute of Tibet Autonomous Region.*

Full size: 17 cm x 15 cm; weave: 1:1 weft-faced compound tabby; pattern repeated: 1.8 cm in weft direction; threads per unit length: 42 x 39 threads/cm^2; width of warp thread: 0.15–0.25 mm, strong Z-twist; width of weft thread: 0.25 mm, strong Z-twist.

The other is in square shape, bearing ochre dots pattern against yellow ground. On its three sides fragments of reddish gauze and plain-weave silks are attached (Fig. 5).

Figure 5. *Brocade with geometric patterns. Reproduced from Institute of Archaeology, CASS and Cultural Relics Conservation Institute of Tibet Autonomous Region, 2014, fig. 22.1.*

Full size: 62 cm x 55 cm; size of brocade: 41.5 cm x 40 cm; weave: 1:1 weft-faced compound tabby; pattern repeated in weft direction; loom width: 40 cm; threads per unit length: 88 x 60 threads/cm^2; width of warp thread: 0.15 mm, slight Z-twist; width of weft thread: 0.2–0.35 mm, slight Z-twist.

Figure 6. *Black gauze. Reproduced from Institute of Archaeology, CASS and Cultural Relics Conservation Institute of Tibet Autonomous Region, 2014, pl. 6.3.*

Black gauze

The fragment is in roughly triangular shape, undecorated. One side preserves the selvage. It is woven with thin tussah silk.[9] The density of threads per cm is extremely high (Fig. 6).

Full size: 43 cm x 29 cm; threads per unit length: central part 72 x 16 threads/cm^2, selvage part 200 x 16 threads/cm^2; width of warp thread: 0.05–0.1 mm, untwisted; width of weft thread: 0.25–0.5 mm, untwisted.

Reddish gauzes

There are five pieces of reddish gauze fragments. The largest one is in rectangular shape, undecorated (Fig. 7).

Figure 7. *Reddish gauze. Reproduced from Institute of Archaeology, CASS and Cultural Relics Conservation Institute of Tibet Autonomous Region, 2014, fig. 22.2.*

Full size: 46.5 cm x 45.4 cm; threads per unit length: 46 x 24 threads/cm^2; width of warp thread: 0.1–0.15 mm, untwisted; width of weft thread: 0.2–0.25 mm, untwisted.
The other four items are fragments being stitched to linen tabby and geometric brocades.

[9] The species of moth producing the filaments of the tussah silk could be expected to be *Antherea pernyi* (the Chinese (oak) tussar moth) as reported from other studies of wild-silk material from China. Future studies of this material will provide a definite answer. Another region for early wild-silk production is South Asia but here different species have been identified (*Antheraea assamensis* and *A. mylitta*), see for example I. L., Good, J. M. Kenoyer, and R. H. Meadow, "New evidence for early silk in the Indus Civilization," *Archaeometry* 50 (2009): 1–10.
https://www.harappa.com/sites/default/files/pdf/Good%20Kenoyer%20Meadow%202009%20Indus%20Silk.pdf

Figure 8. *Brown plain weave silk. Photograph courtesy of Institute of Archaeology, CASS and Cultural Relics Conservation Institute of Tibet Autonomous Region.*

Brown plain weave silk

The fragment is in irregular shape, undecorated (Fig. 8).

Full size: 36 cm x 27 cm; threads per unit length: 54 x 38 threads/cm^2; width of warp thread: 0.1–0.15 mm, untwisted; width of weft thread: 0.15–0.2 mm, untwisted.

Linen tabby

The fragment is in a stripe shape. A piece of reddish gauze has been stitched to each end. (Fig. 9).

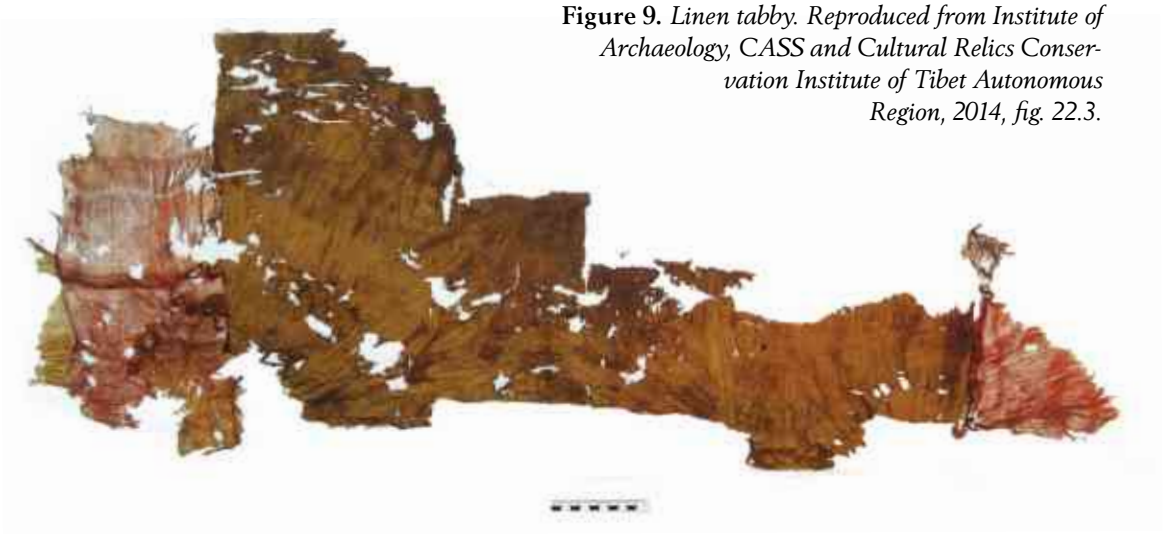

Figure 9. *Linen tabby. Reproduced from Institute of Archaeology, CASS and Cultural Relics Conservation Institute of Tibet Autonomous Region, 2014, fig. 22.3.*

Full size: 122 cm x 45 cm; threads per unit length: 24 x 22 threads/cm^2; width of warp thread: 0.3–0.35 mm, strong Z-twist; width of weft thread: 0.3–0.35 mm, slight Z-twist.

Figure 10. *The gold mask from the Chuvthag (Quta) cemetery (obverse). Reproduced from Tong Tao and Li Linhui, 2015, fig. 2.*

Figure 11. *The gold mask from the Chuvthag (Quta) cemetery (reverse). Reproduced from Tong Tao and Li Linhui, 2015, fig. 3.*

Archaeological indications for a *terminus post quem* dating of the introduction of silk to western Tibet

Besides the samples analyzed above, there are great many fragments waiting for further analysis so possibly there are more categories. Furthermore, as told by the locals, several years ago the locals found colourful robe-shaped cloth when they dug a building foundation. It seems to be silk textiles from the same period. In 2015 some herdsmen discovered three shaft tombs at ca. 50 km northwest of the Gurugyam cemetery. At least one tomb yielded large amount of silk. However, the tombs have not been excavated formally. Seen from the fragments collected by the herdsmen, the silk textiles have similar patterns and a dating close to the Guruyam finds. The tombs' structure and other burial objects reinforce the judgment. It indicates that the silks in the upper reaches of the Xiangquan River are not a solitary case. Silks probably were very prevalent during the Han–Jin period.

In the burials of the Chuvthag (Quta) cemetery in Zanda County, traces of silk have also been found. The cemetery is located ca. 200 km northwest of the Gurugyam cemetery, also on the bank of the Xiangquan River. In 2009 archaeologists found a gold mask in the tomb M1 at the Area I of the cemetery, which is comparable with the one from the Gurugyam[10] (Fig. 10, Fig. 11).

[10] Jin Shubo, 金书波, *Cong Xiang xiong zoulai 从象雄走来* [*Coming from Zhangzhung*] (Lhasa: Xizang renmin chubanshe, 2012); Tong Tao, and Li Linhui, "Ouya shiye nei de ximalaya huangjin mianju," ["The Himalayan gold masks seen in the Eurasian perspective,"] *Kaogu* 2 (2015): 92–102.; Tong Tao and Li Linhui, "The Himalayan Gold Masks from the Eurasian Perspective," Chinese Archaeology 16.1 (2016): 85–90.

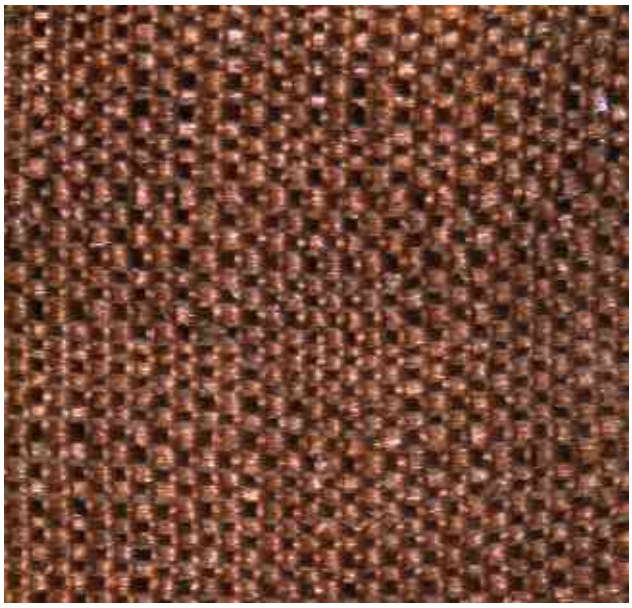

Figure 12. *Fabric construction of the silk underlining of the mask. Photograph courtesy of Institute of Archaeology, CASS and Cultural Relics Conservation Institute of Tibet Autonomous Region.*

The difference is that the Chuvthag (Quta) mask is in life-size and preserves thick cloth underlining on its reverse side, which is proved to be silk cloth. It has two layers of plain weave silks and a wad of silk floss. The plain weave silks are dark reddish and yellowish respectively. The dark reddish silk has 76 x 72 threads per cm^2. Both the weft and warp threads are untwisted, measuring 0.05–0.1 mm in width (Fig. 12).

The burial mask with silk underlining resembles that from the Yingpan cemetery in Xinjiang.[11] According to the C14-dating, the burial is dated to the first to second century CE.

No silk has been found in the five burials at Area II of the Chuvthag (Quta) cemetery excavated in 2014. The burials are from the second century BCE to the first century CE. Therefore, the time that silks occurred and became prevalent in the region should be dated to the first to second century CE.

The provenances of the silks and related questions

Judging from the artistic style, the silks are consistent with contemporary silks found in the neighbouring Xinjiang. A comparative study could be helpful to establish their chronology, to trace their provenances and importing tracks, as well as to study the cultural links between the region of western Tibet and Xinjiang and Central Asia.[12]

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[11] Xinjiang Institute of Archaeology, "Xinjiang Yuli xian Yingpan mudi 15 hao mu fajue jianbao," "新疆 尉犁县营盘墓地15号墓发掘简报," ["A short excavation report on Tomb 15 at the Yingpan site, Yuli, Xinjiang,"] *Wenwu* 文物 1 (1999): 4–16.

[12] There is evidence of silks produced locally in the kingdoms of what is now Xinjiang in the second to third centuries CE. See, for example, the Sino-French excavations at Karadong where finds of silk made by spun, discontinuous *Bombyx mori* filaments were made. This is discussed in terms of Buddhist influence, since it indicates the usage of cocoons pierced by the mature moths instead of intact cocoons, which requires the killing of the silkworm. Such influence is further substantiated by the discovery at the site of two Buddhist shrines, which are among the oldest discovered outside of India. This practice may be related to migrants from the Kushan Empire, who are known to have arrived, for example in Niya and Loulan, at the end of

Figure 13. *Figured brocade from the Juqu Fengdai's tomb in Astana, Xinjiang. Reproduced from Gems of Chinese Cultural Relics' Editorial board, 1993, pl. 133.*

To date there are two pieces of silks from Xinjiang bearing patterns identical to the Gurugyam's figured brocade with the Chinese characters "*Wang Hou*". One example is from Juqu Fengdai's burial at Astana cemetery in Turfan,[13] which has an absolute date (455 CE) according to the burial inscriptions (Fig. 13).

In this case the silk has continuous arch-shaped wave patterns. In the vertical direction between the two waves it is a compartment, containing a similar central axis, supporting columns, winged tigers, and the Four Supernatural Beings. In the lower part, the paired waterfowls and masks can be clearly seen. Their contents are quite identical except that the artistic styles are a little different. In the Gurugyam silk the pattern is much more vividly and freely depicted, while in the Astana silk it is quite rigid and compacted, probably indicating a relative later period, when the pattern became standardized and developed. The assumption is further supported by that in the Astana silk there are no "*Wang Hou*" characters, which was a unique characteristic during the Han–Jin period.

The other comparable item comes from the Tomb M39 at the Yingpan cemetery in Yuli County, [14] dated to the third to fourth century by the excavators (Fig. 14).

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the second century. Sophie Desrosiers, and Corinne Debaine-Francfort, "On Textile Fragments Found at Karadong, a 3rd to early 4th Century Oasis in the Taklamakan Desert (Xinjiang, China)," Textile Society of America Symposium Proceedings, 958. (2016), 66–75 (67, 72–73). https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1961&context=tsaconf

[13] Xinjiang Institute of Archaeology, "Astana gumuqun di shi ci fajue jianbao," "阿斯塔那古墓群第十次 发掘简报 （1972–3)," ["Short Excavation Report on the tenth season at the Astana cemetery, 1972–3,"] *Xinjiang wenwu 新疆文物* 3–4 (2000): 84–167; Gems of China's Cultural Relics' Editorial Board 《中國文物精華》編輯委員會 編, *Zhongguo wenwu jinghua 中國文物精華* [*Gems of China's Cultural Relics*] (Beijing: Wenwu chubanshe, 1993), pl. 133.

[14] Zhao Feng 赵丰, *Fangzhipin kaogu xin faxian 纺织品考古新发现* [*Recent excavations of textiles in China*] (Hong Kong: ISAT/Costume Squad Ltd, 2002), 44–45.

Figure 14. *Figured and inscribed brocade from the Yingpan cemetery, Xinjiang. Reproduced from Zhao Feng, 2002, fig. 4.*

In this silk, patterns of waves, masks, columns, central axis, and various beasts are preserved. The Chinese characters "*Wang Hou*" and its Prakrit translation in Kharoṣṭhī script and their mirror images appear in the compartment. The free artistic style and the Chinese inscriptions are reminiscent of the Gurugyam silk, suggesting that they have close dates and provenances.

In the Tarim Basin of Xinjiang many textiles from the Eastern Han–Jin periods bear Chinese characters "*Wang Hou*". They are considered as political presents that were manufactured by the imperial workshops in the Central Plain of China and rewarded to non-Han-Chinese leaders of what from the imperial power point-of-view was remote frontier kingdoms, to facilitate and strengthen the tributary relationships. Scholars like Yu Weichao[15] and Yu Zhiyong[16] discuss all brocades with the "*Wang Hou*" inscriptions from Niya and other sites in Xinjiang. Considering the burial context, both argue that the owners of these brocades must have been royal members of the local regimes and have maintained close political and trading relation with the central governments of the Han Dynasties. As to the Gurugyam case, it is hard to reach the same conclusion due to the lack of ancient records, and that it was located so far away from central China. But it is unquestionable that the owner of the silk must have been privileged elite who had the power to obtain the most luxurious goods. Other burial objects also suggest a huge hierarchical discrepancy between this and other burials.

[15] Yu Weichao, 俞偉超, "Niya 95 MNI hao mudi M3 yu M8 muzhu shenfen shitan," "尼雅 95 MNI號墓地 M3 与 M8 墓主身份试探," ["Preliminary study on the occupants' identities of the tombs M3 and M8 at the cemetery 95MNI, Niya,"] *Xiyu yanjiu 西域研究*. 3 (2000): 40–41.

[16] Yu Zhiyong, 于志勇, "Loulan – Niya diqu chutu Han Jin wenzi zhijin chutan," "樓蘭—尼雅地區出土漢晉文字織錦初探," ["Preliminary study on the Han–Jin periods textiles inscribed with characters from the Loulan-Niya region,"] *Zhongguo lishi wenwu 中國歷史文物* 6 (2003): 38–48.

The Gurugyam inscribed silk is further evidence that the material was imported from Xinjiang. However, Xinjiang was possibly only a transit station. A majority of Gurugyam silks are warp-faced compound tabby, the typical Han Chinese weaving tradition, showing their provenance could be traced to the Central Plain of China. The other evidence is the black gauze woven with tussah silk. The processing and mass production of the wild silk requires higher skills, because the fibres are much different in width, and may contain more impurities. The Central Plain of China during the Han–Jin periods had obviously approached a high level of silk production. According to ancient Chinese records, in 40 BCE, in today's Shandong province, farmers had harvested more than one thousand *Dan* of wild silkworm cocoons, which was made into silk floss.[17] In 26 CE, the "barbarians" collected the silk floss from wild silkworm cocoons. [18] In 351 CE, in today's Shaanxi province, the locals collected wild silkworm cocoons and made clothes.[19] Tussah silk dating to 120 BCE has been found in Edsen Gol region, Inner Mongolia,[20] suggesting the silks were transported to the west. The Gurugyam findings are evidence of the Han Chinese mass production of tussah silk, reflecting that the weaving technique had developed to a very advanced stage.

The fabric construction indicates that the majority of Gurugyam silks were products from Han China, but not all. The two brocades with geometric patterns, which are weft-faced compound tabby, could have different provenances. The decorating patterns of dots and meandering grass are characteristic of Xinjiang silks from the Eastern Han to Western Jin periods, for example, the two brocades from the eastern suburb of the Loulan city-site,[21] dating to the Eastern Han, and the silk facial cover excavated from Niya, Minfeng County,[22] which are dated to the Han–Western Jin period. However, all of them are warp-faced compound tabby being a typical Han Chinese product. A few weft-faced compound tabbies are found at the Zagunluke cemetery in Qiemo County. Among them at least two fragments bearing the similar dot and meandering grass patterns. One is from the tomb

[17] Cui Bao, 崔豹 (attributed), *Gu jin zhu 古今注* [*Notes to Things Old and New*] from Ouyang Xun (557–641), *Yiwen leiju, 藝文類聚*, [*Classified collection based on the Classics and other literature*], vol. 65, Chanye bu I. (Shanghai: Shanghai guji chubanshe, 1965), 1166.

[18] Sima Biao, 司馬彪, *Xu Hanshu, 續漢書*, [*Continuation of the Han History*], from Ouyang Xun (557–641), *Yiwen leiju, 藝文類聚*, [*Classified collection based on the Classics and other literature*], vol. 65, Chanye bu I (Shanghai: Shanghai guji chubanshe, 1965), 1166.

[19] Cui Hong, 崔鴻, *Shiliuguo chunqiu*十六国春秋 [*Spring and Autumn Annals of the Sixteen Kingdoms*] (Shanghai: Shangwu yinshuguan, 1937), 20.

[20] Vivi Sylwan, *Investigation of silk from Edsen-Gol and Lop-Nor and a survey of wool and vegetable materials.* Reports from the Scientific Expedition to the North-Western Provinces of China under the Leadership of Dr. Sven Hedin, The Sino-Swedish expedition 1927–1933, Publication 32, VII Archaeology (Stockholm: Statens Etnografiska museum, 1949), 20.

[21] Huang Nengfu, 黃能馥, ed., *Yinran zhixiu, shang, 印染織綉，上*, [*Printing, Dyeing, Weaving and Embroidery, part I,*] *Zhongguo meishu quanji, Gongyi meishu bian 中国美术全集工艺美术编 6* [*The Great Treasury of Chinese Fine Arts, Arts and Crafts 6*] (Beijing: Wenwu chubanshe, 1986), English ed., trans., He Fei 1991, fig. 92; Zhao Feng, 赵丰, ed., *Zhongguo meishu quanji, fangzhipin yi 中国美术全集·纺织品一* [*The Treasury of Chinese Fine Arts, Textiles I.*] (Huangshan shushe, 2010), 75.

[22] Ibid., 85.

Figure 15. *Weft tabby with geometric patterns from the Zhagunluke cemetery M73, Qiemo, Xinjiang. Reproduced from The Museum of Xinjiang Uygur Autonomous Region et. al., 2003, pl. 16.1.*

Figure 16. *Weft tabby with geometric patterns from the Zhagunluke cemetery M115, Qiemo, Xinjiang. Reproduced from Wang Mingfang, 2008, fig. 7.*

M73 (Fig.15)[23], dated to the end of the Eastern Han to Western Jin period; the other is from the tomb M115 (Fig.16),[24] dated to no later than the mid-third century.

Although the pattern in the Gurugyam silk is not completely identical to them (it could be considered a regional variation) they are consistent in the fabric construction, that is weft faced compound tabby, the typical weaving tradition of western and Central Asia.

The weft-faced compound tabby from southern Xinjiang and western Tibet could be the earliest of its kind in China. Hitherto most such silks appeared in the Zagunluke cemetery. Some have been found in other neighbouring regions, such as the Huahai cemetery in Gansu (dating to 377 CE), the Yingpan cemetery and the Astana cemetery in Xinjiang, and the Munchaktepa cemetery in Uzbekistan. These tombs are dated to the third to fourth century. Scholars believe that these findings could be Xinjiang local products woven with

[23] Xinjiang Uyghur Autonomous Region Museum, CPAM of Bayingolin Mongolian Autonomous Prefecture, and CPAM of Charchan County, "Xinjiang Qiemo Zagunluke yi hao mudi fajue baogao," "新疆 且末扎滚鲁克一号墓地发掘报告," ["Excavation of Graveyard No. 1 at Zagunluk in Charchan, Xinjiang,"] *Kaogu xuebao* 1 (2003): 89–136, 161–176. pl. 16–1.

[24] Wang Mingfang 王明芳, "San zhi liu shiji Zagunluke zhijin he cixiu," "三至六世纪扎滚鲁克织锦和刺绣," ["Polychrome Woven Silk and Embroidery of Zagunluk between the 3rd–6th Centuries,"] in *Xibei fengge, Han Jin zhiwu 西北风格汉晋织物* [*Western Imprints: Textiles from Han and Jin Dynasties in China*], ed., Zhao Feng (Hong Kong: ISAT/Costume Squad Ltd, 2008), 18–39.

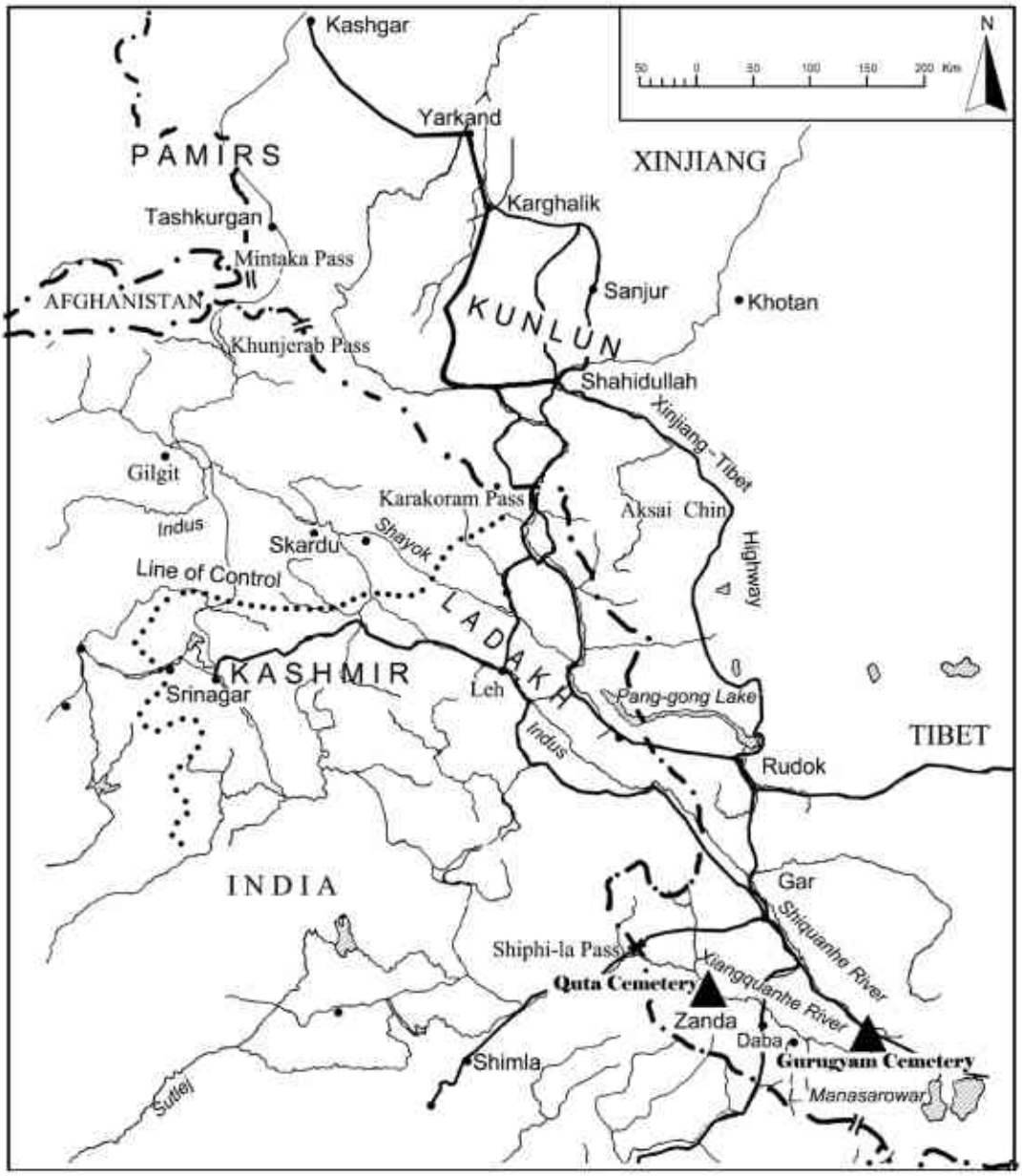

Figure 17. *The Silk Roads in western Tibet. Drawing by Tong Tao.*

spun silk.[25] Both their warp and weft threads are strongly twisted in Z direction, unlike those Han Chinese tabbies whose threads are untwisted or slightly S-twisted. The typical patterns, for instance dot and meandering grass, could have been influenced by Han Chinese silk textiles. They are usually in colours of white, red, grey, and yellow. The loom width of the Xinjiang-produced tabby is normally one metre, with pattern repeat in warp direction but not in the weft direction. In ancient texts, it was counted by the measure word *Zhang* (sheet). It is evident that their occurrence in western Tibet confirms the close relation between the two distant regions.

Conclusion

The Gurugyam silks are an indicator for scholars to trace the cultural exchanges between the two regions of western Tibet and southern Xinjiang. Other than the silks, the burial objects from western Tibet, such as the gold masks, iron-, lacquer-, and wooden objects and various ornaments, suggest its close cultural links with Xinjiang and neighbouring regions. In ancient times the upper reaches of the Xiangquan River could be considered a place of exchange of various foreign goods, either living stuff or articles of luxury. These foreign goods played a vital role in the human life due to the harsh environment and extremely low resources. It may even be said that it was such cultural exchange that enabled ancient humans to reside in such high-altitude areas (Fig. 17).

The archaeological discovery in western Tibet indicates that as early as the Han–Jin periods, the transportation network covering southern Xinjiang and western Tibet was established. It is well-founded to conclude that the mainstream of the Silk Road in Xinjiang had extended branches to the western-most corners of the high Plateau. The existence of the Silk Road has played a significant role in the shaping of the ancient local culture and promoted cultural integration in the west Himalayan Region. Viewed from a historical perspective, the development of the Silk Road laid the foundation for the formation of the later Tibetan Kingdom and its expansion into Central Asia.

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[25] Zhao Feng, 赵丰 "Xinjiang dichan mianxian zhijin yanjiu," "新疆地产绵线织锦研究" ["On Local Silk Products in Xinjiang,"] *Xiyu yanjiu* 1 (2005): 51–59.

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Asian Silk in Scandinavian Viking Age Graves

Based on the boat- and chamber graves in the Eastern Mälar Valley

by

Annika Larsson

Introduction

The exhibition *Cosmopolitan Metropolis Along the Silk Road* (2015-2016)[1] began by showing a fragment of genuine Tang silk, recovered from a Viking Age warrior grave at Birka in the Eastern Mälar Valley, now shown to the general public for the first time. As early as 1938 the extensive textile material from the Birka Viking Age graves was published, but not until September 2015 – nearly eighty years after the publication and almost one hundred and fifty years after the finds were excavated – was this rare, thousand-year-old silk from China (Fig. 1a), given its well-deserved prominent place in Scandinavian Viking Age history.

In connection with the exhibition a seminar day was held, where it was possible to present a comprehensive material of Asian silk found in the Viking Age boatgraves from Valsgärde, just north of Gamla Uppsala in the Eastern Mälar Valley. The boatgraves at Valsgärde were excavated in the first half of the twentieth century, but the results have not yet been published. In the present article the Valsgärde silks are briefly presented, in relation to the Birka material. In both Birka and Valsgärde silk tablet-woven bands with woven patterns made by either drawn silver threads or silver lamella thread on a core of silk, silver thread embroidery on silk fabric, as well as passementerie works of drawn silver thread applied on silk, are found. The suggested place of origin of this material will be discussed here together with the origin of silk woven in both samite and tabby techniques. The conclusion is that the origin should primarily be sought in Central Asian areas. In summary, the context of Asian silk found in Scandinavian Viking Age graves, is discussed.

History review – a survey

The Viking Age necropolis Birka consists of c. three thousand graves, c. a thousand of which were archaeologically excavated in the last quarter of the nineteenth century under the direction of Hjalmar Stolpe (1841–1905). Owing to a very rich content of metals from

[1] Museum of Far Eastern Antiquities, *http://www.varldskulturmuseerna.se/en/exhibitions/previous-exhibitions/cosmopolitan-metropolis-along-the-silk-road/*

weapons and fibulas, a fair amount of textiles was recovered. Metal salts have a conserving effect on textiles, which are otherwise easily perishable. Graves containing weapons and often a horse, as well, were interpreted as male warriors and horsemen burials, while graves containing jewellery were considered women burials. Birka's grave number Bj 944, where the Chinese Tang silk mentioned above was found, was considered a male horseman´s grave from the tenth century CE.

In 1938, the extensive textile material from the Birka Viking Age graves was published by the illustrious textile historian Agnes Geijer (1898–1989), in a thesis that according to the standards of the time was written in German. Weave-technical reconstruction sketches and results from analyses of the fibres and colours of the finds are meticulously presented, in both text and illustrations. An entire chapter is devoted to imported silk fabric from the East.[2] The Tang silk in grave Bj 944 is awarded a special focus. The fragment was found by the ear of the buried warrior and was interpreted as a remnant from his headgear. Further finds of silk fragments were made in the grave, although these were woven in other techniques.

Regrettably, the silk finds from far away were not given any special attention in Scandinavian archaeology. During the end of the nineteenth century Sweden was at the threshold of industrialism. In this time of change, people sought stability in older traditions. The old peasant society was seen as the original and genuine. Societies and movements for local folk culture as well as for local national costumes and handicraft were established, all focussing on 'the good old days' of self-sufficiency. The town dwellers could see ethnological and archaeological objects from the nearby counties in museums located in spacious buildings – emphasising the historical importance of the nation. A genuine Norse cultural heritage was also exhibited on the large and important World Exhibitions in Europe,[3] in contrast to the collections from colonized parts of the world, shown by the colonial powers. The general agreement was that the ancient gravefields in the Swedish countryside contained farmers who worked the soil of the motherland, generation after generation. At the side of every farming ancestor, a faithful housewife industriously worked in spinning and weaving the clothing for the household, using home-grown wool and linen.

The finds of Asian silk clothing from the Viking Age burial rituals at Birka did not fit into such a national romantic historiography, other than as a result of Viking plundering raids or possibly from occasional trade with foreign cultures – activities said to have been reserved for the sons who could not inherit the ancestral farm. The silk finds at Birka, and from other similar central places in Scandinavia, were not seen as part of the unique Nordic history. Following the end of World War II, English became the world *lingua franca*, making previous scientific publications written in German – such as the dissertation on the Birka textiles – less accessible to a new generation of researchers.

However, today, with the increasing financial importance of China on the global market follows the West's increased interest to show long-time Eurasian trade contacts.

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[2] Agnes Geijer, *Birka III: Die Textilfunde aus den Gräbern* (Uppsala: Almqvist & Wiksell, 1938), 58–67.

[3] e.g. three rune stones from the Eastern Mälar Valley were sent to the World Exhibition in Paris 1867: U 489 https://www.raa.se/runinskrifter/sri_uppland_b07_h03_text_1.pdf, U 896 https://www.raa.se/runinskrifter/sri_uppland_b08_text_9.pdf and U1011 https://www.raa.se/runinskrifter/sri_uppland_b09_h01_text_3.pdf

Several Swedish museums have lately realised the importance of silk and the extension of the old Silk Route for cultural exchanges between Scandinavia and the eastern part of Eurasia.[4] The fact is that not all Viking Age silk originated in the Chinese area, even though the origin of the material as such should be sought there. In 1972 Geijer published her last literary work, *Ur Textilkonstens Historia* (From the History of Textile Art), where she focused on a contradictory problem concerning silk finds woven in a technique called *samite* (weft-faced compound twill), found in at least 50 graves in Birka:

> Since this kind of silk has been manufactured both in Persia and in the Byzantine area, it is difficult to determine if this product may have come via the Volga or Dnieper routes / ... / So far, about 80,000 Arabic coins have been registered (in Sweden), while the Byzantine coins are remarkably few. Does this mean that the Norsemen instead received larger quantities of Byzantine goods, i.e. silk?[5]

In my opinion, it seems unlikely that the silk would have come from another area than the huge import of Islamic coins. On the whole, there are remarkably few archaeological finds in Birka that can be attributed to Byzantium. In the following it is argued that the silk finds in Birka and in other similar Viking Age burial sites, as e.g. Valsgärde and Gamla Uppsala, should not be seen as an isolated phenomenon separated from the Central Asian origin of the coins.[6] The collected impression of Scandinavian dress finds in Viking Age boat- and chamber graves show great similarities with dress customs of nomadic warrior horsemen from the East, at least regarding the male costume and weaponry.

In the following, a written source by the Muslim traveller Ibn Fadlan is regularly referred to. Ibn Fadlan was contemporary eyewitness to a boat burial among the *Rus* people, which took place along the eastern parts of the Volga River in 922 CE. The description of the material grave culture of the Rus seems to be consistent with the archaeological remains of the Viking Age boatgraves in, among other Scandinavian sites, Valsgärde and Gamla Uppsala in the Eastern Mälar Valley.

However, no original manuscript of Ibn Fadlan exists today. The so-called *Yakut manuscript*, set down in Arabic by Yaqut al-Hamawi (1179-1229), was the first known manuscript and therefore often referred to in the literature. In 1923 a manuscript from the thirteenth century was found by Ahmed Zeki Velidi Togan at a museum in Mashad in Iran, the so called *Mashad manuscript*. There is also a shorter version of the Ibn Fadlan story, edited by the Persian geographer *Amin Razis* in the sixteenth century. I follow the Swedish translation of Ibn Fadlan´s text edited by Stig Wikander 1978, which is said to mirror the *Togan* edition.[7] The Swedish translation can be followed word by word in an Arabic edition by Sami al-Dahhan.[8]

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[4] e.g. C*osmopolitan Metropolis along the Silk Road* at The Museum of Far Eastern Antiquities, Stockholm 2015 and *The Swedish Silk Road to Persia* at The Royal Armory Museum, Stockholm 2016.

[5] Agnes Geijer, *Ur Textilkonstens Historia* (Helsingfors: Tidens förlag, 3rd Edition 1994 [1972]), 261.

[6] See also Annika Larsson, *Klädd krigare: Skifte i Skandinaviskt dräktskick kring år 1000* (Uppsala: Department of Archaeology and Ancient History, Opia 39, 2007). Summary in English.

[7] Stig Wikander, trans., ed., *Araber, vikingar, väringar* (Nyhamnsläge: Svenska Humanistiska Förbundet 90, 1978), 18–20.

[8] Sami al-Dahhan, ed., رسالة ابن فضلان [*Risalat Ibn Fadlan*] (Damascus, 1959), 150. https://ia903006.us.archive.org/26/items/lis_qd60/lis_qd6004.pdf

The Tang silk in Birka

The Chinese Tang silk in Birka is woven in an extremely fine and loose tabby weave. Seen against the light, the weave is almost translucent, like a thin curtain or veil, despite the fact that each square centimetre of cloth contains 2000 threads. The introductory showcase in the museum exhibition presents the Tang find from the Birka grave Bj 944 as follows:

> One centimetre of material consists of c. 50 threads. In turn, each thread contains 20 thin silk threads, reeled from the silkworms´ cocoons. Each weave has two thread directions, resulting in 2000 fine silk threads per square centimetre!

In addition, between each weave thread, there is an equally wide empty space. Thus, a single square centimetre of the material could have contained double the amount of silk threads.

Careful observation shows darker areas in the gauze-like cloth. These are floating silk threads that form tiny geometrical patterns against the almost see-through background weave. The weaving technique was common during the Han period, and is generally known in the West as *Han damask*, since the patterned areas – similar to a 'genuine' damask weave – shine against a more matte background. During Tang, i.e. the Birka period, gauze-like tabby silk in 'Han' damask technique was, through the Silk route trade, a common object of an extensive silk export from China.[9]

The shine in the floating pattern areas was enhanced by the fact that the silk threads had been reeled directly from the silkworms´ cocoons, without any spinning. This means that the pupa must be killed when it is still inside its cocoon, stopping the pupa to evolve into a butterfly, who, on its way to freedom, would chew the cocoon's kilometre-long shiny threads into short fibres. In addition, to being extremely long and shiny, reeled cocoon threads are very durable. Owing to their durability they are suitable for use as long warps in the thinnest weaves imaginable. The patterns were made by lifting the warp threads – so called *warp-faced* dominance.[10]

When the Birka fragment is enhanced in a microscope, it is possible to see its blue colour (Fig. 1b). The threads in one of the thread directions have been dyed with indigo, a dye that is more resistant over time than others. The colour of the threads in the other direction – now brownish (in some places greenish of copper) – cannot be ascertained.[11] If they were yellow, the combination with the blue threads would make the cloth shimmer in green. If red, the fabric would have shimmered in purple. The tiny shining patterned areas glittered in the floating thread's own dye – blue, yellow or red – on each side of the material, against the more matte background of green or purple. Thus, the thin material was both very fine and very elegant when new.

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[9] Morris Rossabi, "The Silk Trade in China and Central Asia," in *When Silk Was Gold: Central Asian and Chinese Textiles*, ed., James C. Y. Watt, and Anne E. Wardwell (New York: The Metropolitan Museum, 1997), 7–19 (7).

[10] Elisabeth Strömberg, Agnes Geijer, and Marta Hoffmann, eds., *Nordisk textilteknisk terminologi: Förindustriell vävnadsproduktion* (Oslo: Tanum 1974 [1967]), 92f. Definitions in Swedish and synonyms in Danish, Icelandic, Norwegian, Finnish and in English, French and German. See "varpeffekt".

[11] Analysis made by Agnes Geijer, *Birka III – Die Textilfunde aus den Gräbern*, 62, 184.

Expensive gold threads were not used in early Chinese silk weaving. Instead, golden ornaments were painted on the surface of the woven material.[12] According to Vivi Sylwan, who investigated grave silks from early Tang at the Small River in the Lop Desert, the Chinese word *kiəm* means "gold cloth". It is an old Chinese word for "metal, bronze or *gold*", today usually translated "brocade". However, before the Tang dynasty had communications with Western Asia, the Chinese did not use gold thread in their warp-dominated silk. Instead, the objects were ornamented with "stuck-on gold-leaf", as the warp threads cannot, for technical reasons, be in metal. – I should like to translate the word *kiəm* as *guilded cloth*, Sylvan says.[13]

A microscope shows that the Birka fragment's surface sometimes glitters from tiny little remains of printed or painted gold ornamentation. However, there are no traces of gold beneath a preserved lap seam. Thus, it seems likely that the gold ornamentation was not applied on the cloth until after the object had been sewn.[14] Instead, the seam has been covered by plait (trimmings) made from thin silver-wire threads in a fine passementerie work (Fig. 1c), that has been sewn onto the material with long stitches. The stitching holes are clearly visible in the dark seam, even without enhancement and without any background lighting.

Not only from China

Within previous Viking Age costume research the fairly extensive presence of passementerie trimmings made of thin silver-wire found in the Birka graves have been presumed to represent a Byzantine court dress, supposedly worn by the Birka king's courtiers.[15] Nevertheless, I am not completely convinced that a headgear in genuine Tang silk, found in a pagan grave in Birka, would represent a symbolically charged courtier's dress from the Christian Byzantium.[16]

On the contrary, the Northern barbarians were at the time often seen as a threat to the Christians from Byzantium. This is expressed not only in texts, for example *The Nestor Chronicle*, but also by visualizing costume divergences between the Christian Byzantines and the non-Christian Bulgars in contemporary art; e.g. in the *Menologion of Basil II*, produced in Constantinopel c. 1000 CE (Fig. 2a). The actual scenario is said to take place in 985 CE,[17] most probably depicting a Byzantine confrontation with the non-Christian-

[12] Li Wenying, "Textiles from the Second to Fifth Century Unearthed from Yingpan Cemetery," in *Central Asian Textiles and Their Contexts in the Early Middle Ages*, ed., Regula Schorta (Riggisberg: Abegg-Stiftung, 2006), 243–264 (262f).

[13] Vivi Sylwan, *Investigation of silk from Edsen-Gol and Lop-Nor and a survey of wool and vegetable materials* (Stockholm: Sino-Swedish Expedition, 1927–1933, Publication 32, VII. Archaeology, 1949), 172.

[14] Agnes Geijer, *Birka III – Die Textilfunde aus den Gräbern*, 62.

[15] Inga Hägg, "Birkas Orientaliska praktplagg," *Fornvännen: Journal of Swedish Antiquarian Research* 78 (1983): 204–223. http://samla.raa.se/xmlui/bitstream/handle/raa/2472/1983_204.pdf?sequence=1&isAllowed=y

[16] Annika Larsson, *Klädd krigare*, 61–63, 72–77.

[17] Elfride Knauer, "A Man's Caftan and Leggings from the North Caucasus of the Eighth to Tenth Century: A Genealogical Study," *Metropolitan Museum Journal* 36, (2001): 141, Fig. 22. https://www.metmuseum.org/art/metpublications/Mans_Caftan_Leggings_from_Caucasus_8_to_10_C_Intro_The_Metropolitan_Museum_Journal_v_36_2001; *Menologion of Basil II, pl.* Vat.gr.1613, fol.345 https://digi.vatlib.it/view/MSS_Vat.gr.1613

Volga-Bulgars – as the Bulgarians in Central Europe was officially Christianized already in the ninth century. The costumes of the depicted pagans – through which the Byzantines suffered martyrdom – consist of fur-lined hats and short coats with belts, but also swords. The Christian symbolism of the Byzantines is enhanced by a nimbus. Costumes representing the religious Greek-orthodox traditionally reached down to the floor and consisted of much flowing material (Fig. 2b). The depicted slick coats of the pagan perpetrators are completely different, reminding of steppe-nomad Bulgar and Mongol costume traditions at the time[18].

One of the perpetrator's coats is made from a plain material with clear button closures (galloons) at the front. The other perpetrator's coat is of a similar cut but is made from a fabric patterned with flowers. The monochrome flowers are distributed as clear elements on a plain background in an opposite colour. My theory is that the artist has depicted a block-patterned *reservage* print (resist dyed pattern), a dyeing technique as common as Han damask weaving in Chinese silk culture at the time. Several such fabrics were found at the archaeological excavations made by Aurel Stein during his expeditions in the deserts of Central Asia, India and China, in the beginning of the twentieth century.[19]

The patterns of Han damask are small and in tone with the colour of the background material, while patterns made by resisting print remained un-dyed and would thus clearly stand out against a distinctly dyed background. The first technique used dyed threads during the weaving process, while the second dyed the already woven fabric. From a weave-technical perspective the difference is not great; both techniques are based on a plain tabby weave, a basic technique that, at least concerning silk culture, is connected both with old Chinese and Indian silk culture.

From a Scandinavian point of view, it should be added that the depicted Bulgarian coats are reminiscent of the costume finds in Birka's warrior grave Bj 944. This is supported not only by the finds of silk material but by seven bronze buttons found in the grave,[20] as well as plaited works made from silver wire, possibly influenced by the "Orient,"[21] and the remnants of an "oriental" belt.[22] The costume finds are also reminiscent of dress traditions described by the Arabic diplomat Ibn Fadlan, when he was an eyewitness to the burial of a Rus chieftain during a visit to the Volga Bulgars in 921/922. Ibn Fadlan states that the dead chieftain was dressed in a caftan, sewn of silk brocade of "roman character",[23] with gold buttons, for the funeral.[24] When new, bronze gleams like gold. It is a well-known

[18] Knauer, "A Man's Caftan," 139, 141.

[19] Aurel Stein_1 http://collections.vam.ac.uk/item/O87089/the-stein-collection-fragment-unknown/
Aurel Stein 2 http://collections.vam.ac.uk/item/O96367/the-stein-collection-fragment-unknown/

[20] Bj 944 http://mis.historiska.se/mis/sok/fid.asp?fid=434426

[21] Agnes Geijer, *Ur Textilkonstens Historia*, 86, 276; Annika Larsson, *Klädd krigare*, 242.

[22] Charlotte Hedenstierna-Jonson, *The Birka Warrior*: *The material culture of a martial society* (Stockholm: Institutionen för arkeologi och antikens kultur, 2006).

[23] I suggest that "roman character" here should be understood as silk fabric woven in Post-Sasanian samite technique with typical Persian motifs, as parts of the Persian silk producing areas came under control of East-Rome.

[24] Stig Wikander, trans., ed., *Araber, vikingar, väringar*, 67; Jørgen Bæk-Simonsen, "Ibn Fadlans beskrivelse af Ruserne," in *Vikingerne ved Volga: Ibn Fadlans rejsebeskrivelse*, trans., ed, Jørgen Bæk-Simonsen (Højbjerg: Wormianum, 1981), 56; James E. Montgomery, "Ibn Fadlan and The Rūsiyyah," *Journal of Arabic and Islamic Studies* vol. 3 (2000): 1–25 (16).
https://www.lancaster.ac.uk/jais/volume/docs/vol3/3_001-25_MONTGO1jun24a.pdf

fact that dress buttons were not yet in use in the Scandinavian costume at the time.[25]

Ibn Fadlan also mentions that, for the funeral, the dead man was dressed in a hat made from silk cloth with fur. The men depicted in Fig. 2a wear fur-lined hats; judging by the pattern, at least the flowered hat is made from silk. Whether the Tang silk headgear in the Birka grave Bj 944 was lined or edged with fur is uncertain, but the preserved seam close to the dead man's ear supports the idea that the hat was cut in a way similar to the hats of the depicted pagans. When it comes to textile gifts of diplomatic character, Ibn Fadlan states that the finest textile was produced in the silk-producing town of Mery in Central Asia. In this context, he mentions five costumes of silk, one thin veil and another outfit of golden brocade.[26] As mentioned above, gold thread was at the time not used in traditional Chinese silk but in brocade produced west of the Chinese areas.[27]

Silk from West Asia

The first silk that reached Western Asia was in the form of woven material. Silk from China was transported along the caravan routes to the outposts of the country, where traders from more western areas took charge of the goods for further transport and trade. Plinius and Lucanus tell us, that at the beginning the women in the western territories unravelled the loosely woven Chinese silk to weave new cloths from the shiny threads in their own domestic tradition. The long-reeled warp threads were easy to unravel from the weave, making it easy to also coil the even longer weft threads.[28]

Silk cultivation as such did not reach Western Asia until the sixth century CE. At the beginning, the pupas were not killed before the silk was harvested, and the cocoon's threads were then shattered into large amounts of short fibres by the butterfly. These short silk fibres were carded and spun according to the older wool traditions in the area. Thus, reeled silk from the Chinese cultural areas clearly differed in the beginning from spun silk produced in the western Asian areas. The western weaving traditions also differed from the Chinese. West of China, weaving tradition originated in carpet production, where colourful woolen weft threads were laid into wider and sparser warps – so called *weft-faced* dominance[29] – that originally were short and suited to the size of a carpet.

The looms in the area evolved so that the warp could be lifted up in sheds. It was no longer necessary to insert the weft by hand, instead one could shuttle them back and forth in the sheds using repeated weft patterns. Twill weave techniques became common. This technique was further developed so that silk weavers began weaving with several warp systems, aiming to have as many as possible of the silk's shiny weft threads visible and enhanced on the face of the material (Fig. 3). The reverse side of the cloths were matte and without any clear pattern. A typical weaving technique from this period, using double

[25] James E. Montgomery, "Ibn Fadlan and The Rūsiyyah," 16, ref no. 55.

[26] Stig Wikander, trans., ed., *Araber, vikingar, väringar*, 44; Jørgen Bæk-Simonsen, trans., ed, *Vikingerne ved Volga: Ibn Fadlans rejsebeskrivelse*, 40.

[27] Annika Larsson, *Klädd krigare*, 202; Annika Larsson, "Vikingar begravda i kinesiskt siden," *Valör: Konstvetenskapliga studier* 3/4 Konstvetenskapliga institutionen, Uppsala universitet (2008): 33–43; Li Wenying, "Textiles from the Second to Fifth Century Unearthed from Yingpan Cemetery," 262f.

[28] Agnes Geijer, and Vivi Sylwan, *Siden och Brokader. Sidenväveriets och tygmönstrens utveckling: en översikt* (Stockholm: Bokförlaget Natur och Kultur, 1931), 13.

[29] Strömberg et al, eds., *Nordisk textilteknisk terminologi*, 36, see "inslagseffekt."

warp systems, is called *samite* (weft-faced compound twill).[30] It belongs to a group of silk cloths that we could term 'brocade' and it was woven in a technologically very refined draw loom, supposed to have developed in the Old Persia/Sassanian Empire. During the sixth century the high-tech weaving art developed even more in post-Sassanid production in the ancient Persian territories, while parts of the Persian silk producing areas came under control of East-Rome (Byzantium), see also footnote 23.

The patterns and weaving techniques in post-Sassanid silk was a heritage from the Sassanid silk art, present in the entire Persian culture area. The Sogdian province south-east of the Caspian Sea was well known for silk production and silk trade. In this area the post-Sassanid silk culture flourished and met the Chinese silk tradition at the country's outpost. Here we find the silk producing cities which Ibn Fadlan crossed on his way north to the Volga Bulgar region, such as Samarkand, Bukhara and Mery. Further east – along the silk routes in China – there were also several famous places for cultural meetings between eastern and western silk culture, such as Dunhuang and Turfan.[31]

A Central Asian melting pot

The marketplaces along the Silk Road functioned as meeting places for goods and traders as well as for artisans and artisan traditions from east and west, north and south. Both Vivi Sylwan and John Becker point to the meeting between the weaving cultures of the different areas that early on occurred at the outposts along the caravan trails. Sylwan studied archaeological finds of silk and wool from Edsen-Gol (Inner Mongolia) and Lop-Nor (Xinjiang),[32] while Becker has manufactured reconstructions of material from China, Central Asia and Europe in a hand-weaving project at the School of Arts, Crafts and Design in Copenhagen.[33] Both researchers show that the weaving techniques in the east and west were dependent on the prerequisites of the materials as well as on the different types of tools and their development. As an art historian, Agnes Geijer traced the development of the designs and the meeting between patterns and technology in the different cultural areas. She pays attention to that the symmetrical weft-faced motifs in Sassanian silk art, clearly differed from the Chinese motifs. By lifting individual *warp* threads, figural motifs – similar to those of brush-painted lacquer art – were created in the traditional Chinese silk. [34] However, influences of both Sogdian and Iranian as well as Turkish expressions in western Chinese silk art, is highlighted by Mariachiara Gasparini in a study of the Turfan textile collection in Berlin.[35]

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[30] The *samite* technique is defined as "inslagskypert med två varpar" in Strömberg et al, eds., *Nordisk Textilteknisk Terminologi*, 37.

[31] Mariachiara Gasparini, "A Mathematic Expression of Art: Sino-Iranian and Uighur Textile Interactions and the Turfan Textile Collection in Berlin," *The Journal of Transcultural Studies* 5.1 (2014): 134–163. https://heiup.uni-heidelberg.de/journals/index.php/transcultural/article/view/12313/8711

[32] Vivi Sylwan, *Investigation of silk from Edsen-Gol and Lop-Nor*.

[33] John Becker, *Pattern and Loom: A practical study of the development of weaving techniques in China, Western Asia and Euro*pe (Copenhagen: Rhodos, 1987).

[34] Agnes Geijer, *Ur Textilkonstens Historia*, 140, 148.

[35] Mariachiara Gasparini, *A Mathematic Expression of Art*.

In *When Silk Was Gold: Central Asian and Chinese Textiles*, published by the Metropolitan Museum of Art in conjunction with an exhibition with the same title, Watt and Wardwell point to the fact that *z-twisted warp* was characteristic of weft-faced compound twills (samite) in Iran and Byzantium, while lighter fabrics woven with *untwisted warp* occur in the same structure produced in China. Twisted and untwisted warps handle differently on the loom. The very different skills, of both the single weavers but also concerning the type of weaving equipment, required different workshops. Silks with untwisted warp threads were woven further east in Central Asia, where sericulture and silk weaving had been learned from the Chinese and where Sogdian influence was strong. After the Arab defeat of the Tang army in 751 CE, some of the captured Chinese silk workers and weavers remained in Samarkand. A community of Chinese textile workers is also known to have been resident in Bukhara in the eighth century.[36]

More and more, the Silk Roads appear as a cultural melting pot, while Birka's direct contacts with Byzantium and Constantinople seem increasingly doubtful. The Byzantines themselves imported large amounts of silk from the Syrian areas, since their own production was not sufficient for export.[37] In addition, Birka's contacts with Constantinople were fairly limited since Kiev posed a hinder for free trade, at least from the mid-ninth century up until the discontinuation of Birka in the second half of the tenth century. Trade along the River Dniepr was at this time made difficult by the princes in Kiev, who both taxed and demanded tributes on the goods. This is supported not only by the lack of Byzantine goods in Birka, but by the Russian *Nestor Chronicle* describing the local situation in Russia during the time of silk in Birka.[38] From a Scandinavian point of view, the first Christian princess Ingegerd of Sigtuna, in the Eastern Mälar Valley, married prince Jaroslav of Novgorod in 1019, but not until later they could settle in Kiev. At this point the necropolises in Birka no longer existed, neither did the pre-Christian boatgrave traditions in Scandinavia. The earlier presence of silk in the pre-Christian grave costumes at Viking Age Birka and other similar places in the area must be seen in a wider perspective.

Funeral silk of the Viking Age culture area

Gravefields of a very special type from the Late Iron Age and the Viking Age are densely located along the rivers of the Mälar Valley – the so-called *boatgrave* fields. The rivers formed water links between the iron-rich areas in the Swedish north and the central water systems of Lake Mälaren. In turn, Lake Mälaren was in direct contact with the Russian rivers through the Baltic Sea. Sites such as Vendel, Valsgärde, Gamla Uppsala, Ulltuna and Tuna i Alsike and Badelunda, are well known for their boatgraves. The Valsgärde boatgrave field is the largest today known boatgrave field. It contains fifteen archaeologically excavated boatgraves, of which ten are Viking Age and thus contemporary with the Birka

[36] James C. Y. Watt, and Anne E. Wardwell, eds., *When Silk Was Gold: Central Asian and Chinese Textiles* (New York: The Metropolitan Museum, 1997), 22. See also Hero Granger-Tailor, "Weft-Patterned Silks and Their Braid: The remains of an Anglo-Saxon Dalmatic of c. 800?" in *St. Cuthbert, His Cult and His Community to A.D. 1200*, ed., Gerald Bonner et al. (Suffolk: Boydell Press, 1989), 303–327.

[37] Agnes Geijer, *Ur Textilkonstens Historia*, 156–157.

[38] Gabriella Oxenstierna, trans., *Nestorskrönikan* [Nestor Chronicle] (Stockholm: Kulturhistoriskt bibliotek, Symposion, 1998).

chamber graves. The contents of the boatgraves are strongly reminiscent of the content of the contemporary *chamber* graves in Birka. The greatest difference is seen already in the name and consists of that the boatgrave custom buried the dead person in a genuine boat, while the chamber grave custom buried the person in a chamber built from wood.

Owing to the rich presence of metallic salts, the Viking Age boat- and chamber graves are rich in finds of textiles – particularly silk. An early example is the Viking Age boatgrave from Oseberg in Norway, which contained large amounts of silk.[39] Wood from the deck-house construction, which functioned as an integrated grave chamber in the burial ship, is dendrodated to the year 834 CE, indicating when the tree was cut down.[40] The earliest dating of the silk from the grave thus corresponds with the Viking silks in Eastern Scandinavian graves, which date from around mid-ninth century.

The collected impression of Scandinavian dress finds in the Viking Age boat- and chamber graves show great similarities with dress customs of nomadic warrior horsemen from the East, at least regarding the male costume and weaponry. The burial customs of the Rus at Volga Bulgar, described by the envoy for the Caliph of Bagdad, Ibn Fadlan, are almost identical. In 921/922 he travelled north to the Muslim Volga Bulgars with a large delegation to assist financially to the building of a defence fortress against the Jewish Khazars, who attacked from the south. The delegation brought large amounts of diplomatic gifts, including silk, to ease the relationships with the people they met and stayed with on the way. The delegation originated in the silk-producing city of Baghdad but also passed Bukhara, a famous silk-producing city.

Near the Volga Bulgars lay a settlement for a people that Ibn Fadlan called *al-Rūsiya* (the Rus). During their visit, the delegation had the occasion to eyewitness the burial of a Rus chieftain. The grave was placed in a grave-boat, with a cover probably manufactured from birch bark.[41] Ibn Fadlan writes that the dead chieftain was first temporarily buried for ten days, while the real funeral was prepared. Fine burial clothing was then manufactured from silk brocade; including breeches, caftan and a hat. The resting place consisted of a pallet covered with cushions and mattresses, made from silk brocade as well.[42] When buried, the Rus´ were dressed in *dibadj*, Ibn Fadlan says.[43] The Arabic word used for brocade quality (samite) is *dibadj*.[44]

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[39] Arne Emil Christensen, and Margareta Nockert, eds., *Osebergsfunnet: bind IV, Tekstilene* (Oslo: Kulturhistorisk museum, Universitetet i Oslo, 2006); Marianne Vedeler, *Silk for the Vikings (*Oxford: Oxbow books, Ancient textiles series 15, 2014). It should be added that most of the silk cloth fragments in the Oseberg grave, according to Vedeler, seems to be of Central Asian origin, see Vedeler "*Silk*", 9–16, 18.

[40] N. Bonde, and A. E. Christensen, "Dendrochronological dating of the Viking Age ship burials at Oseberg, Gokstad and Tune, Norway," *Antiquity* 67 (1993): 575–583 (581).

[41] Karolina Pallin, "Vendeltida båtkapell: Textilt näverhantverk i Valsgärdes båtgravar" (Thesis for Bachelor of Arts, Konstvetenskapliga institutionen, Uppsala universitet, 2016).

[42] James E. Montgomery, "Ibn Fadlan and The Rūsiyyah," 1–25; Stig Wikander, *Araber, vikingar, väringar*, 66–67.

[43] Ture J. Arne, "'Austr i Karusm' och Särklandsnamnet," *Fornvännen: Journal of Swedish Antiquarian Research* 42 (1947): 290–305 (295). http://samla.raa.se/xmlui/bitstream/handle/raa/5656/1947_290.pdf?sequence=1

[44] Philip. K. Hitti, *History of the Arabs: From the Earliest Times to the Present* (Princeton University: Macmillan Education Ltd., 1970), 345. https://archive.org/details/HistoryOfTheArabs-PhilipK.Hitti/page/n3/mode/2up

Nevertheless, silk "brocade" (*dibadj*) is equally prevalent also in Viking Age female graves. Silk fabric, woven in samite technique, is mainly preserved within pairs of so-called *oval brooches* (Fig. 5a) – so typical of a Scandinavian female grave costume at the time. The brooches, in the shape of a three-dimensional oval bowl, have a small hole for a ring (Fig. 5b) into which a knife was fastened (Fig. 5e) – sometimes together with sewing accessories such as scissors, needles and pincers. Samite remains from the clothing are often found inside the female bowl-shaped fibulas (Fig. 5c), which seem to have been placed right on the women´s breasts (Fig. 5d). To the attire, strands of beads and shiny metal pendants belonged.

Bowl-shaped fibulas (oval brooches) still often containing textile fragments, e.g. silk woven in samite technique (Fig. 5c), are prevalent in female boat- and chamber graves in the entire Viking Age cultural area – from England in the west to Russia in the east but are absent south. In 2006 a Viking Age costume including such fibulas, was found in a female chamber grave in Russian Pskov. The costume from the tenth century contained, in addition to the linen fabrics, only silk. Several patterned silk sections, woven in samite technique, were used in one and the same piece of garment. The pattern of the dominant fabric depicted the Persian king Bahram Gur on a hunting trip in 50 cm circles – a traditional mirrored pattern that continued to be woven for five hundred years in the Post-Sassanid silk culture (Fig. 4a-c). A whole meter of this four-coloured samite was preserved in a coherent piece, when the fragments were put together by the researchers.[45] Distinctive women's graves containing patterned silk samite are common also in the Eastern Mälar Valley; e.g. Boatgrave No. 36 in Gamla Uppsala and the female Boatgrave No. 75 from Tuna in Badelunda, and the boat buried woman in Turinge (Fig. 6a-b).[46] The bead strands in these graves contained bronze pendants with post-Sassanid ornamentation (Fig. 6c-d) as well as silver 'coin' pendants with the Muslim confession of clear Central Asian origin. The Arabic inscriptions attribute the coin pendants to the areas of Wasit in Iraq and to Rayy near Teheran in northern Iran, but also to the Arab-Sassanid Tabaristan.[47]

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[45] Elena S. Zubkova, Olga V. Orfinskaya, and Kirill A. Mikhailov, "Studies of the Textiles from the 2006 Excavation in Pskov," in *North European Symposium for Archaeological Textiles X*, ed., Eva Andersson Strand, Margarita Gleba, Ulla Mannering, Cherine Munkholt, and Maj Ringgaard (Oxford and Oakville: Oxbow Books, Ancient textiles series vol. 5, 2010), 291–298.

[46] Anita Malmius, "Textilanalyser," in *Båtgravar i Gamla Uppsala: spår av en vikingatida högreståndsmiljö*, ed., Else Nordahl, and Anita Malmius (Uppsala: Department of Archaeology and Ancient History, Aun 29, 2001), 75–91 (75ff); Margareta Nockert, "Båtgrav 75: Textilierna," in *Tuna i Badelunda: Guld Kvinnor Båtar I*, ed., E. Nylén, and B. Schönbäck (Västerås: Västerås kulturnämnds skriftserie 27, 1994), 112–117 (116); Margareta Nockert, Textilrapport Årby, Turinge sn, Sörmland, Fornl 165. Oval Spännbuckla med textilrester: F60: C. Rapport: P nr 5274/72 (unpublished), in the Swedish History Museum archive, Stockholm; Sten Tesch, with contributions by Annika Larsson, Gunilla Larsson, and Michael Neiß, "A lost world? Religious identity and practice during the introduction of Christianity in the Lake Mälaren region, Sweden," in *Dying Gods: Religious beliefs in Northern and Eastern Europe in the time of Christianisation*, ed., Ch. Ruhmann, and V. Brieske (Hannover: Niedersächsischen Landesmuseum, Neue Studien zur Sachsenforschung Band 5, 2015), 191–210.

[47] E. Nylén, and B. Schönbäck, eds., "Båtgrav 75: Smyckena," in *Tuna i Badelunda: Guld, kvinnor och båtar I*, 58–63. 60f; Else Nordahl, and Anita Malmius, eds., *Båtgravar i Gamla Uppsala*, 50f.

Regrettably, no original manuscript of Ibn Fadlan exists today. However, the Swedish translation of the actual part of the text from Togan, edited by Stig Wikander in 1978,[48] proposes that – at least in connection to the Rus´ burial ceremonies that Ibn Fadlan witnessed in the Volga Bulgar area – "each woman had a bowl (*hoqqa* /حقة) on her female breast ("tit") (*thadyiha* /تديها). In the bowl there was a ring (*halaqa* /حلقة), where a knife was attached on the breast as well".[49] Already in 1941, T. J. Arne referred to the German translation of the Togan manuscript: "Jede ihrer Frauen hat auf den beiden Brusten eine Büchse (*huqqa*) aus Eisen, Silber, Kupfer öder Gold, nach Mäss und nach Wert des Verinögens ihres Mannes befestigt; bei jeder Büchse befindet sich ein Ring (*halqa*), bei dem sich ein Messer ebenfalls auf der Brust befestigt befindet".[50] The readings seems to be in accordance not only with the archaeological grave finds in Birka, documented by Hjalmar Stolpe during the grave excavations (Fig. 5f), but also with the Viking Age boatgrave conditions in Scandinavia, e.g. in the Eastern Mälar Valley.

In a new English edition of Ibn Fadlan, frequently used within modern Viking research, James Montgomery proposes another interpretation, where "a small disc" with an attached knife was worn "around the neck". Quoting a general description of a supposed everyday female costume tradition in Denmark[51] seems to be misleading when dealing with formal costume in funeral ceremonies of the Rus. Instead, the archaeological boat- and chamber grave conditions in the Eastern Mälar Valley are completely in accordance with the former readings, proposing that bowl-shaped oval brooches with a ring where a knife was fastened, were worn on the "tits" of the female ceremonial costume – as well as strands of beads and silver hangings.[52] The interpretation of the fibula position is strengthened by Amin Razis, who says that bowls were tied on the women´s breasts, "so that they will not get too big".[53] This hardly reflects a neck position.

The silk in Viking Age Valsgärde

The skeleton boatgraves in Valsgärde are all interpreted as male warrior graves. They date to both the Merovingian Period and the Viking Age, but only the material from the Merovingian Period has been published previously.[54] Owing to a large amount of metal weapons, an unusual amount of textiles have been preserved in these graves – from the

[48] Stig Wikander, trans., ed., *Araber, Vikingar, Väringar*, 63.

[49] For the Arabic words see Sami al-Dahhan, ed. [Risalat Ibn Fadlan], 150.

[50] Ture J. Arne, "Ibn-Fadlans resa till Bulgar: en nyupptäckt handskrift," *Fornvännen: Journal of Swedish Antiquarian Research* 36 (1941): 193–212 (208). http://samla.raa.se/xmlui/bitstream/handle/raa/1293/1941_193.pdf?sequence=1&isAllowed=y

[51] James E. Montgomery, "Ibn Fadlan and The Rūsiyyah," 5f, ref. no. 12, 19; Else Roesdahl, *Viking Age Denmark* (London: British Museum, 1982).

[52] Annika Larsson, "Från dräkt till koppar och järn," in *Birka Nu: Pågående forskning om världsarvet Birka och Hovgården*, ed., Charlotte Hedenstierna-Jonson (Stockholm: The National Historical Museum, Studies 22, 2012), 129–140 (132f); E. Nylén, and B. Schönbäck, eds., "Båtgrav 75: Smyckena," fig 55.

[53] Stig Wikander, trans., ed., *Araber, Vikingar, Väringar*, 73.

[54] Greta Arwidsson, *Die Gräberfunde von Valsgärde I: Valsgärde 6* (Uppsala: Almqvist & Wiksells boktryckeri AB, 1942); Greta Arwidsson, *Die Gräberfunde von Valsgärde II: Valsgärde 8* (Uppsala: Almqvist & Wiksells boktryckeri AB, 1954); Greta Arwidsson, *Die Gräberfunde von Valsgärde III:* Valsgärde 7 (Uppsala: Almqvist & Wiksells boktryckeri AB, 1977).

earlier period mostly woolen fabrics, but no silk. As mentioned above, silk in Scandinavia first appeared around 850 CE. In a textile-archaeological research project at Uppsala University, large amounts of Viking Age textile burial finds, mainly from the boatgraves at Valsgärde and Gamla Uppsala gravefields, have been inventoried and analysed under the leadership of the author.[55] From the skeleton Viking Age boatgraves in Valsgärde over 2000 textile fragments have been inventoried – of which the absolutely majority is silk in different textile techniques.

The largest amount of silk fragments is found in Valsgärde boatgrave number 10 and is of the same type as the background weave in the Tang silk from the warrior grave Bj 944 in Birka. However, no finds have been made of floating threads from genuine Han damask, described initially in this article, but similar background weaves of the same dimensions as the Birka find exist in several places over the dead person´s body (Fig. 7a). The fabric is woven in a sparse tabby weave from reeled cocoon threads. The threads in one direction are blue, while the threads in the other direction today are brownish (Fig. 7b). From boatgrave number 3 there are two straps in a similar quality, only about one and a half centimeters wide with folded outer edges of just about a millimeter or two (Fig. 8a). Thanks to the natural glue of the silk (sericin) extremely narrow folds have been possible to make, held in place without any stitches. The straps are cut from a larger piece of woven tabby of untwisted reeled cocoon threads (Fig. 8b) and have not been mounted on other materials. It seems likely that the thin gauze-like silks from Birka and Valsgärde have been produced in the same area, at least within the same silk weaving tradition. I maintain that the fabric should be linked to a silk production that has its closest connection in Chinese silk culture, or from the neighboring areas.

In both the Valsgärde and the Gamla Uppsala boatgraves there are also silk 'brocade', woven in different types of samite technique (*dibadj*). Valsgärde boatgrave number 15 has the richest and most varied content, followed by Boatgrave 36 (a female grave) in Gamla Uppsala. All but one samite quality in Valsgärde are woven by untwisted reeled cocoon threads. Some fragments show not only distinct traces of patterns in different colours, but also distinct traces of cutting (Fig. 9). In the female Boatgrave 36, one patterned samite fragment is woven by z- spun threads from shorter fibers in the warp direction (Fig. 10a-c). The actual garment was open in front of the body,[56] an observation easy to make even for an untrained eye due the folded front edges (Fig. 10b). In Valsgärde boatgrave number 15 there is another unique fragment woven by z-spun threads but sewn with stitches from unspun thread. This fragment is a tight woven monochrome taffeta tabby in blue, probably dyed with indigo (Fig. 11).

Several different qualities of silk are often found in the same grave, sometimes sewn together in one and the same object (Fig. 12a-b). As pointed out earlier, Birka's warrior grave Bj 944 also contains several different qualities of silk fabric. Further parallels can be drawn between the grave costumes in Valsgärde 15 and Bj 944. As mentioned, the graves contain several bronze buttons, six and seven respectively, placed at the centre of the dead body (Fig. 13). Most likely, we are dealing with the same type of funeral cloth-

[55] Project titel: *Bucklor på behagen.* Financed by Torsten Söderberg´s foundation; part I: 2012; part II: 2014.
[56] Anita Malmius, "Textilanalyser," 87, fig. 74.

ing as Ibn Fadlan described when telling of the boat burial ceremony of the Eastern Volga Rus in 922, namely a silk coat with gold-shining buttons.

In Birka as well as in Valsgärde, the silk costumes often contain fine tablet woven bands made of silk, covered by tiny diagonal geometric patterns of silk on a surface of silver thread at one side (Fig. 14a). The silk threads are reeled from the cocoon and used without any spinning. Concerning the tablet woven bands in Valsgärde, there are two different traditions of making the patterns – one tradition used lifted warp threads (Fig. 14b) while the other tradition used *soumak* technique[57], i.e. 'sewn' with an extra pattern thread in the weft (Fig. 14c).[58] A question is whether there may be a connection between the two different tablet-weaving traditions, and the silk weaving warp-faced traditions and weft-faced traditions respectively?

There is also a clear difference between the silver threads used in the tablet woven bands found in Birka and in Valsgärde – in Birka drawn silver wire (Fig. 14d) is dominant, in Valsgärde silver lamella thread is of clear dominance. Nevertheless, the patterns seem to be of the same geometric characters. Future research will hopefully – by deeper technique analysis – trace different workshop traditions or, maybe, a difference in date of production. Worth noting, however, is that all the passementerie decorations are made of drawn silver wire – not lamella – in Birka as well as Valsgärde (Fig. 1c, 15a-b). Even the most traditional passementerie knots are attached to silk in some way (Fig. 15b, c).

The silver lamella thread is found also in an embroidered design of staircase patterns made on the earlier mentioned veil-thin, gauze-like silk tabby in Valsgärde number 10 (Fig. 7c). From Valsgärde 15 and Valsgärde 12, there are two additional types of well-preserved silver embroidery sewn in couching (Fig. 16a-b) and pulled down couching (Fig. 17a-b) technique, respectively. The last-mentioned technique is expressed in an excellent and well-preserved embroidery made on a piece of silk, used either as a jacket collar or as a headgear. The embroidery is usually reproduced on a monochrome bottom. However, a closer study indicates that the embroideries in both graves are made on silk woven in samite by untwisted threads, once emphasizing different colours and beautiful patterns on the fabric´s surface. The embroidery details are evolved by threads sewn in an outstanding colour, made from reeled silk. In the archive documentation there are notes from analysis, claiming that the silver lamella surface once has been gilded.

However, the boatgrave field at Valsgärde consists predominantly of cremation graves, where the deceased were burnt on fire together with the grave gifts. In these graves, ashes from textiles show burnt remnants from both silk samite and silver wire. Oval brooches from a number of the cremation graves also indicate that not only men were buried at the site.

New perspectives

Geijer's interpretations from 1938 are still prevailing when it comes to Viking Age textiles. Her knowledge about textiles and textile production in different parts of the world during different historical times has been fundamental to textile history research, not only in

[57] The *soumak* technique is defined as "Snärjväv" in Strömberg et al, eds., *Nordisk Textilteknisk Terminologi*, 77.

[58] Karolina Pallin, "Återfunna skatter: Silverbroscherade brickvävda band från vikingatida båtgravar i Valsgärde" (Thesis for Bachelor of Arts, Textilvetenskap, Konstvetenskapliga institutionen, Uppsala universitet, 2015).

Sweden and Scandinavia but far beyond these limits. Concerning the textile material in Viking Age Birka, Geijer´s first opinion was that the predominant silk material, i.e. samite, found in the graves, originated from the Christian Byzantine area. As mentioned above, she later modified this view and considered it difficult to determine whether the silk had come to Scandinavia from the south, via the River Dniepr, or if the origin should be sought further east, via the Volga River.[59]

In Hägg's work from 1983 the Byzantine perspective was reinforced, through conclusions that suggested that the passementerie works in silver and gold wire, as well as tablet-woven bands of silk with patterned surface of silver and gold thread, would represent a costume tradition inspired by the Byzantine court environment.[60] These interpretations became, with a few exceptions,[61] a scientific 'truth' which more or less has been left untouched – also in the case of silk of reeled threads woven in samite technique. However, Hägg is on another interesting track, namely that archaeological textiles should not only be interpreted from a technical perspective but also as a social representation – which can be very difficult when trying to understand cultures that have long been dead, such as the Viking Age culture. My ambition is here to, through the grave textiles, not only to review the place of origin of the silk but also the *representation perspective*.

Let us, for a moment, focus on problems that arise when new research fails to replace old interpretations, in this case of the Viking costume. In Birka there was a special fine woolen fabric, woven in so called *diamond twill* technique. Geijer claimed that this product was imported, probably from the Frisonian area (*pallium fresonicum*). Marta Hoffman later argued that the product instead was likely to be produced in Syria,[62] an interpretation that in the article *Var järnålderns "frisiska kläde" tillverkat i Syrien?* (Were the Iron Age "Frisian Cloth" made in Syria?), although accepted by Geijer[63] is yet debated within textile history.[64] Agnes Geijer, but primarily Margareta Nockert, has in several works presented the similarities between the costume of diamond twill from Birka and horseman coats from the fifth century CE found in Egyptian Antinoë.[65] [66] The *male* coats from

[59] Agnes Geijer, *Ur Textilkonstens Historia*, 257, 261.

[60] Inga Hägg, "Birkas Orientaliska praktplagg," 204–223.

[61] e. g. Ture J. Arne, "'Austr i Karusm' och Särklandsnamnet," 290–305; Annika Larsson, *Klädd krigare;* Marianne Vedeler, *Silk for the Vikings*.

[62] Martha Hoffmann, *The warp-weighted Loom: Studies in the history and technology of an ancient implement* (Oslo, Bergen: Universitetsforlaget, 1964).

[63] Agnes Geijer, "Var järnålderns 'frisiska kläde' tillverkat i Syrien? Reflexioner i anslutning till ett arbete om tyngdvävstolen," *Fornvännen: Journal of Swedish Antiquarian Research* 60 (1965): 112–132. http://samla.raa.se/xmlui/bitstream/handle/raa/1980/1965_112.pdf?sequence=1&isAllowed=y

[64] Anne Stine Ingstad, "'Frisiskt klede' En diskusjon omkring noen fine tekstiler fra yngre Jernalder," *Viking. Tidskrift for norrøn arkeologi* 43 (1980): 81–95; Lise Bender-Jørgensen, *Forhistoriske textiler i Skandinavien* (København: Nordiske fortidsminder, Ser. B. 9, 1986); Eva Andersson, *The Common Thread. Textile production during the late Iron Age – Viking Age* (Lund: University of Lund, Institute of Archaeology, Report Series no. 67, 1999), 40f.

[65] Margareta Nockert, "Vid Sidenvägens ände. Textilier från Palmyra till Birka," in *Palmyra: Öknens drottning* (Stockholm: Medelhavsmuseet. Skrifter 11, 1988), 77–105; Eva Lundwall, *Den ljusskygga textilkonsten: Textilkonservering under 1900-talet* (Stockholm: Riksantikvarieämbetet, 2003), 207.

[66] Comparisons are also made between the Birka costume and a Byzantine coat, called Scaramangion. See e. g. Inga Hägg, *Kvinnodräkten i Birka*: *livplaggens rekonstruktion på grundval av det arkeologiska materialet (*Mit

Antinoë is said to be mirrored also in the remains of the five hundred-years later *women's* apparel found in Scandinavian Viking Age graves. The conclusion is drawn from fragments of silk samite and woolen diamond twill in the female boatgrave number 75 from Tuna in Badelunda in the Eastern Mälar Valley in Sweden, and it is based on comparisons with the Birka fragments of samite fabrics cut in strips, which appear to have been used to decorate garments sewn in diamond twill.[67] In Birka, however, this phenomenon applies *only* to women's costume. Diamond twill does not appear in men's suit.[68]

By my own review of the rich silk material from the Viking Age boatgraves in Valsgärde, I was struck by the fact that also these graves (all male) are completely missing diamond twill – a quality which instead is to be found at the site in the boatgraves from the earlier Merovingian period. However, there is not a single trace of any silk from this early period, neither any Viking Age silk applications sewn on non-silk material like for example diamond twill wool. This contradictory relationship raises questions that put earlier interpretations about the similarity between the Viking Age grave costume and the male coats from Antinoë, at its peak.

Even more hasty conclusions have probably been drawn over the years. Geijer said, for example, that there are no traces of cutting among any garment finds in Birka. However, there are Viking Age examples of cutting found in other contexts as for example the cohesive piece of a total of 100 x 50 cm from a garment cut and sewn of samite found in the above-mentioned chamber grave in Pskov.[69] From boatgrave 36 in Gamla Uppsala there are also silk remains of a presumed piece of clothing in total. This garment is considered, by Anita Malmius, in a "unique" way to be composed of two layers of different kinds of silk (twill and tabby).[70] However, in closer studies, I have found that we are dealing with a fabric consisting of two "layers" – so typical for the samite technique (Fig. 10a-b).[71] Thus, this quality is not unique but the most common prevailing quality among the Viking Age silk, developed for the purpose of bringing forward beautiful motifs in different colours on the upper side of the shiny fabric that we can call 'brocade' (*dibadj*).[72] In Valsgärde there are also whole pieces of garments preserved – e.g. the complete silver-embroidered collar on silk samite (Fig. 17) probably belonging to a coat (or a hat). Cutting is also clearly visible in Fig. 9.

In addition, Viking Age figurines, so called 'Valkyries', are now and then depicted in clothing sewn of silk 'brocade'. Thanks to the unequivocal pattern of *pearl roundel* (Fig. 18a, b) we can identify the garment fabric as silk samite, which probably derived

einem zusammenfassung: Die Frauentracht in Birka: eine Rekonstruktion der Körperkleidungsstücke auf Grund der archäologischen Funde*)*, 99–100.

[67] Margareta Nockert, "Båtgrav 75: Textilierna," 116f. See also Agnes Geijer, *Ur Textilkonstens Historia*, 275f.

[68] Agnes Geijer, *Birka III: Die Textilfunde aus den Gräbern*, 176ff.

[69] Elena S. Zubkova, et al., "Studies of the Textiles from the 2006 Excavation in Pskov," 291–298.

[70] Anita Malmius, "Textilanalyser," 80f (figs. 3a, 3b), 91.

[71] Annika Larsson, "Silk Samite in the Viking Age female Boatgrave 36, Gamla Uppsala: A Textile Review," *NESAT XIV 2020* (North European Symposium for Archaeological Textiles) (University of Oulu, Aalto University & University of Helsinki University). Accepted for presentation. https://www.nesatxiv.org/schedule

[72] In the museum of Gamla Uppsala, however, the actual silk from Boatgrave 36 is said to be 'reconstructed'. A 'copy' is shown to the public as a monochrome fabric.

from Central Asian areas. The repeated circle motifs, in which the circles are built up of a number of smaller dots, originated in Sassanid silk culture and remained in post-Sassanid silks, woven in samite technique (*dibadj*) in damask looms. The silk patterns apparently have been important when depicting the Viking figurines, which are considered to reflect certain rituals within the Viking Age culture. To the pre-Christian Viking Age grave costume tradition also a large number of tablet-woven bands of silk and silver thread belonged, a material that by Hägg was interpreted as of Byzantine symbol value.[73] In the present Turkey, however, such historical costume details reflect the Muslim Era that – later – followed the fall of the Christian Byzantium.[74]

Tablet-woven bands with geometric designs

Already in 1926, the Swedish textile historian Vivi Sylwan analyzed tablet woven bands as cultural objects. She pointed out that the technique was well developed and widely spread in the Nordic region already in the early third century CE. Indeed, findings of tablet-woven woolen bands with geometric patterns occur in Scandinavia before the Viking era.[75] In the book *Prehistoric Textiles*, Elizabeth Barber shows that some of the earliest evidence for tablet weaving is found in the textile finds from Hallstadt in Central Europe, as early as the fourth century BCE. Here a silk fabric, consisting of a tablet-woven border and patterned with stripes of diamonds, meanders and swastikas, was found – produced from the fibres of the genuine silkworm *Bombyx mori*, which only existed in China at the time. There is also some clearly evidence for tablet-weaving in northeast Caucasus, in Kurgan graves from the Nalchik area. Thus, Barber suggests that the early silk would have come from China to Europe on the northern Silk Road – across Altai and the Ukraine – rather than via Xinjiang and Syria, which was a later, southern caravan road stretching west from China. If so, the tablet weaving seems to be of the same origin.[76] In 1972, Agnes Geijer wrote:

> Silk tablet woven bands with gold or silver effects are found in abundant amounts among the finds in the Viking Age Birka – in no less than 60 graves, many times in several variants. / ... / Due to the overall uniformity and high quality, I have become increasingly convinced that all these bands were imported from the Orient via the Russian trade routes, like many other materials among these finds.[77]

The tablet-woven bands from Birka are available in more than 90 different variants.[78] In addition, Geijer also mentions 92 items of lace-like work (passementerie) of drawn gold and silver wire, found in the Birka graves. Similar objects are also found at Mammen, in Denmark:[79]

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[73] Inga Hägg, *Birkas Orientaliska praktplagg*, 204–223.

[74] Annika Larsson, *Klädd krigare*, 63, 351–356.

[75] Margareta Nockert, *The Högom Find and other Migration Period Textiles and Costumes in Scandinavia: Högom Part II* (University of Umeå: Department of Archaeology, Archaeology and Environment 9, 1991), 81–93.

[76] Elisabeth Barber, *Prehistoric Textiles* (United Kingdom: Princeton University Press, 1992), 203.

[77] Agnes Geijer, *Ur Textilkonstens Historia*, 86.

[78] Ibid., 276.

[79] Ibid., 261.

> Of Oriental origin are also the artwork of gold and silver wire designs that are related to both lace and embroidery – examples of which were found in Mammen and Valsgärde, but above all in Birka /.../ the Mammen find, also contains other Oriental, probably Persian, costume ornaments.[80]

I have recently suggested that the patterns of the "Silk tablet-woven bands with gold or silver effects that are found in abundant amounts among the finds in the Viking Age Birka", may contain Muslim expressions in geometrical Kufi. In her dissertation, *The Phenomenon of The Square Kufic Script*, Tehnyat Majeed maintains that a circular compositional square sequence was extremely popular for Muslim inscriptions in early geometrical Kufi. The script was preferred for expressing the names of Allah, Mohamed and Ali.[81] In *Matching Islamic patterns in Kufic images*, the authors show how to deal with Geometric Kufi as symbolic "images,"[82] which I claim would fit into the tablet-woven material from Birka as well as Valsgärde. If so, this would indicate that the material neither represented a Christian culture sphere (e.g. Byzantium) or a Jewish (e.g. Khazaria). Further research on this subject will be published separately.

Epigraphic bands, so called *tiraz*, on many Islamic textiles confirmed loyalty to God and to the caliph and marked the recipient with honor. The origin of the word *tiraz* is Persian and it means 'scripture'. Inscribed textiles were given as robes of honor to courtiers and ambassadors in the *khil´a* ceremony, where they served as a symbol of individuals´ loyalty to the caliphate. *Tiraz* textiles with special qualities made them especially suited for funerary purpose, and were often wrapped around the head of the deceased with the text covering the eyes, which attest to the religious significance of these inscriptions.[83] Referring to this phenomenon, the position of the tablet-woven bands B 5, B 7 and B 14 in Birka's grave Bj 845 and Bj 968 (Fig. 5f), respectively, is of particular interest. According to the grave plans, made by Hjalmar Stolpe during the excavations, the bands were placed right over the buried women's forehead, and still, after being buried more than a thousand years, the tablet-woven band B 14 almost covered the eyes of the deceased.[84]

In Bukhara, a silk *tiraz* workshop existed until the end of the eleventh century.[85] A luxury production had also spread west to Europe, where inscriptions with Arabic writing (*kufi*) often were used as decoration.[86] In the 1100–1200s, fine bands of silk patterned with gold threads, *tiraz*, was manufactured in Palermo. The factory produced textiles for the Norman royal palace during the time when pseudo-kufic textile patterns were modern

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[80] Ibid., 276.

[81] Tehnyat Majeed, "The Phenomenon of the Square Kufic Script: the cases of Ilkhanid Isfahan and Bahri Mamluk Cairo" (Ph.D. diss., University of Oxford, 2006), 38ff. https://www.academia.edu/7851625/Chapter_One_What_is_Square_Kufic_An_Historical_Survey_and_Analysis_of_the_Physical_Evidence

[82] Damla Arifoglu, Emre Sahin, Hande Adiguzel, Pinar Duygulu, and Mehmet Kalpakli, "Matching Islamic patterns in Kufic images," *Pattern Analysis and Applications* vol. 18.3 (2015): 601–617.

[83] Maryam Ekhtiar, and Julia Cohen, "Tiras: Inscribed Textiles from the Early Islamic Period," in *Heilbrunn Timeline of Art History* (New York: The Metropolitan Museum of Art, 2000-) https://www.metmuseum.org/toah/hd/tira/hd_tira.htm (July 2015).

[84] Agnes Geijer, *Birka III: Die Textilfunde aus den Gräbern*, 169.

[85] Richard Frye, "Bukhara and Zandaniji," in C*entral Asian Textiles and Their* C*ontexts in the Early Middle Ages*, ed., Regula Schorta (Riggisberg: Abegg-Stiftung, 2006), 75–80 (78).

[86] Agnes Geijer, *Ur Textilkonstens Historia*, 172.

in Europe. The factory was under the leadership of Muslims and they used mainly Muslim workers in the production, with traditions from the former Muslim rulers on the island.[87] However, the very special tablet-woven silver bands in Mammen, Birka and Viking Age Valsgärde are a couple of hundred years older than these epigraphic bands produced in Europe. The diagonal geometric patterns – such as different types of swastikas – probably originated in China and India, but were integrated into Persian and Central Asian design along with signatures on coins, as well as symbolic decorations on, for example, building walls on Muslim grave monuments. The symbolic patterns have survived in textile handicraft for long time, and remains can, as a result of cultural integration, still be seen in e.g. the Russian folk art.

From Central Asia to Russia and Scandinavia

Geijer wrote that the unique Tang silk from the grave Bj 944 came to Scandinavia from China via the eastern trade routes through Russia along the Volga River.[88] At the time, the largest production of both silks and silver was in the Central Asian areas, close to the Chinese border. In this area there was also a long tradition of silk trade. Why would not the rest of the silk material in this and other Viking Age graves, like the extensive material of Central Asian coins, have gone the same way?

Ignoring some earlier interpretations about the origin of the silk, there is hardly any archeological material in Birka which can be attributed to Constantinople and Byzantium. Instead, thousands and thousands of Islamic coins in Sweden testify eastern cultural contacts with the Caliphate. Most of the Islamic coins represent Abbasid and Samanid dynasties from the Central Asian region. The latest coins found in the graves at Birka, dates 955[89] or 966 CE.[90] Shortly thereafter, the use of Birka as a burial place, ended.

Birka graves containing silk date from the mid-ninth century until the second half of the tenth century. I find it likely that the Islamic coins, especially Samanid, can be traced to the same origin as the silk origin, probably also to the same time for cultural exchange. My hypothesis is that the large presence of Samanid coins in Scandinavia, represents trading interaction with Samanid centers for silk production in the ninth and tenth centuries. Coins dated earlier may have been in circulation for a long time, as we do not know of any silk finds in Scandinavia before the mid-ninth century. A German coin from the beginning of the 1000´s indicates that the pre-Christian *chamber* funerals in Valsgärde probably lasted a couple of decades longer than in Birka, and that the cultural integrations with Central Asia had come to an end.[91]

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[87] Vivi Sylwan, "Brickbandet som kulturobjekt: Några iakttagelser och deras resultat," *Fornvännen: Journal of Swedish Antiquarian Research* 21 (1926): 231–244 (240). http://samla.raa.se/xmlui/bitstream/handle/raa/800/1926_231.pdf?%20sequence=1&isAllowed=y

[88] Agnes Geijer, *Ur Textilkonstens Historia*, 257, 261.

[89] Christoph Kilger, "Myntfynd och den vikingatida silverhandeln," in *Myntningen i Sverige 995–1995*, ed., Kenneth Jonsson, Ulf Nordlind, and Ian Wiséhn (Stockholm: Svenska numismatiska föreningen, 1995), 27–42 (32).

[90] Arwidsson, Greta. "Die Münzen der Gräber von Birka." Offprint *Birka II:3. Systematische Analysen der Gräberfunde* (Stockholm: Kungl. vitterhets-, historie- och antikvitetsakademien, 1989), 139.

[91] Annika Larsson, *Klädd krigare*, 351–356.

There is an extensive documentation of Central Asian textile production and its development. In *Encyclopaedia Iranica* research on silk production from Iranian areas is summarized,[92] and it's compiled in *Ars Islamica* by R. B. Serjant. [93] Different fabrics in domestic silk production, but also external trade, are among other economic aspects of Central Asia presented by UNESCO in 1996.[94] [95] In *Central Asian Textiles and Their Context in the Early Middle Ages*, Richard Frye writes about the Sogdians' significant role as traders and their spread of, in particular, precious textiles from Central Asian textile centers such as Mery, Samarkand and Bukhara – to mention some of the more important places.[96] The authors all mention the common silk quality specified as *dibadj*, mostly translated into English as 'brocade'[97] and produced in the area parallel to a production of thin gauze-like fabric, *gazz*-weave. From the area silver embroidery and thin veils are mentioned as well, but also production of *tiraz*. Unfortunately, we do not know exactly what the *tiraz* looked like. Extravagant *tiraz* is said to be have been made of silk with golden inscriptions, produced in specialized factories or workshops which belonged to the court. None of these expensive *tiraz* has survived, but from the text sources we know that they often served as currency or investments and were traded and sold.[98]

Samanid centers for silk production were found mainly in urban areas in Transoxania and Khurasan. An interesting piece of information is that these centers also produced large amounts of cotton in for example Samarkand and Bukhara, but the material seems not to have reached the Scandinavian Vikings, although the Central Asian cotton should have been widely known.[99] During the ninth and tenth centuries the Central Asian trade, from the centers of silk production to Western Asian and Eastern European trading centers, increased. The *Great Silk Road* stretched from the area of the above-mentioned textile centers, to northern China and Mongolia in the east and to the Levant area in the west. Ibn Fadlan described also another important arm of the Silk Road, namely the caravan road that stretched north to the Volga River. The same route continued south to the Khazar Empire and to the city of Itil on the north coast of the Caspian Sea. Fine glasses[100] and woolen textiles, but, above all, silk and weapons were delivered to the Volga River area in exchange for fur and skins, honey and wax as well as slaves. Several Volga Bulgar coins found in Birka, imitate Samanid coins from the first part of the tenth century,[101] which might widen our understanding of trade with, among other items, Central Asian silk.

[92] *Encyclopaedia Iranica*, online edition, New York, 1996-. http://www.iranicaonline.org/articles/abrisam-silk-index

[93] R. B. Serjant, "Material for a History of Islamic Textiles up to the Mongol Conquest," *Ars Islamica* vol. 9 (1942): 54–92.

[94] M. S. Asimov, and C. E. Bosworth, eds., *History of Civilizations of Central Asia, Vol. IV, The age of achievement: A.D. 750 to the end of the fifteenth century* (Paris: UNESCO Publishing: Multiple History Series, 1998). http://unesdoc.unesco.org/images/0011/001116/111664eo.pdf

[95] N. N. Negmatov, "The Samanid State," in *History of Civilizations of Central Asia. Vol. IV, The age of achievement: A.D. 750 to the end of the fifteenth century*, ed., M. S. Asimov, and C. E. Bosworth (Paris: UNESCO Publishing: Multiple History Series, 1998), 83–101.

[96] Richard Frye, "Bukhara and Zandaniji," 75–80.

[97] See also Philip. K. Hitti, *History of the Arabs*, 245.

[98] Maryam Ekhtiar, and Julia Cohen, "Tiras: Inscribed Textiles from the Early Islamic Period".

[99] N. N. Negmatov, "The Samanid State," 90.

[100] The Swedish History Museum http://historiska.se/upptack-historien/object/106816-karl-bagare-av-glas/#group-1

[101] Greta Arwidsson, "Die Münzen der Gräber von Birka," 140.

Throughout the ninth and tenth century, large amounts of Samanid coins and Samanid luxury goods, through the Rus´ area, reached all the way to the Baltic Sea in the west, but also further to the Scandinavian neighbors. The Silk Road cargoes were both big and small, and the caravans stayed at special trading stations along the way. The Caliph al-Muqtadir (908–932 CE) sent the largest known caravan load – 3000 pack animals escorted by 5000 men. They had all the necessary services, including military protection, but also artists and craftsmen as well as raw materials for both industry and handicrafts. Within the production, both free and slaves worked.[102] The delegation of Ibn Fadlan, which went north to the Turkish Volga Bulgars from Baghdad via Mery, Bukhara and Khwarezm east of the Caspian Sea to Bulgar, situated at the river Volga about 30 km downstream from its confluence with the Kama River, is said to have brought thousands of Dinars as well as silk fabrics and clothing in finest gold brocade – *dibadj*[103] – but also Muslim costumes of honor and elegant veils made of silk.[104] It is not impossible that similar loads, mainly through the Russian rivers, also made their way to Scandinavia.

Summary – Silk Culture in Viking Age Scandinavia

Silk in the pre-Christian context is rarely noted in Scandinavian archeology. Remaining fragments are tiny and the design expressions almost invisible. Thus, silk from Viking Age Scandinavia are difficult to interpret for an untrained eye. Silk cultivation and silk production did not exist in Europe at this time. The material was produced in Asia, and primarily associated with rich graves in central Scandinavian settlements close to waterways. Both the necropolis at Birka and Valsgärde boatgrave field in the Eastern Mälar Valley, are good examples. However, silk must have been relatively common in the Viking Age Scandinavia, as there are often traces of silk not only in warrior´s graves but also often in the oval brooches in female graves. The brooches are so common that even smaller Scandinavian museums often have them in their Viking Age collections. When textile remains still can be found inside the fibulas, small fragments of patterned samite woven from untwisted silk threads in different colours are not uncommon findings (Fig. 6b).

Viking Age silks in Scandinavian contexts are only found in graves. Most of the silks from the Viking Age boatgraves in Valsgärde, not far from Gamla Uppsala in the Eastern Mälar Valley, are loosely woven by untwisted reeled silk threads, which give the fabrics a light and thin quality. This is characteristic for almost all fabrics that remain, woven in tabby as well as in samite techniques, indicating a Central Asian origin. A genuine Han-damask fragment with remains of gold painting, found in the horseman´s grave Bj 944 in Birka, rather confirms that Chinese silk was part of the Silk Route long-distance trade westwards to Eastern Central Scandinavia, which emerged from the cultural melting pot in Central Asia. Z-spun threads are at firsthand connected to the Middle East and Byzantine areas. So far, only one silk fragment made of spun threads has been found in Valsgärde. In Gamla Uppsala, one additional fragment is found. I propose that these two exceptions probably came to Scandinavia through the Central Asian crossroads as well.

[102] N. N. Negmatov, "The Samanid State," 91.
[103] Ture J. Arne, "'Austr i Karusm' och Särklandsnamnet," 295.
[104] Stig Wikander, *Araber, Vikingar, Väringar,* 44f.

The open gauze-like silk fabrics in Birka and Valsgärde are almost the same, woven with the same blue colour in one of the thread directions, although in the Valsgärde fabric no floating pattern threads can be seen as in the genuine Han damask fabric from Birka. Instead, the Valsgärde fabric is covered by sparse embroidery made of silver lamella threads, attached by couching stitches on the loosely woven tabby. Worth noting, is that all silver thread decorations that occur in Valsgärde, including embroidery and tablet woven bands, only occur on silk material. Even the spun silver lamella threads have a core of silk. This is not an old Scandinavian tradition – already in *Exodus* in the Old Testament it is described how lamella thread was made out of hammered gold foil for use in the clergy's ceremonial clothing in the Middle East.[105] Concerning the Eastern Scandinavian finds of lamella from the Viking Age, the material seems to only have been used for embroidery on silk and silk tablet-weaving.

There is no evidence in the graves for any gold or silver threads woven into silk cloth. When comparing to the "golden brocade" mentioned in Central Asian context by the Muslim traveler Ibn Fadlan in the beginning of the tenth century, it is hard to know whether he actually refers to silk fabric with gold threads in the weft or to golden decorations made either by painted "gold-leaves", golden embroidery, passementerie applications or tablet-woven bands from guilded silver threads. The similarity to Chinese silk culture, as well as the lack of gold threads in brocades woven in samite technique found in Scandinavia, indicate that he likely refers to silk brocade (*dibadj*) decorated with gold ornaments.

The present article has interpreted silk from Viking Age burial costumes not only as a result of plunder. It is rather a material expression of greater values, shared throughout the Viking cultural area where the Rus should have been greatly influenced by trade with Samanid and Sogdian merchants. My interpretation is that most of the silks in both Birka and Valsgärde necropolis sites, originated from urban silk producing centers such as Bukhara and Mery, situated in Central Asian areas near the eastern border to China, between the mid-ninth and the late tenth century CE. From the same date and the same cultural area originate large amounts of Samanid coins in the Viking Age Scandinavia.

An important piece in the puzzle will be the geometric expressions in the tablet-woven bands of silk and silver (sometimes gold) belonging to the Viking Age grave costumes, which could strengthen the argument for the Muslim parts of Central Asia as the area of production. I find it quite remarkable that traditional maps showing the Viking world do not include the Central Asian areas, often not even the Caspian Sea.[106] It is high time for a paradigm shift in Viking textile studies, where textile material should not be separated from archeological knowledge and where cultural contexts in Central Asia also should be added into the archeological Viking Age research.

In my thesis – *Klädd krigare; Skifte i skandinaviskt dräktskick kring år 1000* (Warriors clothing; Shift in Scandinavian Costume in the vicinity of year 1000) – it was concluded that the Scandinavian trade routes to the Oriental East changed after the use of the necropolis at Birka ended – from getting cultural influences from the Caliphate through trade along the River Volga, to trade and cultural exchange with the Christian Byzantine

[105] The 2nd Book of Moses, 39:3: "And they did beat the gold into thin plates, and cut it into wires, to work it in the blue, and in the purple, and in the scarlet, and in the fine linen, the work of the skillful workman."

[106] e.g. S. Brink, and N. Price, eds., *The Viking World* (London: Routledge, 2008), xxiii.

Empire and Constantinople via the River Dniepr after the year 1000 CE[107] – an interpretation that Ture J. Arne made already in 1947, in an article dealing with Scandinavian Viking Age cultural contacts eastwards. His result was based on Swedish runic inscriptions from the eleventh century.

– Interpretations, claiming Byzantine silk in Scandinavia during the Birka Era are not correct, Arne says. Byzantine silk import to Eastern Scandinavia is of slightly later date than the North Persian import of silk to Birka.[108] Based on the extensive material of hitherto unpublished silk fragments from Viking Age boatgraves in Valsgärde and Gamla (Old) Uppsala, which in my ongoing research are analyzed and compared with the silk finds from the necropolis in Birka, the same conclusions can be drawn and strengthened.

Acknowledgements

I would like to extend a great thank you to *Torsten Söderbergs Foundation*, which, through financial contribution, has made my textile analyzes of the finds from the Valsgärde boatgraves possible. I would also like to thank *Riksbankens Jubileumsfond* and *Estrid Ericson Foundation*, which both have supported my continued work in placing the material in a relevant context. Further, the *Swedish Institute* and Mårten Frankby, Consul at the *Swedish General council* in St. Petersburg have made comparison studies on site, from west to east in European Russia, possible. During the journey in Russia the results were presented at the International Silk Road Seminar held in Kislovodsk in the North Caucasus in September 2019, a joint arrangement between the University of Stavropol and the China Silk Museum.

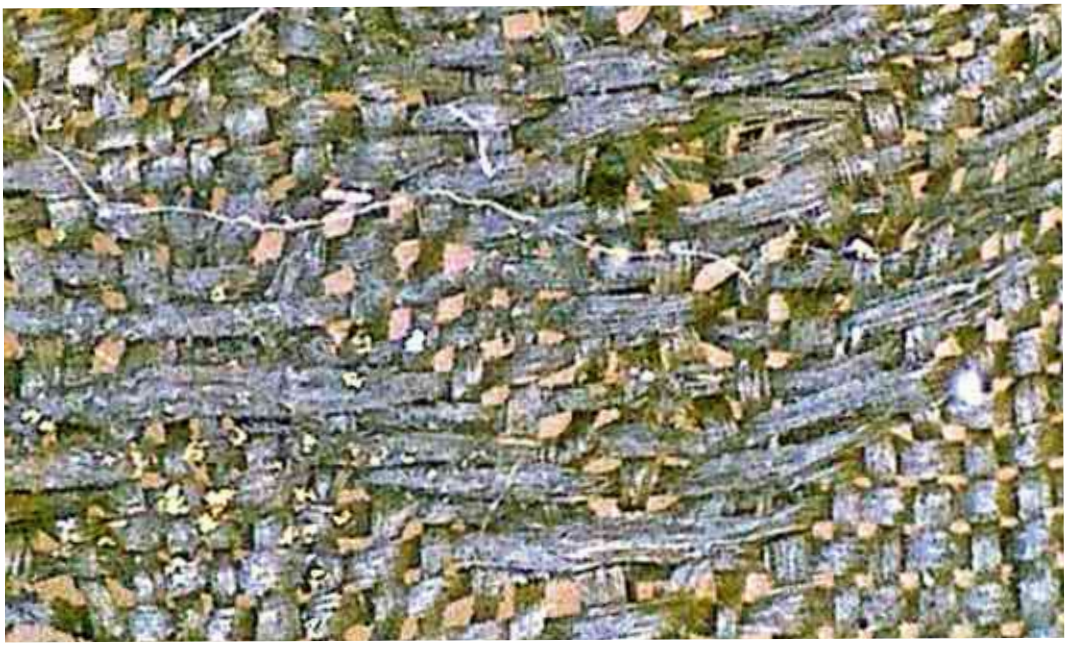
My warmest thanks go however to my Arab research colleague Mohamed Guennoun in Rabat, Morocco, who in ongoing collaboration contributes with relevant literature regarding Eastern cultural areas. Mohamed does not only translate from Arabic into English, but also teach me a great deal about Islamic cultural history. Together we are at the moment working on a book that follows up on this article.

[107] Annika Larsson, *Klädd krigare*.

[108] Ture J. Arne, "'Austr i Karusm' och Särklandsnamnet," 295.

a)

b)



c)

Figure 1. a) *Tang-silk woven in "Han damask" found in horseman´s grave Bj 944 in Viking Age Birka, tenth century (photo © Annika Larsson).* **b)** *The threads in one direction of the fragment are still blue. Reeled, untwisted silk fibers were used (microscope photo © Annika Larsson).* **c)** *The seam was covered by passementerie lace-work made of silver wire (after Agnes Geijer 1938: Taf. 29: 1–2).*

a).

b)

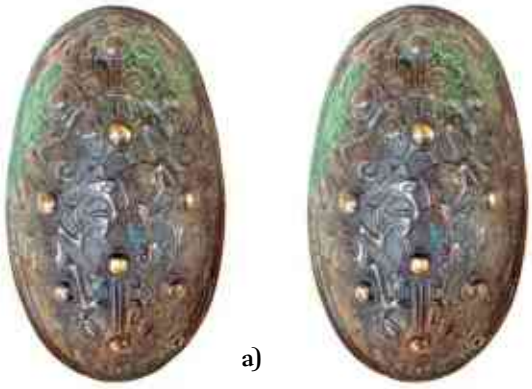
Figure 2. a) *Bulgarians attack Byzantine Christians 985 CE at a wind of the River Volga. Drawing after the original Vat.gr.1613, fol.345 (drawing Vera Olsson © Vera Olsson and Annika Larsson).* **b)** *Preserved wall painting depicting Byzantine silk costumes. Chora church, Istanbul (photo © Annika Larsson).*

Figure 3. *Viking Age silk fabric woven in samite technique found in horseman´s grave Bj 944 in Viking Age Birka, tenth century. Long, shiny weft threads were enhanced and visualised on the face side of the fabrics. This is a typical tenth century silk find in the Birka chamber graves (microscope photo © Annika Larsson).*

a) **b)** **c)**

Figure 4

a) *Silk samite with motif of the Persian king Bahram Gur on a hunting trip in 50 cm circles. From a Viking Age woman´s grave costume in Russian Pskov, tenth century (drawing Vera Olsson © Vera Olsson and Annika Larsson).*
b) *In technologically developed looms, the detailed circular patterns were repeated (drawing Vera Olsson © Vera Olsson and Annika Larsson).*
c) *The remains from the grave costume consisted of a whole meter of the silk samite fabric (drawing Vera Olsson © Vera Olsson and Annika Larsson).*



a)

b).

f)

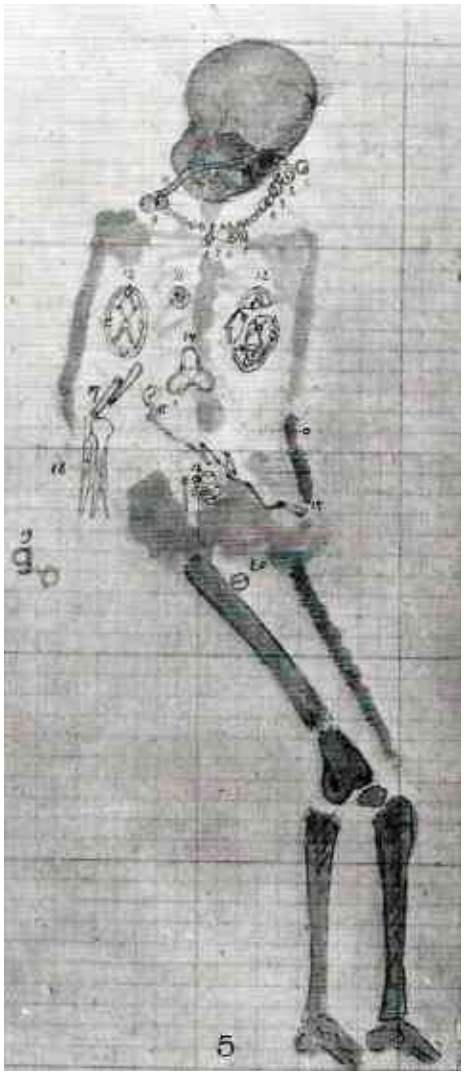


Figure 5.

a) *A pair of female bowl-shaped fibulas, so called oval brooches, Viking Age. In the archaeological collections, Uppsala University (photo © Annika Larsson).*
b) *In the bowl-shaped fibulas there was a ring, were a knife was fastened. Boatgrave 36, Gamla Uppsala, c. 900 CE. (photo Mikael Wallerstedt © Mikael Wallerstedt and Annika Larsson).*
c) *Textile remains from the clothing are often preserved inside the fibulas. Here, linen tabby and silk samite. Boatgrav 36, Gamla Uppsala, c. 900 CE. (photo Mikael Wallerstedt © Mikael Wallerstedt and Annika Larsson).*
d) *The green colour on the upper arm bone show the position of the oval brooches on the dead woman´s breasts. Boatgrave 36, Gamla Uppsala, c. 900 CE (photo © Annika Larsson).*
e) *The knife from Boatgrave 36, Gamla Uppsala. A bronze ring was still in position at the excavation, c. 900 CE (photo © Annika Larsson).*
f) *Grave Bj 968 in Birka. Plan by Hjalmar Stolpe. A pair of oval brooches, where the knife and scissors were fastened, were in breast position. Tablet-woven bands covered the dead woman´s face (after Agnes Geijer 1938: Taf. 40:5).*

c)

d)

e)

a)

b).

c)

d)

Figure 6.

a) *From the excavation of the Viking Age female boatgrave in Turinge, Eastern Mälar Valley, a pair of oval brooches as well as five metal pendants in the bead strands, are visible (photo courtesy Sten Tesch).*
b) *Silk samite remains in the fibulas from the Turinge boatgrave, show colourful woven patterns. Blue, yellow and red threads from untwisted reeled fibers are visible (microscope photo © Annika Larsson).*
c) *A necklace pendant with Post-Sassanian ornaments from the Viking Age boatgrave in Turinge (photo © Annika Larsson).*
d) *A necklace pendant with Post-Sassanian ornaments from the Viking Age boatgrave in Turinge (photo © Annika Larsson).*

a)

c)

b)

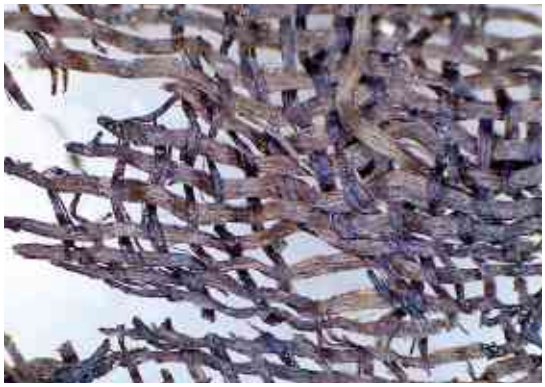


Figure 7. a) *Valsgärde boatgrave number 10. Male grave from the tenth century. Remains of veil-thin tabby woven from untwisted, reeled silk threads covered the body of the deceased (photo © Annika Larsson).*
b) *The veil-thin tabby has been produced with blue threads in one direction (microscope photo © Annika Larsson).*
c) *Embroidered staircase patterns made of silver-lamella thread covered the veil-thin tabby (microscope photo © Annika Larsson).*

a)

b)

Figure 8. a) *Silk straps, only about one and a half centimeters wide. Male boatgrave, Valsgärde number 3, tenth century. Thanks to the natural glue of the silk extremely narrow folds have been possible to make, held in place without any stitches (photo © Annika Larsson).*
b) *The straps are cut from a larger piece of gauze-like woven tabby, made of untwisted, reeled cocoon threads (microscope photo © Annika Larsson).*

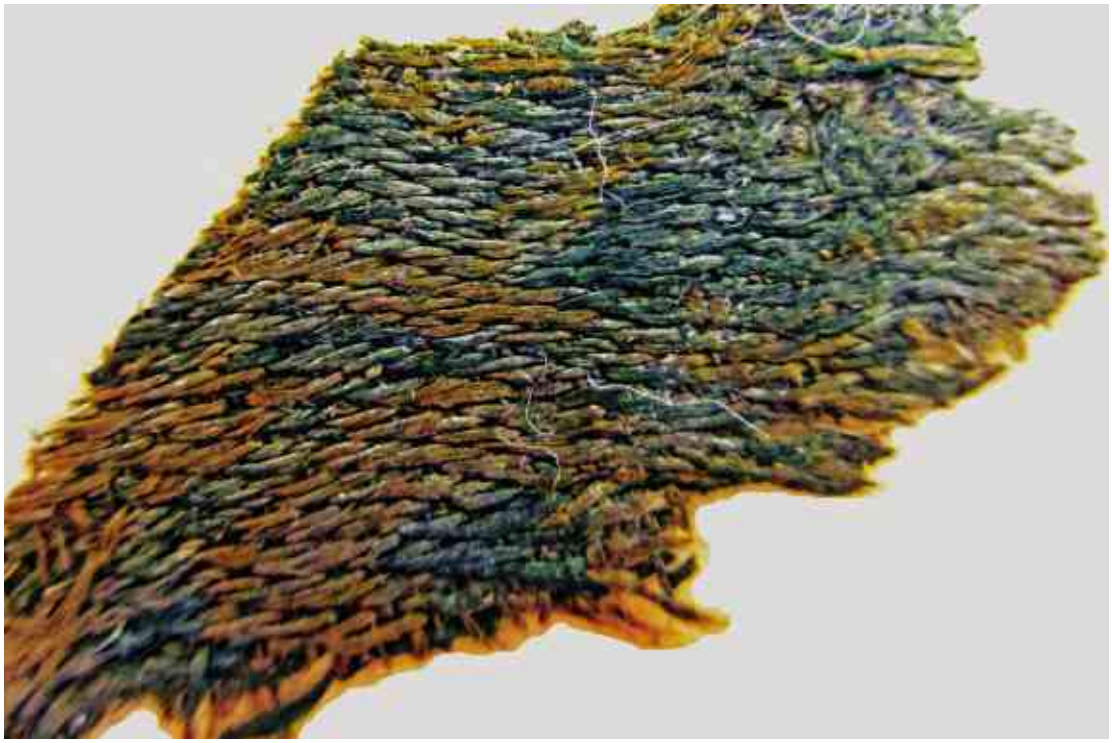


Figure 9. *Silk samite in Valsgärde boatgrave number 11 show not only distinct traces of patterns in different colours, but also distinct traces of cutting, tenth century (photo © Annika Larsson).*

a)

b)

Figure 10. ***a)*** *Female boatgrave 36, Gamla Uppsala, c. 900 CE. Face side of a piece of silk samite, woven in at least two colours (photo © Annika Larsson).*
b) *Reverse side of the same samite fragment. Note the cut and folded edge, indicating that the garment was open in the front of the body (photo © Annika Larsson).*
c) *The fabric is woven by z-spun threads from shorter fibers in the warp direction, but still shiny, un-twisted threads are used in the weft (microscope photo © Annika Larsson).*

c)

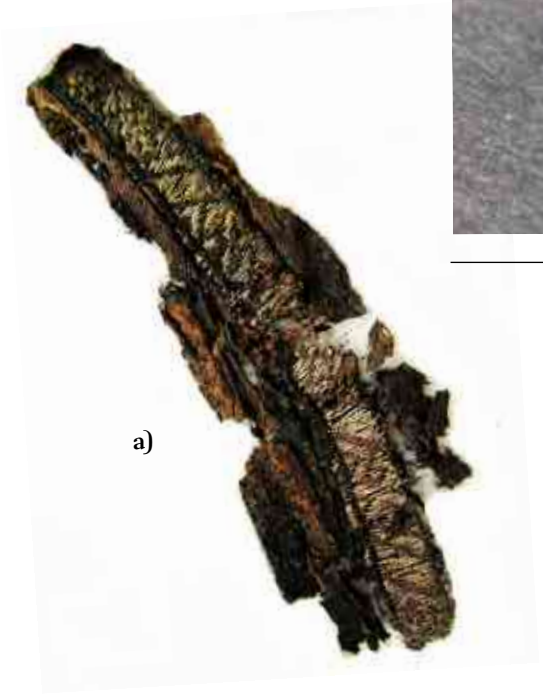
Figure 11. *Unique silk taffeta fragment in Valsgärde boatgrave number 15. Woven by z-spun threads and sewn with stitches from un-spun thread, indigo blue, tenth century (photo © Annika Larsson).*

a)

b)

Figure 12. ***a)*** *Several qualities of silk are often sewn together in the Valsgärde boatgraves, tenth century. Patterned silk samite, bordered with tabby weave and then embroidered with staircase patterns of silver lamella thread, Valsgärde 10 (photo © Annika Larsson).* ***b)*** *Tablet-woven band sewn into samite fabric, Valsgärde 15 (microscope photo © Annika Larsson).*

Figure 13. *Two, of in total six, bronze-buttons placed on the front of the male body in Valsgärde boatgrave number 15 (photo © Annika Larsson).*



a)

c)

b)

Figure 14. a) *Tablet-woven bands made of silk and silver thread. From male boatgraves in Valsgärde, tenth century. The tablet-woven bands in Valsgärde 15, are sewn into silk samite fabrics. Most of the silver threads that cover the surface consist of lamella type (photo © Annika Larsson).*
b) *Some of the patterns of the tablet-woven bands from Valsgärde are made by lifted warp threads. Valsgärde 15 (microscope photo courtesy Karolina Pallin).*
c) *Other tablet woven bands from Valsgärde are made in a kind of soumak technique, where an extra weft thread is used. Valsgärde 15 (microscope photo courtesy Karolina Pallin).*
d) *In Valsgärde 3, the silver thread in the tablet woven bands are drawn (microscope photo © Annika Larsson).*

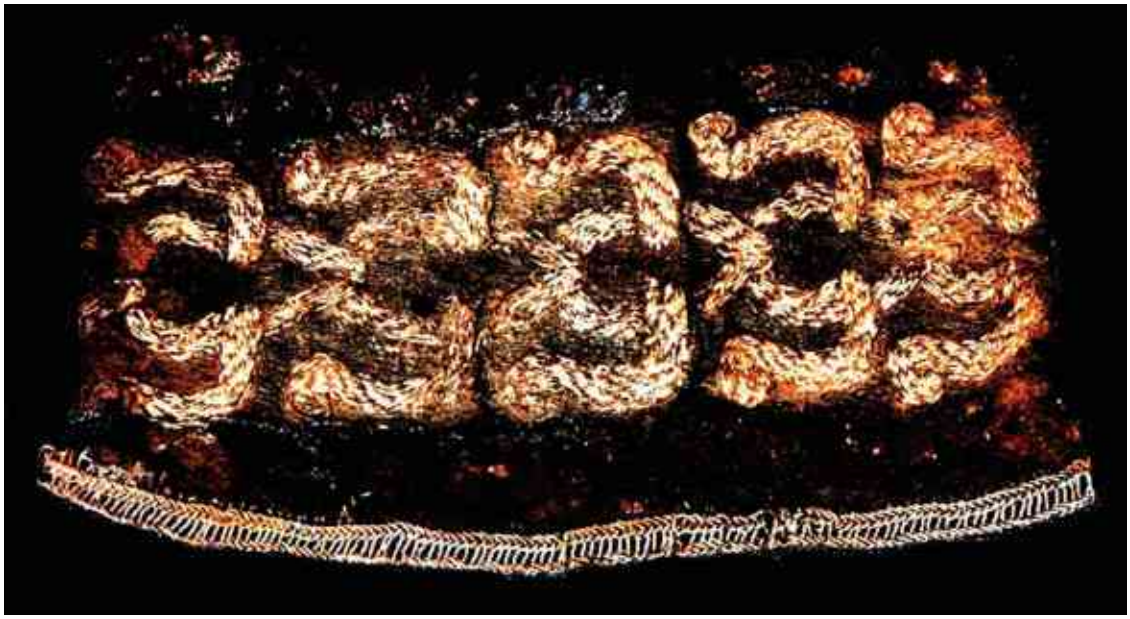
d)

a)

Figure 15.
a) *Passementerie pendants and knots, from the male boatgraves 12 and 15 in Valsgärde, are made of drawn silver wire. Tenth century (photo © Annika Larsson).*
b) *The most traditional passementerie knots still often surround some kind of organic remains (photo © Annika Larsson).*
c) *The microscope studies of 15b show the organic remains of silk samite (microscope photo © Annika Larsson).*

b)

c)



a)

Figure 16.

a) *Silver embroidery on silk-samite in Valsgärde boatgrave number 12. Both silver lamella thread and drawn silver wire is used, tenth century (photo © Teddy Törnlund and Uppsala University).*

b) *Details of the silver lamella embroidery sewn in couching technique (microscope photo © Annika Larsson).*

b)

a)

b)

Figure 17.
a) *The silver lamella embroidered collar on silk samite in Valsgärde boatgrave number 15, tenth century (photo © Teddy Törnlund and Uppsala University).*

b) *Details of the silver lamella embroidery sewn in pulled down couching technique. The embroidery is enhanced with reeled silk threads, dyed in an outstanding colour (microscope photo © Annika Larsson).*

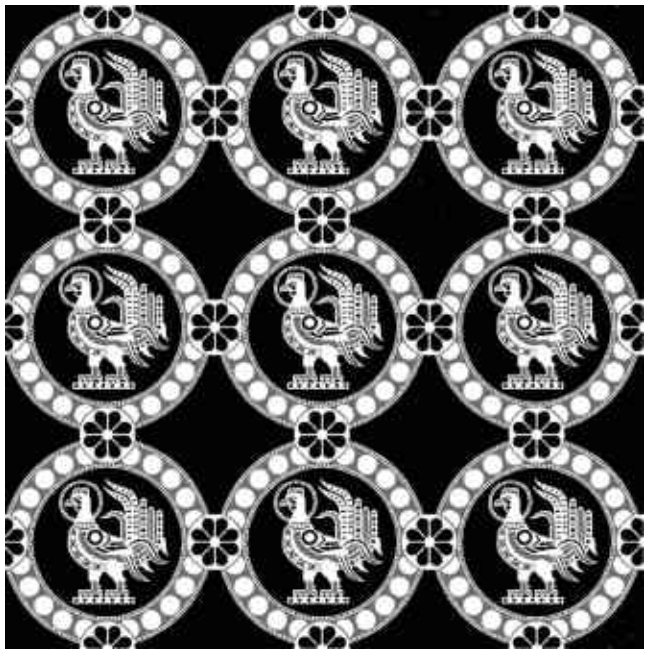


Figure 18. a) *Visualization is an important part of the textile research process. By recreating the splendor of the Central Asian silk fabrics in screen print, new knowledge also can be mediated (drawing Vera Olsson © Vera Olsson and Annika Larsson).*

b) *Small Viking Age figurines (Valkyries) of metal are sometimes depicted in clothing, sewn in silk from clear Central Asian areas. Pearl roundel motifs are typical for Post-Sassanian silk. Find from Nygaard, Bornholm in Denmark. Here, the original gilding of the pearl roundel dots is reinforced by the author (object number C32009, the National Museum in Denmark. Photo Roberto Fortuna and Kira Ursem, CC-BY-SA).*
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An overview of ancient amber artefacts excavated in China

by
Guo Wu

Introduction

For a long time, amber has been appreciated and used by people in the West and the East to make precious objects such as ornaments. In this paper, most types of amber artefacts that have been found in what is now China and dated to before the Qing dynasty will be introduced and discussed. The amber artefacts from the Han and Liao dynasties will be discussed in detail because of the large number of discoveries from these periods. No easily exploited sources for amber are present in the area covered by China. Even the name of amber in Chinese, *hupo 琥珀*, might be a loanword, such as Greek *harpax* which originated from a Syriac word.[1] Therefore, the question regarding the origin of the raw material will be raised, including the possibility that the raw material of ancient amber artefacts found in China was collected in the Baltic Sea region.

Literary sources of ancient China indicate that it was customary to burn amber during large festivities. If amber is heated under the right conditions, amber oil is produced, and in past times this was combined carefully with nitric acid to create "artificial musk" – a resin with a peculiar musky odor. This may be a factor to consider when archaeologically retrieved amber artefacts are discussed chronologically below, as the burning would destroy the material evidence for the use of amber.

The sources further show that elite groups in ancient China were not only fond of the bright colour, lustre and character of amber, but that it also had been given special function and mystical implication: the defense for the evil, the force for good luck, healing power and religious symbolism.[2] Together with the function of displaying wealth all these objective and subjective elements of amber could be considered reasons for people in ancient China to use it.

Amber artefacts dating to the Shang dynasty (ca. 1600–ca. 1050 BCE) up to the Warring States period (ca. 476–221 BCE)

The use of amber started at a later date in ancient China as compared to the West. Only a few amber artefacts dating to before the Western Han dynasty (206 BCE–9 CE) have

[1] Xu Xiaodong 许晓东, *Zhongguo gudai hupo yishu 中国古代琥珀艺术* [*Art of ancient amber in China*] (The Forbidden City Press, 2012), 18–19.

[2] Gao Ershi. 高二適 *Xinding Jijiu zhang ji kaozheng 新定急就章及考證* [*Textual criticism on the newly updated Jijiu zhang*], vol. 2. (Shanghai: Shanghai guji chubanshe, 1982), 197–198.

a)  b) 

Figure 1 a and 1 b. *An amber pendant (the obverse and reverse side) dated to 1300 BCE was found in Sanxingdui site in Guangyuan county, Sichuan Province. To date (2015) this is the oldest find of an amber object in China.*[3]

been excavated. The oldest, presently known, amber ornaments have been excavated from remains of the late Shang period to the Warring States period (1300 BCE to 300 BCE) in the western regions of what is now China. One example is an amber pendant dated to 1300 BCE found in the Sanxingdui site in Guangyuan county, Sichuan Province.[4] Furthermore some amber beads were excavated from a tomb dated to the Shang dynasty in Baode County in the northern region of Shanxi Province which was the frontier region of the Shang.[5]

There are other exotic materials that first appear during the Bronze Age. Red gems were seldom used before the Western Zhou dynasty (1050–771 BCE), but a necklace made of some carnelian beads was excavated from Fuhao's tomb (d. c. 1200 BCE) in the Shang dynasty capital Anyang in Henan Province. However, carnelian beads and tubes began to be used generally in Western Zhou dynasty together with jade. As neither the raw material of carnelian nor amber is to be found within the area, they were probably introduced by the people living in the frontier regions who might have obtained the material and techniques from distant regions, such as what is now India, Burma and Central Asia.[6]

Amber artefacts from the Han-dynasty (206 BCE–220 CE) to Northern and Southern dynasties (386–589)

Amber artefacts dated from the Han dynasty to the Northern and Southern dynasties have

[3] Sichuan Institute of Relics and Archaeology, *Sanxingdui ji si keng* 三星堆祭祀坑 [*Excavation of the Sacrificial Pits at Sanxingdui*,] (Beijing: Wenwu chubanshe, 1999) pl. 39, 1–2.

[4] Sichuan Institute of Relics and Archaeology, [*Excavation of the Sacrificial Pits at Sanxingdui*], 1–2.

[5] Wu Zhenlu 吳振錄 "Baode xian xin faxian de Yindai qingtongqi," "保德縣新發現的殷代青銅器," ["New finds of bronze artifacts in Baode county,"] *Wenwu* 4 (1972): 62–66.

[6] Jessica Rawson, "Carnelian beads, animal figures and exotic vessels: traces of contact between the Chinese States and Inner Asia, ca. 1000–650 BC," in *Bridging Eurasia* (Mainz: Verlag Philipp von Zabern, 2010), 1–36.

been excavated from tombs of the feudatory, dignitary, and the nobility in the present-day provinces of Xinjiang, Gansu, Qinghai, Inner Mongolia, Shaanxi, Hebei, Shanxi, Jiangsu, Hunan, Jiangxi, Yunnan, Sichuan, Guizhou, Guangxi, and Guangdong.[7] Most of the tombs with finds of amber from these periods are in the provinces of Guangxi, Guangdong, Sichuan, Yunnan and Guizhou Province, that is mostly in areas in the southern and south-western part of what is now China.

The amber artefacts are of varied shape such as spherical, oval, and rectangular beads, and beads in the shape of jars, buttons, fans, baskets, and tubes. Other beads are in the shape of tigers or lions, cicadas, frogs, heads of pigs, turtles, birds, the *sheng* (a female hair ornament) and fishtails. Apart from beads, amber seals have also been found. The archaeologists found twenty-four amber artefacts in the shape of a frog, a beast, a kind of bird and so on, in tomb 43 in Ding County in Heibei Province. This is the largest find of amber in a single Western Han dynasty (206 BCE–9 CE) context. The person buried in tomb 43 was a feudatory king.[8] To date, we have only found small artefacts in the archaeological excavations, but Chinese literature mentions some amber made into large objects, such as boxes and pillows.[9]

There were important ports along the coast of present-day Guangxi Zhuang Autonomous Region during the Han dynasty and during the Eastern Han dynasty (25–220 CE), the Silk Road of the sea was flourishing. Some exotic artefacts have been excavated from tombs of this period, such as glass objects and small spherical objects made of gold which show the exchange between this area and regions to the west such as the Indian subcontinent, the area of what is now Iran, and the then Roman empire. There are also many finds of amber artefacts in the shape of lions or tigers in tombs from this period. But the raw material may not have been brought from further west than from the area of what is now Burma.

The most famous finds of amber from the Northern and Southern dynasties are those from the tomb of Li Xian and his wife (no pictures of these amber artefacts are included in this article). Li Xian was the Pillar of State and General-in-Chief (a designation granted eight supreme military leaders) under the Northern Zhou dynasty (557–581 CE). Li Xian's family had a very high social status and was in charge of a crucial part of the trade along the Silk Road in Guyuan county in Ningxia.[10] This may explain the many exotic artefacts imported from Central Asia and ancient Iran in the tomb. The archaeologists also found many amber artefacts including seventy-six beads and three artefacts in the shape of cicada in this tomb.[11]

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[7] Gu Fang 古方, ed., *Zhongguo chutu yuqi quanji 中国出土玉器全集* [*The Complete Collection of Jades Unearthed in China*,] vol. 1–15 (Beijing: Kexue chubanshe, 2005), vol 12.

[8] Ding County Museum 定縣博物馆, "Hebei Dingxian 43 hao Han mu fajue jianbao," "河北定縣 43 號漢墓發掘簡報," ["Brief report of the excavation of tomb 43 of Han Dynasty in Ding county in Hebei Province,"] *Wenwu* 文物 11 (1973): 8–20.

[9] Cited by Ge Hong in Eastern Jin Dynasty, see Li Xueqin 李學勤, and Lü Wenyu 呂文鬱, eds., "Xijing zaji," "西京雜記," ["Miscellaneous Records of the Western Capital,"] in *Siku da cidian 四庫大辭典* (Changchun: Jilin daxue chubanshe), vol. 2, 2167.

[10] Ningxia Museum, and Guyuan Museum, "Ningxia Guyuan Bei Zhou Li Xian fufu mu fajue jianbao," "寧夏固原北周李賢夫妇墓发掘简报," ["Brief report of Li Xian couple tomb of the Northern Zhou Dynasty in Guyuan county, Ningxia,"] *Wenwu* 11 (1985): 1–20.

[11] Ibid.

Figure 2. *In 2015, a rare blood amber enclosing an insect was discoveried in The Marquis of Haihun Liu He's tomb in Nanchang in Jiangxi Province. The Marquis died in 59 BCE, so the amber must have been obtained before that.*[12]

Figure 3. *This pendant in the shape of a beast, a lion or tiger, height 2.6 cm, dating to the Han Dynasty, was collected from the burial site at Yangfutou, Kunming, Yunnan Province.*[13]

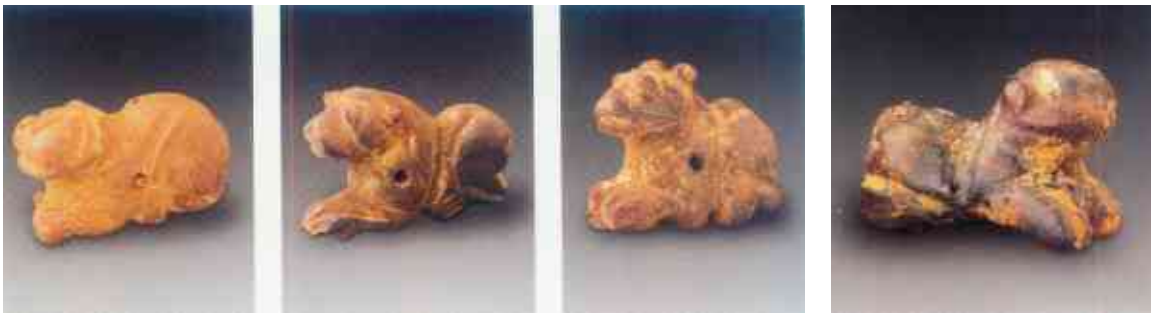

Figure 4. *Amber pendants from the tombs at Fengmenling, Hepu in Guangxi Zhuang Autonomous Region.*[14]

[12] Jiangxi Institute of Archaeology, and the Capital Museum, *Wuse xuanyao: Nanchang Handai Haihun houguo kaogu chengguo* 五色炫曜：南昌汉代海昏侯国考古成果 [*Splendid Finds: The archaeological excavation of the Han marquis of Haihun's tomb complex in Nanchang*] (Nanchang: Jiangxi renmin, 2016), Fig. 24.

[13] Gu Fang古方, ed., [*The Complete Collection of Unearthed Jade in China*,] vol. 12.

[14] Guangxi Zhuang Autonomous Region Institute of Relics and Archaeology, *2009–2013 nian Hepu Han Jin mu fajue baogao 2009–2013* 年合浦汉晋墓发掘报告 [*Excavation of the Han to Jin Dynasty Cemeteries in Hepu county from 2009–2013*] (Beijing: Wenwu chubanshe, 2016).

Figure 5. *This string of beads, Western Han dynasty, bead length c. 1 cm, was excavated from Tomb 101 at Yaozhuang, Yangzhou, Jiangsu Province. Held in Yangzhou Museum. The black and the red beads are made of amber.*[15]

Figure 6. *This seal, Western Han Dynasty, height 0.8 cm, was excavated from Tomb 102 at Yaozhuang, Yangzhou, Jiangsu Province. Held in Yangzhou Museum. The inscription on the seal is* Changle Fugui, *which means* "happy forever" *as well as* "riches and honour."[16]

Figure 7. *This string of beads, length 13 cm, dates to the Western Han dynasty. It was excavated in Nanchang, Jiangxi Province, and is held in Jiangxi Provincial Museum. The beads are made of amber, glass, crystal and agate respectively. The two tube-shaped beads to the right are made of amber.*[17]

[15] Gu Fang古方, ed., [*The Complete Collection of Unearthed Jade in China,*] vol. 7 (Beijing: Kexue chubanshe, 2005), 142.

[16] Gu Fang古方, ed., [*The Complete Collection of Unearthed Jade in China,*] vol. 7, 94.

[17] Gu Fang古方, ed., [*The Complete Collection of Unearthed Jade in China,*] vol. 9 (Beijing: Kexue chubanshe, 2005), 71.

Figure 8. *Those five beads, dating to the Eastern Han dynasty, were excavated from Tomb 2 at Guijiayuanzi, Zhaotong, Yunnan Province, and is held in Yunnan Provincial Museum. One squatting tiger-shaped bead, length 2.1 cm, one* Sinan*-shaped bead, width 1.9 cm, one cicada-shaped bead, length 2.34 cm, one flat-bodied round bead, length 1.9 cm, and one round bead, length 1.34 cm.*[18]

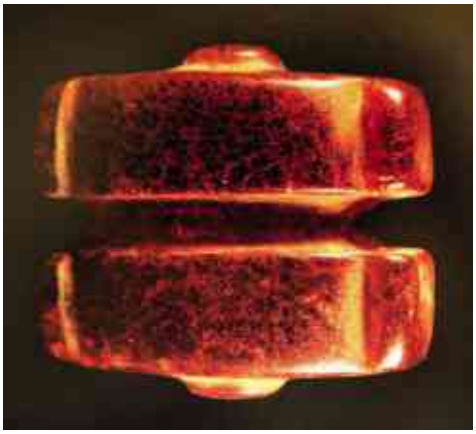

Figure 9. *This pendant, length 2.5 cm, in the shape of a* Sinan*, dating to the Eastern Han Dynasty, was excavated from Tomb 2 at Ganquan, Hanjiang, Jiangsu Province, and is held in Nanjing Museum.*[19]

Figure 10. *This amber artefact, height 2 cm, in the shape of a mythical creature* (Tianlu)*, dating to the Eastern Han dynasty, was excavated from the Tushan tomb, Xuzhou, Jiangsu Province, and is held in Nanjing Museum.*[20]

[18] Gu Fang古方, ed., [*The Complete Collection of Unearthed Jade in China*,] vol. 12, 111.
[19] Gu Fang古方, ed., [*The Complete Collection of Unearthed Jade in China*,] vol. 7, 152.
[20] Ibid., 155.

Figure 11. *This amber seal, height 1.3 cm, is dated to the Eastern Han dynasty. It was excavated in Shijiayao, Nanchang, Jiangxi Province, and is held in Jiangxi Provincial Museum.*[21]

Figure 12. *Pendant of amber, length 2.3 cm, in the shape of a beast, dated to the Eastern Han dynasty. It was excavated in Shijiayao, Nanchang, Jiangxi Province, and is held in the Jiangxi Provincial Museum.*[22]

Figure 13. *A very fine amber sculture in the shape a girl riding a sheep was excavated from a large tomb of a royal person of the Caowei period (220–265) in Xizhu village in Luoyang, Henan province in 2016, and is held in Luoyang Institute of Cultural Relics and Archaeology*.[23]

[21] Gu Fang古方, ed., [*The Complete Collection of Unearthed Jade in China*,] vol. 9, 82.

[22] Gu Fang古方, ed., [*The Complete Collection of Unearthed Jade in China*,] vol. 9, 81.

[23] Wang Xianqiu 王咸秋, "Henan Luoyang xicun Cao Wei damu kaogu gongzuo," "河南洛阳西朱村曹魏大墓考古工作取得重要收获," *Zhongguo Kaogu* 2016–11–18 http://www.kaogu.cn/cn/xccz/20161118/56191.html; Zhu Hu 朱滸, "Cao Wei meishu de xin shiye-Xizhucun damu chutu hupo tongzi qu yang xiang de yiyi tantao," "曹魏美术的新视野——西朱村大墓出土琥珀童子骑羊像的意义探讨," ["New Vision of the Art of the Cao-Wei Period—Discussion of the Significance of an Amber model of Boy Riding a Sheep Unearthed in the Xizhu Village Tomb,"] *Nanjing yishu xueyuan xuebao (meishu yu sheji)*. *南京艺术学院学报(美术与设计)* [*Journal of Nanjing Institute. Art & design*] 1 (2018).

Figure 14. *Two amber beads that were found in the tomb of Feng Sufu in Liaoning Province, dated to Northern Yan (409–436). Some glass vessels which might have been traded from the eastern Mediterranean area were also found in this tomb.*[24]

Figure 15. *This necklace dated to the period of Wei, Jin, and the Northern and Southern Dynasties (220–589), is made of agate, crystal, jade and amber. It was excavated from a tomb at Pingba, Guizhou Province, and is held in Guizhou Provincial Museum.*[25]

Figure 16. *This amber artefact, height 2.4 cm, in the shape of a mysterious beast, is dated to the Southern dynasties. It was excavated from a tomb at Jingshan, Nanchang, Jiangxi Province, and is held in the Jiangxi Provincial Museum.*[26]

[24] Liaoning Provincial Museum, *Beiyan Feng Sufu* 北燕冯素弗墓 [*Feng Sufu Couple's Tombs of the Northern Yan*] (Beijing: Wenwu chubanshe, 2015).

[25] Gu Fang古方, ed., [*The Complete Collection of Unearthed Jade in China*,] vol. 12, 222.

[26] Gu Fang古方, ed., [*The Complete Collection of Unearthed Jade in China*,] vol. 9, 88.

Figure 17. *String of Beads, Northern Qi Period (550–577), excavated from the tomb of Shedi Huiluo at Jiajiazhuang, Shouyang, Shanxi Province, Shanxi Provincial Institute of Archaeology. The figurine in the center, height 4.3 cm, in the shape of a beast, is made of amber.*[27]

Amber artefacts dating to the Sui (581–618) and Tang (618–907) dynasties

There are some records in the literature from the Sui and Tang dynasties that mention that many kinds of amber artefacts were used in imperial and noble daily life. Amber was said to be used to make wine sets, vessels, decorations for large vessels and as building components.[28] However, few amber artefacts have been found from excavations dating to this period.

Two amber artefacts in the shape of a *suanni* (狻猊) – a lion-dog – and a set of prayer beads were excavated from a hoard found at the basement of the pagoda-stupa of Famen temple in Xian in Shanxi Province. The pagoda-stupa, with its enshrinement of Buddhist relics, was located in this royal temple of the Tang Dynasty; the lion is the symbol of the Buddha Dharma.[29] In some sutras, amber is considered as one of the seven precious trea-

[27] Gu Fang古方, ed., [*The Complete Collection of Unearthed Jade in China*,] vol. 3 (Beijing: Kexue chubanshe, 2005), 239.

[28] Xu Xiaodong 许晓东, [*Art of ancient amber in China*], 52–54.

[29] Shaanxi Institute of Archaeology, *Famensi Kaogu Fajue Baogao 法门寺考古发掘报告* [*Report of archaeological excavations at Famen Temple*] (Beijing: Wenwu chubanshe, 2007).

Figure 18. *Amber artefacts from a hoard found at the basement of the Pagoda-Stupa in Famen Temple, Xian, Shaanxi Province, held in Famen Temple Museum.*[30]

sures which can give the anchoring force to the believers.[31] Amber is seen as the blood of Buddha while crystal is seen as the bone of Buddha.

An amber artefact in shape of *suanni* was excavated also from a hoard in Hejiacun in Xian in Shanxi Province together with many gold and silver vessels.

The most important discovery was that of one hundred and forty-seven amber artefacts in the shape of birds, comb shafts with decoration of fenixes, and beads, which were excavated from the tomb of the Great Lady of the Qi Kingdom. She was the daughter of the important general Wu Xiguang of the Tang dynasty, her husband was a Tang dynasty general, governor Wang Shizhen, whose ancestors belonged to the Khitan people. The Khitan later came to rule China as the Liao dynasty.

Amber artefacts dating to the Liao dynasty (970–1125)

The richest archaeological finds of amber artefacts in China have been made in burials of persons of royal lineage of the Liao dynasty. Almost all the burials of the period with amber artefacts are located in the western part of today's Liaoning province and the eastern part of Inner Mongolia which was the original homeland of the Khitan people.[32] Most amber artefacts are dated to the middle period of Liao dynasty, and are very rare in the early and the late period of Liao dynasty.

During the Liao dynasty it was the privilege of persons of royal lineage to use amber. The colour and character of amber was appreciated by the ruling class, the Khitan. It has been suggested that they might have used amber artifacts to express their unique steppe

[30] Shaanxi Institute of Archaeology, [*Report of archaeological excavations at Famen Temple*].

[31] Prajnaparamita-sutra.

[32] Xu Xiaodong 许晓东, [*Art of ancient amber in China*], 132.

nomadic taste.[33] But it is very interesting that the Mongolian and Manchu people did not use amber as much as the Khitan even though they were all nomads establishing a dynasty in China. People of the royal lineage used amber to make all kinds of decorations to show their special value compared to the people of the Song dynasty to the south as well as the special status of the ruling class to the ordinary people of Liao dynasty.[34]

Archaeological discoveries give an insight in the nobility's usage of amber during the Liao dynasty. Amber was used to make jewellery, ornaments, for artefacts related to Buddhism, special articles for the dead in the burial, for vessels, and other things. The most important discovery is the tomb of the Princess of Chen and her husband where totally 2,101 amber artifacts made in eleven sets were found.[35]

The Khitan people wore a type of amulet. The most important were on necklaces, but they also are seen on chest-laces and bangles. Both single strand and multi-strand necklaces were found (see Fig. 22). Comparing to the necklaces that were diverse in style and complicated in shape, the bangle and the chest-lace were simpler but almost the same in terms of material, handicraft and shape. The most common material used for this Liao dynasty ornament according to the archaeological record was jade, but some were made of amber.[36] Usually the T-shaped and heart-shaped amulets are found on necklaces and must have had a profound meaning for the Khitan nobility. The shape of the amulets might be influenced by people from the West, such as the region of the Eastern Mediterranean.[37]

Amber is one of the treasures for Buddhism, so many amber necklaces, are found as popular decorations on bodhisattvas.[38]

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[33] Emma C. Bunker, *Adornment for the Body and Soul: Ancient Chinese Ornaments from Mengdiexuan Collection* (The University Museum and Art Gallery, the University of Hong Kong, and the University of Hong Kong Museum Society, 1999).

[34] Su Fengshu 苏芳淑, "Qidan yu he hupo diaoshi cu lun," "契丹玉和琥珀雕饰初论," ["On the Jade and Amber Ornaments of the Khitan,"] *Zhongguo Sui Tang zhi Qingdai yuqi xueshu yantao hui lunwen ji中国隋唐至清代玉器学术研讨会论文集* [*The Academic Conference from Sui-Tang Dynasty to Qing Dynasty*], ed., Shanghai Museum (Shanghai: Shanghai Classics Publishing House, 2002), 237–248.

[35] Inner Mongolia Institute of Cultural Relics and Archaeology, and Zhelimu Banner Museum, eds., *Liao Chenguo gongzhu mu 辽陳国公主墓* [*Tomb of the princess of the State of Chen*] (Beijing: Cultural Relics Publishing House, 1993); Sun Jianhua, "The Discovery and Research on the Tomb of the Princess of Chen and her husband, Xiao Shaoju," in *Gilded Splendor: Treasures of China's Liao Empire (907-1125)*, ed., Hsueh-man Shen (New York: Asia Society, 2006), 66–73.

[36] Zhou Lin 周琳., "Liaodai yingluo peishi yanjiu," "辽代璎珞佩饰研究," ["Research on the Keruya Ornament of Liao Dynasty,"] (MA. diss., Liaoning Normal University, 2011); Wang Chunyan 王春燕, "Liaodai chutu hupo chubu yanjiu," "辽代出土琥珀初步研究," ["Preliminary Research on the Excavated Amber of Liao Dynasty,"] (MA diss., Inner Mongolia University, 2011).

[37] Xu Xiaodong 许晓东, [*Art of ancient amber in China*], 152–155. See also Jenny F. So ed, *Noble Riders from Pines and Deserts: The Artistic Legacy of the Qidan* (Hong Kong: Art Museum of the University of Hong Kong, 2004).

[38] Xu Xiaodong, [Art of ancient amber in China], 155–161; Kumarajiva, trans., *Saddharmapundarika-sutra* (Taizhong: Ruicheng Printing House, 1972); Patricia Berger, "Vanity of Vanities: Adorning the Body in Life and in Death," *Orientations* 28:3 (1997): 63–69; Zhou Lin, ["Research on the Keruya Ornament of Liao Dynasty"].

Figure 19. *Amber necklace from the grave of Yelu Yuzhi dated to the early Liao Dynasty.*[39]

Figure 20. The *coffin of the Princess of Chen and her husband* [40]

Some amber artefacts have been unearthed from Liao dynasty temples and stupas, such as Beita Stupa in Chaoyang city, Liaoning Province, Dule Temple in Tianjin and White Pagoda in Qinzhou, Inner Mongolia.[41]

[39] Inner Mongolia Institute of Cultural Relics and Archaeology, and Chifeng Museum, "Liao Yeliü Yuzhi mu fajue jianbao,""辽耶律羽之墓发掘简报, "["Brief report of Liao Dynasty Tomb of Yelü Yuzhi,"] *Wenwu* 文物 1 (1996): 4–31; Xu Xiaodong 许晓东, [*Art of ancient amber in China*], 97.

[40] Inner Mongolia Institute of Cultural Relics and Archaeology, *Wenwu huazhang : Neimenggu Zizhiqu wenwu kaogu yanjiusuo 60 nian zhongyao chutu wenwu* 文物华章 一内蒙古自治區文物考古研究所60年重要出土文物 [*The Important Relics Unearthed in Inner Mongolia the Past 60 Years*] (Beijing: Cultural Relics Publishing House, 2014), 229.

[41] Xu Xiaodong 许晓东, [*Art of ancient amber in China*], 94–161.

Figure 21. *The silver-gilt crown of the princess from the tomb of the Princess of Chen and her husband.*[42]

Figure 22. *Amber necklaces found in the tomb of the Princess of Chen and her husband.*[43]

[42] Inner Mongolia Institute of Cultural Relics and Archaeology, and Zhelimu Banner Museum, [*Tomb of the princess of State Chen*].

[43] Inner Mongolia Institute of Cultural Relics and Archaeology, [*The Important Relics Unearthed in Inner Mongolia the Past 60 Years*], 122–123.

Figure 23. *Amber amulet of a necklace found in the tomb of the Princess of Chen and her husband.*[44]

Figure 24. *Amber artefact that people used to hold and play with. When they died and were buried, the artefacts would traditionally be put in their hands. This is one of a pair of such artefacts found in the tomb of the Princess of Chen and her husband.*[45]

[44] Inner Mongolia Institute of Cultural Relics, and Zhelimu Banner Museum, [*Tomb of the princess of State Chen*].

[45] Inner Mongolia Institute of Cultural Relics and Archaeology, [*The Important Relics Unearthed in Inner Mongolia the Past 60 Years*], 127.

Figure 25. *Amber necklaces found in the tomb of the Princess of Chen and her husband.*[46]

Figure 26. *One of a pair of amber hand-held amulets found in the tomb of the Princess of Chen and her husband.*[47]

[46] Inner Mongolia Institute of Cultural Relics and Archaeology, [*The Important Relics Unearthed in Inner Mongolia the Past 60 Years*], 120–121.

[47] Ibid., 126.

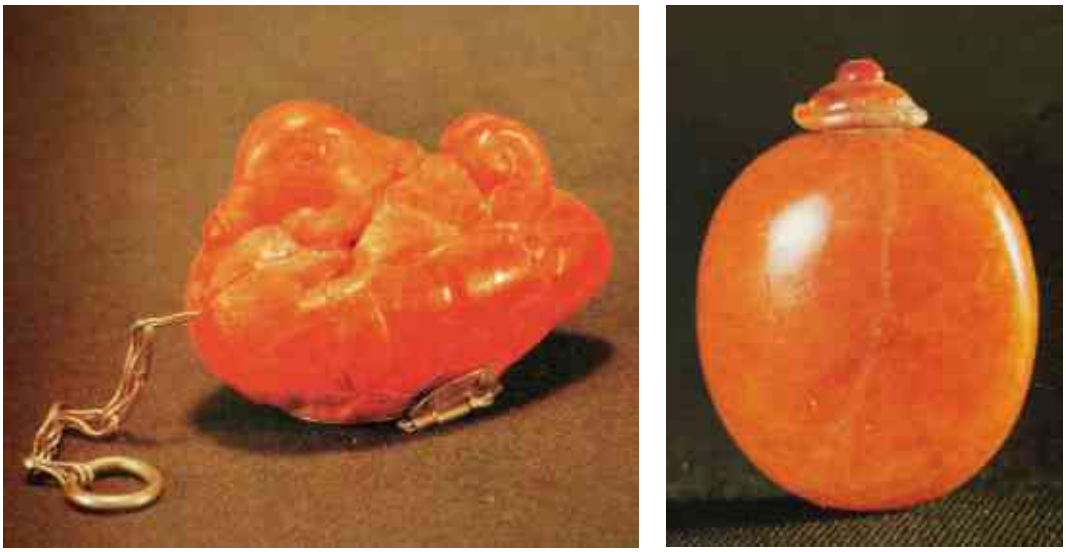

Figure 27. *Amber artefacts found in the tomb of the Princess of Chen and her husband.*[48]

Figure 28. *Amber artefact found in the tomb of the Princess of Chen and her husband.*[49]

[48] Inner Mongolia Institute of Cultural Relics, and Zhelimu Banner Museum, [*Tomb of the princess of State Chen*].

[49] Inner Mongolia Institute of Cultural Relics and Archaeology, [*The Important Relics Unearthed in Inner Mongolia the Past 60 Years*], 125.

Figure 29. *Amber artefact found in the tomb of the Princess of Chen and her husband.*[50]

Figure 30. *Amber artefacts found in the tomb of the Princess of Chen and her husband.*[51]

Figure 31. *Amber artefacts found in the tomb of the Princess of Chen and her husband.*[52]

[50] Inner Mongolia Institute of Cultural Relics and Archaeology, [*The Important Relics Unearthed in Inner Mongolia the Past 60 Years*], 125.

[51] Inner Mongolia Institute of Cultural Relics, and Zhelimu Banner Museum, [*Tomb of the princess of State Chen*].

[52] Inner Mongolia Institute of Cultural Relics, and Zhelimu Banner Museum, [*Tomb of the princess of State Chen*].

Figure 32. *Amber artefacts found in the tomb of the Princess of Chen and her husband.*[53]

Figure 33. *A knife with a handle made of amber found in the tomb of the Princess of Chen and her husband.*[54]

[53] Inner Mongolia Institute of Cultural Relics and Archaeology, [*The Important Relics Unearthed in Inner Mongolia the Past 60 Years*], 12.

[54] Ibid., 72.

a)

b)

Figure 34 a and b. *Archaeologists have found amber artefacts in some smaller tombs dating to the Liao Dynasty, such as the amber necklace in tomb -8 in Xiao Lama Gou in Liaoning Province. The amber pieces are roughly in original shape and are not fine or large as those from the tomb of the Princess of Chen.*[55]

Figure 35. *This pagoda-shaped piece of amber, height 4 cm, held in Yunnan Provincial Museum, was excavated from Chongsheng temple of Dali Kingdom (937-1253) in Santa, Dali, Yunnan Province. The colour and character of the amber shows that it was traded from Burma.*[56]

[55] Liaoning Provincial Institute of Cultural Relics and Archaeology, *Lingyuan Xiao Lama Gou Liao mu 凌源小喇嘛沟辽墓* [*The Liao Tomb at Xiao Lama Gou in Lingyuan*] (Beijing: Wenwu chubanshe, 2015).

[56] Gu Fang古方, ed., [*The Complete Collection of Unearthed Jade in China*,] vol. 12, 122.

Amber artefacts dated to the Song (960–1279) and Yuan (1279-1368) dynasties

According to the historical record amber was still considered a very precious material for decorations and other purposes during the Song and Yuan dynasties, but very few amber artefacts from this period have been discovered in archaeological excavations.[57] During the Yuan Dynasty, amber could have reached China from the Baltic because the Mongols controlled the extensive lands of the Eurasian steppes, and the route on the sea was also unblocked.

Amber artefacts dated to the Ming dynasty (1368–1644)

The people in Ming Dynasty could distinguish the amber from the Baltic from that obtained from Burma.[58] However, amber was still very precious and rare, as could be inferred from the fact that amber artefacts have been found buried only in the mausoleum of emperors or nobility.

Several very splendid amber artefacts have been discovered in the tomb of Mu Rui. They are made of red amber from Burma. The Mu clan had governed the land of today's Yunnan Province which is not far from Burma.[59]

The people in the Qing Dynasty began to know the exact origin of the Baltic amber and imported the amber directly from the Nordic countries.[60]

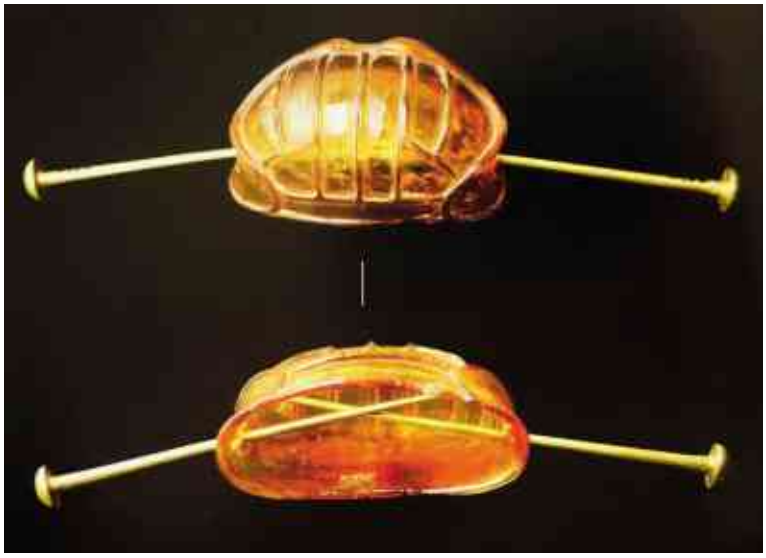

Figure 36. *Court Headdress, Ming Dynasty, height 3.7 cm, excavated from the tomb of Xu Fu (d. 1517) at Bancangcun, Nanjiag, Jiangsu Province held in the Nanjing Museum.*[61]

[57] Xu Xiaodong 许晓东, [*Art of ancient amber in China*], 57–61.

[58] Xu Xiaodong 许晓东, [*Art of ancient amber in China*], 62.

[59] Nanjing Museum, *Jin Yu Yu: Gongyuan 14–17 Shiji Zhongguo Guizu Shoushi 金与玉--公元14-17 世纪中国贵族首饰* [*Gold and Jade: the Jewellery of Chinese Aristocracy from 14–17 century AD*] (Shanghai: Wenhui Press, 2004).

[60] Xu Xiaodong 许晓东, [*Art of ancient amber in China*], 190–193.

[61] Nanjing Museum, [*Gold and Jade,*] 3; Gu Fang古方, ed., [*The Complete Collection of Unearthed Jade in China,*] vol. 7, 198.

Figure 37. *A cup made of amber with a handle in the shape of an old fisherman capturing a fish was excavated from the Ming dynasty tomb of Mu Rui at Jiangjunshan, Jiangning, Jiangsu Province, and held in Nanjing City Museum. The diameter of the mouth is 7 cm.*[62]

Figure 38. *A string of one-hundred-and-eight amber beads in different shapes such as ball, stupa, triangle, and rectangle was dated to the Ming Dynasty. It was excavated from the tomb of Zhu Yiyin, Prince Yixuan Nanchang, Jiangxi Province, held in Jiangxi Provincial Museum.*[63]

Where did the amber come from to ancient China before the Yuan Dynasty?

The Sanxingdui Culture in Sichuan Province had knowledge of the existence of amber from the time of the Shang Dynasty. This region is close to Burma, which is very famous for the deposits of amber, so the people in the Sichuan basin might have got the amber material from Burma. But as mentioned above some amber beads were excavated from a tomb in Baode County in the northern region of Shanxi Province which was the frontier region of the Shang Dynasty.[64] The people living there could have been in contact with peoples inhabiting the Eurasian steppe. We should analyze these beads to know their origin.

[62] Gu Fang 古方, ed., [*The Complete Collection of Unearthed Jade in China*,] vol. 7, 197.
[63] Gu Fang 古方, ed., [*The Complete Collection of Unearthed Jade in China*,] vol. 9, 203.
[64] Wu Zhenlu, ["New finds of bronze artifacts in Baode county,"].

Some amber beads from Tomb 5 in the large kurgan II in Arzhan of Tyva in Russia, dated to the end of the seventh century BCE, have been analyzed. The results indicate that the raw material was obtained from the Baltic Sea. This is a very important result as it is the earliest samples found in the eastern Eurasian steppe which indicate communication between the regions of Sayan-Altay and the regions of the Baltic Sea.[65]

The first pastoralist kingdoms developed here during the early period of the first millennium BCE. The prestige goods, the imperial kinsmen's cemetery and the large seasonal ritual centre symbolized the ideology of the ruling class. The kurgans in the Arzhan in Tyva belonged to the Aldy-Bel /Sandaohaizi culture and might be the remains of the earliest pastoralist kingdom in the Eurasian steppe. The Kurgan site in the Arzhan Valley in Tyva, Russia is the imperial kinsmen's cemetery, the land of Sandaohaizi is the ritual center in summer.

The expansion of the Aldy-Bel /Sandaohaizi culture constitutes a strong indication that a trade route from Sayan-Altay mountains to the Baltic Sea regions existed in the seventh century BCE. The route across the Eurasian Steppes through the different tribes is also reflected in Chinese text, such as the legend of the travels of the King Muwang of Western Zhou Dynasty.[66]

From a slightly later period the Silk Road through the Eurasian steppe has been attested by many archaeological discoveries, for example, archaeologist found Chinese silk together with a Chinese bronze mirror and lacquer in Pazyryk burials in Altay Mountains in Russia which was dated to the fourth to third century BCE.[67]

An amber artefact in the shape of a crouching animal similar to those found in the Han dynasty material was excavated from the tomb 5 in Tillya-tepe cemetery in the northern region of Afghanistan, which is dated to the end of the first century BCE. In this tomb, a typical bronze mirror of the Han dynasty also forms part of the burial goods.[68]

Many amber artefacts have been found in the Han dynasty tombs. In this period the Han dynasty could have been in indirect contact with the Roman empire through the people along the Silk Road in Central and Western Asia. Baltic amber could have reached the people in the Han dynasty from the Roman empire through Burma or Vietnam as well, carried by the western traders by shipping. However, considering the colour and character of the amber artefacts of the Han dynasty, there is a strong indication that the origin of the

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[65] Konstantin V. Chugunov, Hermann Parzinger, and Anatoli Nagler, "An elite burial of the period of early nomads in Tyva (a preliminary report of the 2001 Russian-German Archaeological Expedition)," *Archeology, Ethnology and Anthropology of Eurasia* 2.10 (2002): 115–124; Konstantin V. Čugunov, Hermann Parzinger und Anatoli Nagler, *Der Skythenzeitliche Fürstenkurgan Aržan 2 in Tuva.* Archäologie in Eurasien Band 26, Steppenvölker Eurasiens Band 3 (Mainz: Verlag Philipp Von Zabern, 2010); A. M. Shedrinsky, T. P. Wampler, and K. V. Chugunov, "The examination of amber beads from the collection of the State Hermitage Museum found in Arzhan-2 burial memorial site," *Journal of analytical and applied pyrolysis* 1.71 (March 2004): 69–81.

[66] Guo Wu 郭物, *Xinjiang shiqian wanqi shehui de kaoguxue yanjiu 新疆史前晚期社会的考古学研究* [*Archaeological research on late prehistoric societies in Xinjiang*] (Shanghai: Shanghai guji chubanshe, 2012).

[67] Sergei I. Rudenko, *Frozen tombs of Siberia: The Pazyryk burials of Iron-Age Horsemen* (London: Dent & sons, 1970).

[68] Viktor Sariadini, *The Golden Hoard of Bactria from the Tillya-tepe excavation in northern Afghanistan* (Leningrad: Aurora Art Publishers, 1985), pl. 76, 253.

amber might be Burma during this period as well.[69]

Historical material from the Northern and Southern Dynasties (386–589) record that the amber artefacts were presented to the court of the central plain from the western regions in Central Asia. In Chinese literature from the Tang to the Song Dynasty (618–1279) most amber products are mentioned in historical sources as articles of tribute from the western regions as well.[70]

As we know, the region of the Baltic Sea was the key area in western Eurasia for collecting and using amber in the past. The Samland coast west of Königsberg in Prussia was the world's richest source of amber. About 90% of the world's extractable amber is still located in that area, which became the Kaliningrad Oblast of Russia in 1946. From at least the sixteenth century BCE amber was moved from northern Europe to the Mediterranean area through the Amber Route.[71] From the Black Sea, trade could continue to Asia. Some samples found in China dated from the Western Han Dynasty to the Northern and Southern Dynasties have been analyzed through non-destructive techniques such as microscopy and infrared spectrometer, and the material of these samples is amber and has the features of amber from Baltic Sea.[72]

Birka was a Viking-age trade center from the mid-eight to the late tenth century on the island of Björkö in Lake Mälaren in what is now Sweden. A harbour and a cemetery are found beside the ancient settlement site. The archaeologists have found silk fragments in no less than fifty graves at Birka, and according to Agnes Geijer the majority of the silk fabrics appear to belong to the type known as *samite, a weft-faced compound twill*, which was manufactured in Byzantium and Persia in this period.[73] But the silk fragment from burial 944 was identified as a so-called *qi* [綺] or as it is termed by Geijer "Han-damask" – *a tabby weave with floating warp threads*, probably produced in Tang-dynasty China. This discovery testifies that the Silk Road was linked to the region of the Baltic Sea at that time, either from southern Europe through the Alps or via the Eurasian steppes (see Charlotte Hedenstierna-Jonson and Annika Larsson this volume regarding the latter possibility). Among other finds, a stirrup from tomb 735 in Birka is an example of a Central Asian import.[74]

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[69] Berthold Laufer, "Historical Jottings on Amber in Asia," *Memoirs of American Anthropological Association* vol. I, 1905-07 (New York: Kraus Reprint Corporation, 1964), 153, 154, 215–244.

[70] Xu Xiaodong 许晓东, [*Art of ancient amber in China*], 179–188.

[71] Arnolds Spekke, *The Ancient Amber Routes and the Geographical Discovery of the Eastern Baltic* (Stockholm: M. Goppers, 1957).

[72] Qin Chunlei 覃春雷, and Sun Hao 孙傲, "Zhongguo gudai hupo zhu shi jianding ji qi chandi chutan," "中国古代琥珀珠饰鉴定及其产地初探," ["Identification and origin of ancient Chinese amber bead ornaments,"] *Yanshi kuangwu xue zazhi 岩石矿物学杂志* [*Acta Petrologica et Mineralogica*] (Suppl 1, 2016): 127–132.

[73] Agnes Geijer, *Birka III: Die Textilfunde aus den Gräbern* (Uppsala: Almqvist & Wiksell, 1938). See also Eva Andersson Strand, this volume.

[74] Ingmar Jansson, "Gürtel und Gürtelzubehör von orientalischen Typ," in *Birka II:2, Systematische Analysen der Gräberfunde*, ed., Greta Arwidsson (Stockholm: Kungl. vitterhets-, historie- och antikvitetsakademien, 1986), 77–108; Ingmar Jansson, "Wikingerzeitlicher orientalischer Import in Skandinavien," in *Oldenburg-Wolin-Staraja Ladoga-Novgorod-Kiev: Handel und Handelsverbindungen im südlichen und östlichen Ostseeraum während des frühen Mittelalters.* Internationale Fachkonferenz der Deutschen Forschungsgemeinschaft, vom 5–9 Oktober 1987 in Kiel. Sonderdruck aus Bericht der Römisch-Germanischern Kommission 69, (Mainz am Rhein: Verlag Philipp von Zabern, 1988), 564–647 (620–621).

According to the *Qidanguozhi* (*Khitan History)*, most kingdoms and empires in the western regions, including the Arabic caliphate, contributed amber to the Khitan triennially. In fact, all the amber articles presented to the court of the central plain or Khitan is mentioned to have come from *Daqin* (Eastern Mediterranean). Rome in turn would have got the amber from the Baltic Sea regions through the Amber Route.

It is said in "Xirong" of the *Jiu Tangshu (Old Tang History)* as well as in the "Xiyu zhuang" ("The Western Regions") of the *Xin Tangshu (New Tang History)* that "Daqin…… rich in gold, silver and rare precious goods, ……amber……most of the treasures in the Western regions" all come from the Eastern Mediterranean.

Date	**Source**	**Amount of amber**	**References**
771 CE	Persian	Some amber	[75]
951 CE	Uighur	9 Jin (1/2 kilogram) amber, 20 big amber beads	[76]
952 CE	Uighur	50 Jin amber	[77]
961 CE	Uighur	Some amber	[78]
964 CE	Uighur in Gaochang	40 Jin amber	[79]
965 CE	Uighur in Xizhou	Amber cup	[80]
977 CE	Uighur in Shazhou	Some amber	[81]
1010 CE	Kucha	Some amber	[82]
1011 CE	Arabia	Some amber	[83]
1068-1077	Khotan	Some amber	[84]

[75] Zheng Qiao 鄭樵, "Xirong," "西戎," ["The Western Tribes,"] in *Tongzhi* [*General Annals*], *Siku quanshu 四库全书* edition, vol. 381（Shanghai guji chubanshe, 1987), 279.

[76] Ibid, 290.

[77] Ibid, 291.

[78] Zhang Ruyu 章如愚, *Qun shu kao suo: hou ji, 群書考索后集* [*Investigative Guide to Numerous Books: Second Part,*] *Siku quanshu 四库全书* edition, vol. 937 (Shanghai: Shanghai guji chubanshe, 1987), 900.

[79] (Yuan Dynasty) Toqto'a, 铁木儿塔识/鐵木兒塔識, and Alutu 阿鲁图/阿魯圖, "Waiguo zhuan," "外国传," ["Biographies of Foreign States,"] in *Songshi 宋史* [*History of the Song*], vol. 490 (Beijing: Zhonghua Book Company, 1977), 14114.

[80] Ibid., 14110.

[81] Ibid., 14114.

[82] Ibid., 14116.

[83] Ibid., 14121.

[84] Ibid., 14108.

So, the raw amber used for the Liao dynasty amber artefacts might have come from the Baltic either through the Mediterranean or the states along the Silk Road in the Western regions.[85] Some sample from the collections and excavations have been analyzed, and the results show that the composition is similar to those of the Liao dynasty material.[86]

Novgorod (in present day north-western Russia) was the trade center for amber from the Baltic Sea during the 10th -11th century CE. From Novgorod amber could be traded to the Mediterranean region, the Pontic Region and western Central Asia respectively.[87] Some names and stories of the pioneers who set off from east-central Scandinavia to the Caspian Sea along the sea route and the rivers are recorded.[88] It is possible that the court of the Liao dynasty could have obtained amber directly or indirectly through the trade routes over the Eurasian steppes, linked to the so called Fur Route from the Baltic.[89]

It would be possible for them to trade through an unobstructed route over the Eurasian steppes as the Liao dynasty was founded on a pastoralist society and ruled most land of the eastern Eurasian steppes, especially the regions of Altay Mountains. However, the court of Liao dynasty could also have got amber from the states along the Silk Road as precious presents or tributes as noted above.

Conclusions

The use of amber began later in ancient China than in western Eurasia. There are some deposits of amber in China, but they are difficult to find and exploit, so the people living in the frontier regions began to obtain amber from surrounding regions in the late half of first millennium BCE.

According to ancient Chinese literary sources amber was regarded as a mysterious material which was used to cure illness, to defend the soul and spirit and to decorate the body. The rich burials where amber material is mainly found, show that it also indicated wealth and status in ancient China.

Based on the archaeological discoveries two peaks of usage of amber in ancient China can be observed: during the Han dynasty and the Liao dynasty. The main source of amber in the Han dynasty might be Burma, while most amber found in Liao dynasty archaeological contexts might have been traded from the Baltic indirectly, some presented as tributes to the court of the Liao dynasty from neighbouring regional rulers of Central Asia. The societies that grew up within the sparsely populated, marginal areas of steppe and

[85] Xu Xiaodong 许晓东, "Liaodai hupu laiyuan de tantao," "辽代的琥珀来源的探讨, " ["On the origin of Liao Amber Artefact,"] *Beifang Wenwu 北方文物* 3 (2007): 35–42.

[86] Cult W. Beck, and Edith C. Stout, "Amber from Liaoning Province and Liao Amber Artifacts," in *Adornment for the Body and Soul: Ancient Chinese Ornaments from the Mengdiexuan Collection*, ed., Emma C. Bunker, Julia M. White, and Jenny F. So. (Hong Kong: The University Museum and Art Gallery, The University of Hong Kong, 1999), 167–172 (167–168).

[87] E. A. Rybina, "Novgorod's Amber Trade (Tenth-Fourteenth Centuries)," in *Re-interpreting Russian History: Readings (860–1860s)*, ed., Daniel H. Kaiser, and Gary Maker (New York and Oxford: Oxford University Press, 1994), 38.

[88] Barry Cunliffe, *Europe Between the Oceans: Themes and Variations: 9000 BC–AD 1000* (New Haven and London: Yale University Press, 2008), 12–14, Figs.1.6, 1.7, 468–472, fig. 13.13.

[89] Brand, Hanno, "Baltic Sea Trade," *Baltic Connections*. Hanse Research Center, 1 Jan. 2006.

semi-desert, which arc around the northern and western borders of China's fertile Central Plain, have played a critical role in the trade.

Based on the finds of silk and amber throughout Eurasia, including the silk material found in the Viking Age town of Birka in Sweden, the Baltic sea region could be discussed as part of the trading network linked to eastern Asia.

In the future, archaeologists should use a variety of interdisciplinary approaches, and scientific methodology to research the amber artefacts excavated from China in order to verify the origin of the raw material.

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Transmission of technology along the Silk Road – theoretical reflections and three examples

by

Janken Myrdal

Technological change

Large and small. Technology transmission in Eurasia during the medieval and early modern periods is often represented by the triad of gunpowder, the compass and printing. Sometimes a few other innovations are mentioned such as paper and the stern-post rudder.[1] I do not deny the crucial role of these important innovations,[2] but want to draw attention to the multitude of other innovations, exemplified by the wheelbarrow, the plunge churn and a specific type of mousetrap.

Comments on the first version of this text, which focused on the three examples, showed that a theoretical introduction and a short section on methodology were necessary.[3] An Appendix about wood archaeology has been included as a consequence, being a further development of the section on methodology.

The text is mainly concerned with the land routes over Eurasia though I am well aware of the dense network over both land and sea in Afro-Eurasia.[4] Inventions as well as innovations, the adoption and application of novelties, will be examined.[5]

Research about inventions, especially for the industrial period, has discussed the relation between larger and smaller inventions (transformed into larger and smaller innovations). Joel Mokyr has defined "micro-inventions" as improving existing techniques, and "macro-inventions" as "a radical new idea" without clear precedent. Although micro-inven-

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[1] For an overview see Edwin Van Kley, "East and West," in *Encyclopaedia of the History of Science, Technology, and Medicine in Non-Western Cultures*, ed., Helaine Selin (Berlin, New York: Springer, 2008), 703–709.

[2] For a modern synthesis about gunpowder in Eurasia see Tonio Andrade, *The gunpowder age: China, military innovation, and the rise of the West in world history* (Princeton: Princeton University Press, 2016).

[3] I would like to thank Arne Jarrick, Eva Myrdal, Ingvild Øye, Eva Rystedt, Susan Whitfield, an anonymous reader, and others for comments.

[4] Thomas Lindkvist, and Janken Myrdal, "World Trade in the fifteenth and early sixteenth centuries," in *Trade and Civilization*, ed., Kristian Kristiansen, Thomas Lindkvist, and Janken Myrdal (Cambridge: Cambridge University Press 2018), 605–625. The article has a map of all the large trade routes in the fifteenth century.

[5] In the history of technology it is often stated that the adoption of technique is more important than the origin; see Arnold Pacey, *Technology in world civilization: a thousand-year history* (Oxford: Basil Blackwell, 1990), 24, and for modern periods Nathan Rosenberg, *Exploring the black box: technology, economics and history* (Cambridge: Cambridge Univ. Press, 1994), 19.

tions taken together have more impact on the economy, the macro-inventions are, according to Mokyr, decisive in the long run.[6] As Mokyr's concept implies some kind of hierarchy, which I want to avoid, the concepts used here are large and small inventions/innovations.

Large inventions have some kind of antecedents,[7] prototypes and also amendments of existing technology. An overarching feature is that *known technology is always more extensive than the technology normally applied.* A large invention can be of secondary importance, seldom used, for centuries before it is spread.[8] It often has to be further developed before the advantages can pay for an introduction (a switch to a new technology always includes costs). Another important reason is that the *individual technological elements must fit into a system.*

Systems and details. The systemic aspect is noted by most scholars working with the history of technology.[9] However, this rarely leads to the recognition of small inventions and incremental change as being of decisive importance. When investigating the agrarian technological complex in medieval Sweden my goal was to identify every researchable implement and method in order to reconstruct the whole technological complex and not only a part of it. I was able to detect a number of overlooked technical changes and furthermore identify how a new technological complex with interlinked elements emerged in c. 1000–1300. The role of a few large innovations – for example, the plough – decreased in relative importance and also emerged as elements of a system.[10]

I am certainly not alone in this interest in the plethora of small details. French scholars have the lead in developing theories of small-scale technology during pre-industrial periods. To simplify: André Leroi-Gourhan gave the basis, Pierre Lemonnier explained the

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[6] Joel Mokyr, *The lever of riches: technological creativity and economic progress* (New York: Oxford Univ. Press, 1992), 12–13. For a summary and insightful discussion of the literature on the importance of the multitude of small inventions see Rosenberg, *Exploring*, 3–8, 62–68.

[7] George Basalla, *The evolution of technology* (Cambridge: Cambridge Univ. Press, 1988), 57–59.

[8] This is the basis for the Ester Boserup's stage theory about technological change: possibilities for intensification exist but are not taken into use until population pressure makes them a necessity; Ester Boserup, *The conditions of agricultural growth: the economics of agrarian change under population pressure* (London: Allen & Unwin, 1965). The basic assumption is correct, but the theory is oversimplified. Technological change consists both of utilized and underutilized technology, and thus the available possibilities will expand over time.

[9] The most well-known theoretical approach in Anglo-Saxon research has been elaborated by Thomas Hughes, though he is more concerned with the social components of large technological systems, e.g. Thomas Hughes, "The evolution of large technological systems," in *The social construction of technological systems*, ed., W E Bijker, T P Hughes, T J Pinch (Cambridge, Mass: MIT, 1987), 51–82. More focused on technology as such is Pierre Lemonnier, *Elements for an anthropology of technology* (Ann Arbor, Mich.: Univ. of Michigan, 1992), where he also, 26–35, discusses the production chain, which is an important part of a technological complex.

[10] This total description of arable farming is only available in Swedish: Janken Myrdal, *Medeltidens åkerbruk* (Stockholm: Nordiska museet, 1986). Many years later I did the same for animal husbandry, still aiming at a complete description but now writing more on methodology: Janken Myrdal, *Boskapssköteln under medeltiden* (Stockhom: Nordiska museet, 2012). For a similar total description, concerning China, see Francesca Bray, *Agriculture, Science and Civilisation in China*, vol. 6, pt. 2 (Cambridge: Cambridge University Press, 1984).

theories and then François Sigaut reached the highest theoretical level.[11] As Anglo-Saxon scholars seldom refer to their works a presentation is justified.

These theories identify human intellectual endeavour in relation to production. In his concluding book C*omment Homo devint faber*, Sigaut referred to the French philosopher Henri Bergson, who explained that in the encounter with matter, humans develop practical intelligence.[12] Underestimating this is to leave much human creativity aside.

Central to these theories is an effort to combine *the limited number of possible solutions to the enormous variation in technology*. In two volumes Leroi-Gourhan presented a great variety of technical solutions harboured in necessity, which he termed "tendance".[13] This "tendance" was the main explanation for the independent emergence of similar inventions in different places. François Sigaut, with a more developed theory but fewer examples, talked about the limited plurality of solutions. One example is the four (or five) possible finger grips when drawing a bow. He also pointed out that the Western conception of normal technique prevents us from understanding the reasons for such variation.[14]

Natural laws, especially mechanics, limit the number of technological solutions. A problem for research about technology is that scholars trained in humanities tend to be unfamiliar with mechanics.[15] At least as important are the restrictions posed by human cultural history as such. Obviously, some inventions have to appear before others. The carpentry we know today was not available before the spread of iron, but soon afterwards nearly all the tools we are familiar with began to develop. In a wider perspective, restrictions caused by cultural development relate to the systemic aspect.

Turning from restrictions to variation, this is not just about technical considerations but also involves human needs. Lemonnier launched the concept of technological choices: these were made on a societal level, and much technology and production can only be understood in cultural and social contexts.[16] This relates to the well-known fact that *humans invent both needs and solutions*. The use of new technology can be discovered, and totally new need may evolve (well-known modern examples are telephones and computers) parallel with the inventing of technical solutions to existing – and evolving – needs. A variation in solutions thus also reflects a cultural variation in established needs (including renunciations and taboos).

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[11] André Leroi-Gourhan, *Évolution et techniques*, vol. 1 *L'homme et la matière;* vol. *2 Milieu et techniques*, 2nd ed. (Paris: Albin Michel, 1971–1973); Lemonnier, *Elements*; François Sigaut, C*omment Homo devint faber: Comment l'outil fit l'homme* (Paris: CNRS éditions, 2012).

[12] Sigaut, C*omment Homo,* 18–24; Henri Bergson, C*reative Evolution* (New York: Holt, 1911), 136–151.

[13] Leroi-Gourhan, *Évolution*, vol 1, 14–15, 24; vol 2, 337–340. For the concept "tendance" see also Lemonnier, *Elements*, 83. For a similar descriptive and systematic survey of technological solutions, but much less theoretical, see Walter Hirschberg, and Alfred Janata, *Technologie und Ergologie in der Völkerkunde* 1, 3rd ed. (Berlin: Dietrich Reimer, 1986), and Christian Feest, and Alfred Janata, *Technologie und Ergologie in der Völkerkunde* 2 (Berlin: Dietrich Reimer, 1989).

[14] Sigaut, C*omment Homo*, 71–82.

[15] Brian Cotterell, and Johan Kamminga, *Mechanics of pre-industrial technology: an introduction to the mechanics of ancient and traditional material culture* (Cambridge: Cambridge Univ. Press, 1990), 13.

[16] He illustrates this by describing seemingly irrational solutions, such as fighting without shields, which occurred because of a social logic; see Pierre Lemonnier, "Introduction," in *Technological choices: transformation in material cultures since the neolithic*, ed., Pierre Lemonnier (London: Routledge, 1993), 1–35; Lemonnier, *Elements*, 17.

Sigaut emphasized the role of details: "les détails qui sont la vrai réalité" (the details are the true reality).[17] I would like to elaborate this somewhat. An implement can be spread as a whole, but more often the diffusion of technology concern details, and change of methods and implements also basically consists of new and crucial details. A novelty, a new implement or method always has to go through an incremental change of details before it can be applied as an efficient technology. I label these the "functional details": a weak point, such as the attachment of the handle to the head on a hay-rake, or the working part of the implement, such as the share of a plough. Such functional details are the focus of human creativity and often several solutions are tested until a functional type is established.

I use the term "prototype" for inventions trying to solve a problem. Such prototypes could be more or less successful, and some of them turn into innovations that spread and dominated for a time. Normally they will be replaced by one or more inventions that solve the problem in a way regarded as functional and efficient.

When a functional type is established and spread, it can be the dominant type for many centuries, because it is "the perfect form" within the prevailing system. A spade for digging, with shoulder, a short shaft, a handle and an iron-shod blade, is a typical example. It had its breakthrough in northern and western Europe in the High Middle Ages, 1000–1300 CE, with the increased use of iron and in connection with a new technological complex built around an intensified grain production.[18] This type was not replaced in Europe until a new set of materials (such as steel) and production systems (the industrial system) came in the nineteenth century. (In fact, the form of the spade survived, and factory-made spades look very much the same as they have done for a thousand years.) If the development of details is not investigated it is not possible to understand how a "perfect form" is established.

Two misunderstandings must be eliminated. The incremental change of small details is not the same as claiming that technology always changed at the same pace. Technological systems will be replaced, and the shift from one system to another is often dramatic. During such periods of faster change previously suppressed innovations can emerge as dominant and crucial in the new system.[19] The other misunderstanding is about "conservative" peasants. A common and valid argument is that in a society with small margins novelties are tested with caution. However, more important is the existence of the perfect form; when this has been established the implement or method only undergo minor changes until the whole system is replaced.

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[17] Sigaut, *Comment homo,* 27.

[18] For a discussion about the "perfect form", regarding scythes and spades, see Janken Myrdal, "The perfect scythe – and other implements," *Journal of Nordic Archaeological Science* 15 (2007): 5–17. For the spread of the iron-shod spade see Janken Myrdal, and Alexandra Sapoznik, "Spade cultivation and intensification of land use 1000–1300: written sources, archaeology and images," *Ruralia* 10 (2017): 203–223. This type was typical in Central and Northern Europe. Before 1000 CE spades with long handles dominated and they still do in many parts of the world; see H. J. Hopfen, *Farm implements for arid and tropical regions* (Rome: FAO 1969), 42–43.

[19] Emblematic is the history of the wheel plough in western Europe. It existed for centuries in less perfect forms and in restricted areas until the general breakthrough on the Northern and Central European plains came 1000–1300; see Janken Myrdal, "The Middle Ages: Agrarian revolution or slow evolution? A research overview," in *Långa linjer och många fält: Festskrift till Johan Söderberg* (Stockholm: Stockholms universitet 2016), 19–49.

Inventors and innovators

In considering human creativity, the role of the inventor has to be discussed. Two contrasting views are: 1. Most humans live in inertia and change comes about through a few geniuses; 2. Humans are very innovative animals and change is constantly ongoing. As I emphasize the small details it would seem as the second view would be preferred, but it is a bit more complicated.

George Basalla has presented a balanced argumentation for the role of the few intelligent inventors. He does not deny the importance of incremental change and small amendments. One part of his theory is that inventions can be compared to mutations undergoing a selection process similar to natural selection.[20] More importantly, Basalla believes that large inventions are crucial and associated with a few individual inventors: the geniuses. His conclusion is that only a small number of people took part in developing technology. [21]

The metaphors "mutations" and "natural selection" do not acknowledge the specific character of cultural change. *Humans make decisions, and develop needs and solutions at a qualitative level not comparable to other animals.*[22] In fact, cultural development is much more efficient than biological evolution. Mutations often occur but fewer than one in the million are successful.[23] The metaphor about mutations is thus misleading; human inventiveness is so much more efficient.

Indeed, the essence of Balassa's theory is the identification of the genius. A counter hypothesis can be formulated.[24] The human capacity for conceptualization means that people active in production on a daily basis solve problems at far higher level of complexity than do any other animals, which also implies a gradient extending from continuous decision-making to small inventions. Before modern science and education, peasants and craftspeople were the only ones who pondered such questions every day. They were, as Sigaut explains it, in encountering matter developing practical intelligence.

However, one cannot deny that some very intelligent and devoted individuals exist. We have such persons today and they must always have existed, though perhaps in preindustrial periods they were found more on village level than higher up in society.

The problems they had to solve concerned functional details: the hay-rake is an example. The first rakes, from the centuries around the beginning of the Common Era, had only one point of attachment between the handle (shaft) and the head, with a wooden plug where the handle went into the head. This was unstable and the head was much smaller than today. Around 500–700 CE a new type spread in which the lower part of the handle was split, so it could have two points of attachment to the head. The next step occurred in

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[20] Basalla, *The evolution*, 135–138. A remark in passing is that artificial selection is a human-controlled technology.

[21] Basalla, *The evolution*, 25, 57, 139.

[22] Thomas Wynn, "Tools and tool behaviour," in C*ompanion Encyclopedia of Anthropology*, ed., Tim Ingold (London: Routledge, 1994), 133–160. Wynn mentions Basalla's use of "mutations" as an example of simplistic theory.

[23] I thank Magnus Enquist, Director of the Centre for the Study of Cultural Evolution, Stockholm University, for this information.

[24] Leroi-Gourhan considered the concept "genius" useless for analytical purposes, as any person is a part of a group and not free of influences; see Leroi-Gourhan, *Evolution*, vol. 2, 313–314.

the fifteenth and sixteenth centuries, when two different types developed. In more populated regions a complicated type spread, and the making of such rakes demanded craftsmen. It had one or two bows going through the lower part of the handle, and the bows together with the handle created several points of attachment to the head (it is called "the bow-rake"). In less populous regions, especially in the north, a type with a broad lower part of the handle going into the head was invented and spread. This broad section of the handle going into the head also allowed for several points of attachment, but it could be made by the peasant himself. These two main types lasted until the industrial period.[25]

The new solutions were separated by hundreds of years. General spread of the innovation came when the time was right, and the invention as such may have existed in beforehand. New rake types spread in periods with growing importance of cattle breeding. As the bow-rake was made by craftsmen, this innovation was combined with an increased commercialization of the countryside.

We must give the inventor credit as being gifted, but we cannot expect to find evidence of him or her. Perhaps the process of inventing was not straightforward, but consisted of repeated attempts followed by rejections, so that not even contemporaries could have identified the inventor and we will never know the names of single inventors. Instead, the spread of inventions when they turned into innovations can be researched in relation to the role of different groups. In periods for which good source materials are available extensive studies have demonstrated that peasants and craftspeople often took the lead, though if big investments were needed contributions from the upper classes were a necessity.[26] With the modern period and specialized inventors and natural scientists this changed, but still people engaged in the production chain have a large influence on technological change.

Diffusion

The use of an innovation can increase in two ways: it can have an increased use in a specific region (not only the region of origin of course) and it can spread to other regions. Often an innovation is modified to suit its new environment,[27] which does not change the fact that the innovation was borrowed. A key issue here is the spread to other regions, the diffusion.

Some scholars took theories of diffusion to the extreme, and such ideas were popular until the first half of the twentieth century. Basically, they held humans to be naturally conservative, so change had to come from a few leading regions. Even innovations such as irrigation or pyramids were assumed to have spread from a single origin, when these technologies in fact follow from any attempts to direct the flow of water or build a tower with simple technique.[28] These theories were also linked to Eurocentrism and racism. In history

[25] Janken Myrdal, "The hayrake," *Ethnologia Scandinavica* (1984): 25–33; Janken Myrdal, "Räfsan: Att återvända till allmogens föremål," *Saga och Sed* (1998): 29–48.

[26] With colleagues, I have discussed and tested this, see for instance technical change at the farm level decade by decade in eighteenth-century Sweden, presented in Carl-Johan Gadd, "The agricultural revolution in Sweden, 1700–1870," in *The Agrarian History of Sweden from 4000 BC to AD 2000*, ed., Janken Myrdal and Mats Morell (Lund: Nordic Academic Press, 2011), 118–164.

[27] Pacey, *Technology*, 51.

[28] For a historiography, see Alan Barnard, *History and Theory in Anthropology* (Cambridge: Cambridge University Press, 2000), 47–54; Henrika Kuklick, "Diffusionism," *Encyclopedia of Social and Cultural Anthropology*, ed., Jonathan Spencer, and Alan Barnard (London: Routledge, 1996), 160–162. For references to some central

and anthropology, diffusionist ideas have been less popular in the recent decades.

Indeed, through history diffusion of technology is a fact. I will address three questions: 1. Does the spread of general ideas play any role for specific inventions (stimulus invention)? 2. Do innovations generally spread in a spatially continuous fashion? 3. How can we separate diffusion from independent inventions?

The definition of stimulus invention varies somewhat, but basically it is assumed that general ideas can stimulate specific inventions in distant regions.[29] This is extremely difficult to prove, and it is even doubtful whether general ideas could have inspired specific inventions. A general idea must be related to the thought system prevalent in a culture, and the known but not widely utilized technology is a part of such a system. The specific invention brought about has to be not only new in relation to what is used, but also something else than what is considered as possible. This is seldom taken into account when stimulus to specific inventions is suggested. I will return to this discussion in the section about the wheelbarrow.

Stimulus from general ideas on technology occurs, but normally on a higher level, concerning technology as such (for example mathematics used in technical solutions). Related to diffusion of technology is the flow of ideas regarding for instance religion,[30] which is of importance for how technology was conceptualized and developed.

Spatial diffusion has been researched extensively in human geography, mainly concerning the contemporary period.[31] In earlier periods, when information flow was restricted, direct contacts formed the basis for spread of technology. This neighbour relationship is also advocated by Leroi-Gourhan, though he emphasizes borrowing between people with similar habits.[32]

Direct contacts certainly include those via merchants and traders travelling between ports and towns, and transport items, such as the compass, belong to common technology loans. Indeed, diffusion normally presupposed a level of intensity and continuity in the contacts. The role of a few individuals making very long journeys should not be overesti-

works of world history see Patrick Manning, *Navigating world history: historians create a global past* (New York: Palgrave Macmillan, 2003), 219–223. That extreme ideas still prevail can be exemplified by Peter Atkins, Brian Roberts, and Ian Simmons, *People, land and time: an historical introduction to the relations between landscape, culture and environment* (London: Arnold, 1998). Here the supposed early spread of irrigation is illustrated by a map. The origin is believed to have been in West Asia from where it spread around the world. Remarkably the authors imagine that it spread to the New World before 1500 CE. Ibid., 121.

[29] Pacey, *Technology*, vii-viii, discusses the "stimulus invention" concept and later, 51, suggests that it may be replaced by the concept of "technological dialogue" between regions. Wikipedia in the article on "Diffusion" (https://en.wikipedia.org/wiki/Diffusion, accessed May 2017) mentions that a stimulus innovation is based on attachment to a concept. Kroeber talked about the reinvention of an element transmitted across a cultural barrier; see Thomas Glick, "Diffusion, diffusionism," in *The dictionary of anthropology*, ed., Thomas J. Barfield (Oxford: Blackwell, 1997), 115–116.

[30] Susan Whitfield has, with evidence from stupas and paintings in the Tarim Basin, shown this flow of influence, related to trade, during the first millennium of our era; Susan Whitfield, "On the Silk Road. Trade in the Tarim?" in *Trade and Civilization*, ed., Kristian Kristiansen, Thomas Lindkvist, and Janken Myrdal (Cambridge: Cambridge University Press, 2018), 293–325.

[31] For a summary see Derek Gregory, "Diffusion," in *The dictionary of human geography*, ed., Ronald John Johnston, 4th ed. (Oxford: Blackwell, 2000), 175–178.

[32] Leroi-Gourhan, *Évolution*, vol. 2, 351–373.

mated; for instance, it cannot be proved that Marco Polo contributed to a single innovation in Europe, though his travel stories spread widely.

An important question is whether a particular technology was an independent invention or introduced through diffusion. Several factors play a role in determining this, as follows:

1. A general/simpler idea is more easily invented independently, whereas a specific technical solution tends to be invented in one place and then spread.

   Note: Identifying the functional detail/details is decisive.

2. When the pace of technical change increases, inventions tend to spread more often, because the new ideas are introduced from elsewhere before they had time to develop internally.

   Note: the two main factors increasing the pace of technical change are population and specialization. The role of the number of people interacting is obvious. The prime example is to compare the three landmasses that were more or less separated before c. 1500 – Australia, the Americas, Afro-Eurasia – and their levels of technology when they were connected. With specialization, a deeper knowledge is developed by specialists. Basically, this is Adam Smith's credo.

3. The pace of diffusion increases with the growth of networks and contacts.

   Note: Trade expands with population increase and technical development, and thus hastens the pace of technological change.

   These factors are balancing each other, so that even simple inventions, in a world with extremely low population density (e.g. during the Stone Age) tended to be invented on one place and then spread. This is what Joseph Needham pointed out. He phrased it in the reverse way: with rising complexity (sophistication) even more complex inventions are often made as separate inventions in different parts of the world. [33]

Joseph Needham is an extremely important scholar, and anyone discussing transmission of technology and ideas across Eurasia must relate to him. He formulated a question that has inspired but also steered much research: the so called "Needham question".[34] His question was: Why was the East for a long time ahead of the West, and then overtaken by the West? For him economic and societal development were explanatory factors rather than a part of the question.[35]

His project *Science and Civilisation in China* was a challenge to the prevailing Eurocentric ideas. It demonstrated that change in technology and science to a large extent took place outside Europe. To sustain his hypothesis about a shift in the flow of influences he presented a famous list of innovations transmitted from the East to the West, and another

[33] Joseph Needham, *Introductory orientations, Science and Civilisation in China* vol. 1 (Cambridge: Cambridge University Press, 1954), 228–229.

[34] For a presentation see Robert Temple, *The genius of China: 3,000 years of Science, Discovery, and Invention* (New York, N.Y.: Simon and Schuster, 1986), 91–92. Critical remarks regarding for instance lack of contextualizing "skills and knowledge of the period", see Francesca Bray, *Technology and Gender: Fabrics of Power in Late Imperial China* (Berkeley: University of California Press, 1997), 9–10. For a Chinese perspective see Liu Dun, "A new survey of the Needham question," *Studies in the History of Natural Sciences* 19.4 (2000). The "Needham question" is such an accepted core idea today that it even has an entry in Wikipedia, under "Needham", (https://en.wikipedia.org/wiki/Joseph_Needham, accessed June 2017).

[35] Joseph Needham, *The grand titration: science and society in East and West* (London: Allen & Unwin, 1969).

much shorter list of those that spread in the opposite direction.[36]

His main proof of diffusion is earlier evidence in China.[37] Needham argued that a cluster of inventions spread in the second half of the twelfth century, such as the magnetic compass, paper-making, the windmill and the wheelbarrow.[38]

Earlier evidence in one region than in another is not a sufficient proof of diffusion and regarding single innovations Needham's conclusions have often been questioned. One example is the winnowing machine for grain. In China the winnowing machine had been used since the Han Dynasty. It is documented that the winnowing machine was introduced by boat from China to parts of Europe (e.g. Sweden) in the eighteenth century.[39] Sigaut remarked that the winnowing machine at that time already existed in Europe and was an independent invention made in sixteenth-century Europe, but he did not deny that it was also introduced directly from China to regions of Europe where the European type had not spread.[40] Arnold Pacey cites other examples as the blast furnace and aspects of printing, adding that "Broad similarity between techniques is not sufficient, in the absence of other evidence, to establish a connection."[41]

Needham's method of demonstrating diffusion is insufficient, which highlights the importance of a discussion on methods for distinguishing independent inventions from innovations introduced from elsewhere.

Method

If methods and sources are not discussed in detail it tends to weaken arguments. I will point out some rules to be followed: 1. Sources must be presented critically, and for world history that normally includes secondary literature; 2. The investigation should be presented in a repeatable way; 3. A combination of sources normally has to be utilized, especially in cultural history.

First the main sources are presented and discussed in relation to my research questions. I base my conclusions on primary sources, so secondary sources will not be discussed below, though I have dealt with these elsewhere.[42] Anthropological literature can in my investigation be regarded as a primary source.

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[36] Needham, *Introductory*, 242–243. In his concluding chapter in a book summarizing the whole project (which was published posthumously in 2002; Needham died 1995), he presented a list of 250 Chinese inventions, giving the date of the first literary reference, but not including a comparison with Europe; see 215–-225 in Joseph Needham, "Conclusion," in *General Conclusions and Reflections, Science and Civilisation in China* vol. 7:2, ed., Joseph Needham et al. (Cambridge, Cambridge University Press, 2002), 199–231. For a popular presentation of many innovations, see Temple, *The Genius.*

[37] Needham, *Introductory*, 241–244.

[38] Needham, *The Grand Titration*, 114.

[39] Bray, *Agriculture*, 377.

[40] François Sigaut, "La Chine, l'Europe et les techniques agricoles,"*Annales, Économies, Sociétés, Civilisations*, 44:1 (1989): 212–213; François Sigaut, "Y a-t-il eu des innovations techniques dans l'agriculture avant le XIX[e] siècle?" *Bulletin de la Société d'Histoire Moderne et Contemporaine*, 1–2 (1999): 92–95.

[41] Pacey, *Technology*, 51.

[42] For a discussion about secondary literature as a source for world history, see Janken Myrdal, "On source criticism in world history," in *Methods in world history: a critical approach*, ed., Arne Jarrick, Janken Myrdal, and Marie Wallenberg Bondesson (Lund: Nordic Academic Press, 2016), 45–83.

Anthropology: Borrowing from neighbours is the most common mode of diffusion, and it follows that a continuous spatial distribution is an important indication of diffusion. During the nineteenth and early twentieth centuries, anthropologists, including folk-life researchers (ethnologists) in Europe, collected and registered preindustrial material culture. The most important, source-critical aspect is that this massive amount of data can only represent its own period. It cannot be used, without other historical sources, to reconstruct a distant past. For the last phase of a peasant-dominated society (including hunters and gatherers) we get an immense number of observations about details – often reported with curiosity and keen observational skills.

To find these sources extensive library search is of course an important method. Searching in the Human Relation Area Files (HRAF) is also rewarding.[43] Thousands of books about hundreds of cultures have been made searchable through HRAF. With cunning searches for single words practically every cultural element can be documented, and then paragraphs and whole pages can be downloaded. (The coding in categories is less useful for the kind of research discussed here.)

Written sources: Longer texts were normally written for the upper classes, but some of them concern everyday life. One such important genre is agricultural treatises. In a survey of larger agricultural treatises before 1500 I could distinguish two separate cultural areas: West Asia–Europe–northern India on the one hand and China–Korea–Japan on the other. However, a weak link between them could also be identified. In Persian treatises Chinese agriculture is known, but with no direct reference to Chinese treatises.[44]

This is a good example of the pros and cons of written sources. Agricultural treatises are one of the most important sources we have when discussing change of technology. Some of the Chinese and Arab treatises comprise several hundred thousand words. Though extensive they are not exhaustive, and none of the three examples below are described in the treatises. The agricultural treatises reflect the interests of and contacts among the literate class. Indeed, other contacts existed. Along the Silk Road, merchants, nomads and other travellers met and exchanged information.[45] The absence of direct connections between agricultural treatises in the West and East (see Fig. 1) is not a proof that technological transmission along these trade routes was unusual or unimportant.

Archaeology. Wood was the main material for tools and constructions before industri-

[43] There are two sections of HRAF – archaeology and culture. I have mainly used the latter: http://ehrafworldcultures.yale.edu/ehrafe/. In the Appendix I have also used the archaeology section, http://ehrafworldcultures.yale.edu/ehrafe/.

[44] Janken Myrdal, "Agricultural Treatises in Eurasia before ca. 1500: The Iceberg Method, a Survey, and a Grand Hypothesis," *The Medieval Globe* 6:2 (2020). A treatise in Persian mentions Chinese agriculture in the early fourteenth century, which is marked with a dashed line on the map. This is also mentioned by Thomas Allsen, *Culture and Conquest in Mongol Eurasia* (Cambridge: CUP, 2001). Furthermore, he identified a personal contact around 1300 between a famous author of a Persian agricultural treatise, Rashid Al-Din, and a Mongolian administrator who had served as supervisor of the department of agriculture at the Chinese court. Allsen concluded that the detailed accounts of Chinese agriculture in the treatise might be the result of acquaintance between these two intellectuals.

[45] Allsen, *Culture*, gives numerous examples of possible knowledge transmission in several different fields, such as astronomy and medicine. He also mentions several plants that were transmitted or became more popular during periods of more intense contacts along the West–East axis, ibid., 121–126.

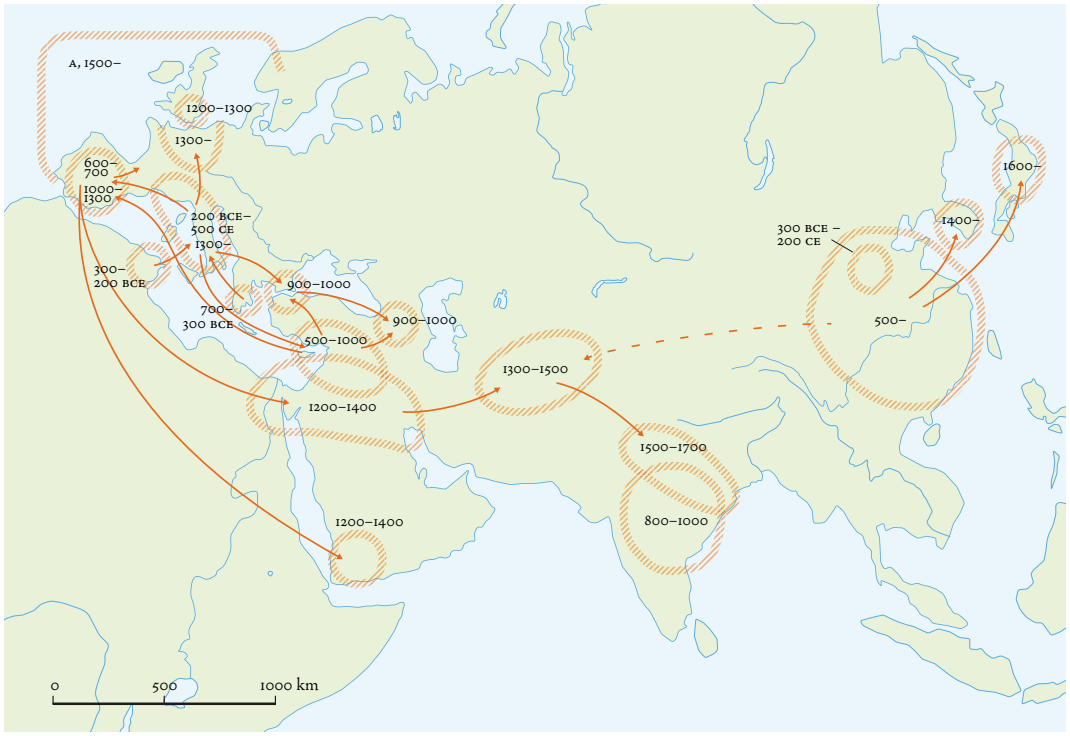

Figure 1. *Major agricultural treatises before 1500. Direct influence such as mentioning, quoting, or translating is marked with a line. The dashed line marks that agriculture in the other main region was known. Source Myrdal, "Agricultural Treatises in Eurasia."*

alization. In excavations stone, ceramics and some iron dominate, and we get information about a limited section of the material culture. Organic material, such as wood, is preserved only under specific circumstances, such as very wet or very dry conditions (or in frozen ground). In Afro-Eurasia a relatively large amount of wood has been preserved in a few regions: Egypt (arid), along the North Sea in Europe (wet) and in the Tarim Basin (arid). From medieval Greenland, rather much cloth but fewer wooden tools have been preserved (presumably because wood was a scarce resource). In towns in northern, western, and central Europe, wood is preserved in medieval layers. I assume that other regions have wood finds, and hopefully in the future, with more excavations, we will have a better coverage of the history of everyday culture (see Appendix).

The main source-critical problem concerns the selection process. In graves or tombs objects were chosen in relation to ideas about afterlife. In regions where wood is scarce, large objects will be underrepresented, because they were recycled or used as fuel.

Additionally, one must accept that most small pieces can never be interpreted. Identification is only possible if a characteristic piece of an object has been preserved (this is not the same as the functional detail).

Art. The problem with images is that art historians have not sufficiently presented their material as a source for the historical community as a whole. Catalogues of realia, images of tools and methods, exist but are rare.[46]

[46] There are exceptions, especially concerning European medieval art; see Myrdal, *Boskapskötseln*, 55–119. A model study is Maria Parani, *Reconstructing the reality of images. Byzantine Material Culture and Religious*

This short list does not do justice to the source materials. When trying to collect all evidence in the Nordic countries on medieval agricultural technology I used a range of materials: proverbs, miracle stories, parables in sermons, etc. Such total investigation has to been regional. Thereafter it can, as a secondary source, be linked into world history.

The method suggested for identifying diffusion has three steps: 1. Identifying the functional principles; 2. Mapping the spread in the nineteenth and early twentieth centuries; 3. Finding historical evidence.

The three examples presented illustrate the method and different aspects of the theory. The case of the *wheelbarrow* demonstrates that a hypothesis about diffusion cannot be made on flimsy grounds. The *plunge churn* shows that Central Asia could be as innovative as eastern and western Eurasia. Prototypes of the churn existed in Central Asia, and the plunge churn may have been invented there. The *mousetrap* is a small invention, but the only one of my examples with a distribution limited to the Silk Road.

Wheelbarrow

Needham assumed that the wheelbarrow came from the East to the West in the twelfth century.[47] In fact the dominant "wheelbarrows" in the East and in the West, are so different that they cannot be regarded as variations in typology, but must be understood as separate vehicles.

The only type in Europe has the wheel at the front, but the type dominating in East Asia has the wheel under the loading platform. The European is a simple lever system, and can be described as a stretcher with a man at one end and a wheel at the other. The dominating type in China is a cart with one wheel, and the mechanical principle is that of balancing. The type used in Europe also existed in China.[48]

The advantage with the type dominating in China is that the porter does not have to support much force. The wheel was also larger to facilitate longer transports, and this wheelbarrow, or rather "single-wheeled cart", was used to carry heavy loads over long distances. The advantage with the European type is that it has a lower carrying surface, and thus can be more easily loaded and unloaded.

These two types are two different vehicles, and Needham was of course aware of this. To maintain the hypothesis of diffusion, he assumed that it was the principle – a vehicle with one wheel – that was transmitted in "stimulus diffusion". A "faint suggestion of an idea" triggered an inventor in a distant part of the world.[49]

As already mentioned, I doubt that stimulus diffusion exists in this form. Ideas about technology form a wide and amorphous entity. The wheel is a good example. Where the wheel exists, it can be used for diverse functions, or it can be a known but underutilized technology. The wheel existed as a toy but nearly nothing else in pre-Columbian America. In Europe, it was used for a series of functions: potter's wheel, different vehicles, water

Iconography (11th–15th Centuries) (Leiden: Brill, 2003).

[47] Needham, *The Grand Titration*, 114.

[48] Cotterell and Kamminga, *Mechanics*, 214–215; Andrea L. Matthies, "The medieval wheelbarrow," *Technology and culture* 32:2 (1991): 360, 364.

[49] Joseph Needham, *Mechanical Engineering, Science and Civilisation in China* vol. 4:2 (Cambridge: Cambridge University Press 1965), 271; Needham, *Introductory*, 244.

wheel, etc. Some large regions in the world can be characterized as "wheel cultures", cultures where the wheel concept constituted a core technological idea. In other cultures, the wheel did not belong to core technological ideas.[50] Europe belonged to the wheel cultures, with a range of possibilities at hand for use of the wheel.

Before we can rule out the wheelbarrow as a "stimulus" invention the spatial distribution and the context have to be discussed.

According to the method outlined above the distribution in the late pre-industrial period must be mapped. A search in HRAF clearly shows that the wheelbarrow was nearly non-existent outside Europe and the Far East. [51] Wheelbarrows are never mentioned and sometimes even the absence is commented on. Indian scholars have been inspired by the Needham project, and started a similar project. In his presentation of technology in India from c. 650 to 1750 CE, Irfan Habib wrote that the wheelbarrow "never seems to have been used in India until colonial times".[52] In their book about mechanical principles, Cotterell and Kamminga noted with some surprise that even today the wheelbarrow is not used on construction sites in Iran.[53]

The only exception is interesting. In northern Pakistan, in the Himalayas, the Hunzukuts, a group of agriculturalists, built terraces for irrigation. The only wheeled vehicle they had, and it was rare, was a ladder (stretcher) with a simple wheel at the front end. The wheel was just a section of a tree trunk attached to a rung, and the rung and the wheel rotated together.[54] The simplicity and the isolated occurrence indicates an independent invention, which also points at this construction – a wheel in one end of a ladder – as something obvious, like rolling a boat on logs.

In Europe, the wheelbarrow had existed for a long time, but wheelbarrows were still rare in the countryside in the nineteenth century. In a classical work about wheeled vehicles in Sweden Gösta Berg showed that wheelbarrows were nearly non-existent in rural areas, and the general spread came only with the railways in the late nineteenth century.[55] The same applies to the countryside in most of Europe.[56]

Turning to the historical evidence, I start with China, where this vehicle was first invented. The history of the wheelbarrow in China has been described in detail.[57] The wheelbarrow with the wheel at the front was already in general use in the first century BCE. The other vehicle, with a central wheel, was invented around the beginning of the Common

[50] Gösta Berg, in his seminal work on wheeled vehicles mentions this diversity of functions; Gösta Berg, *Sledges and Wheeled Vehicles: Ethnological Studies from the View-Point of Sweden* (Stockholm: Stockholms högskola, 1935), 148–149; Basalla, *The evolution*, 7–10, also has an informative discussion about the use and non-use of wheels.

[51] See footnote 43.

[52] Irfan Habib, *Technology in Medieval India 650–1750* (New Delhi: Tulika Books, 2008), 58.

[53] Cotterell, and Kamminga, *Mechanics*, 197.

[54] Emily Overend Lorimer, *Language Hunting in the Karakoram* (London: Allen & Unwin, 1939), 211; see also Needham, *Mechanical Engineering*, 271, who has noticed this case but refers to another source.

[55] Berg, *Sledges*, 146–147.

[56] The wheelbarrow is rarely mentioned in European folk life studies; see for instance the overview in A. Fenton, J. Podolak, and H. Rasmussen, eds., *Land Transport in Europe* (Copenhagen: Nationalmuseet, 1973), where it does not occur at all.

[57] Needham, *Mechanical Engineering*, 258–281, 759.

Era, in the first century BCE or the first century CE.[58] It soon became widespread. This single-wheeled vehicle was also in use in Korea. It was mainly used for transport of goods and people.[59] The one-wheeled cart was almost always run by porters; draught animals were only occasionally used. A curiosity is that sails could also be used.

Both types of vehicles, the wheelbarrow and the single-wheeled cart, were used in construction, such as large-scale water management projects, but the wheelbarrow proper was never used for long-distance transport.

In a Chinese context, with a large population relative to the number of draught animals, the type with a central wheel fitted well into the system. In the seventeenth and eighteenth centuries the knowledge of the Chinese central-wheel vehicle was spread to Europe, but never came into general use because animal traction with two- or four-wheeled carts completely dominated.[60] The one-wheeled cart did not fit into a European system less based on human muscle power.

In the West, the earliest firm evidences of wheelbarrows proper are from the late twelfth century. From the thirteenth century, we have rather much evidence from southern England, northern France and the Low Countries.[61] Compared with a handbarrow, i.e. a stretcher, for two men it was an expensive implement. English manorial accounts indicate that a wheelbarrow could cost as much as six times more, though it reduced labour requirements from two workers to one.

Andrea Matthies registered 359 medieval images of building construction and only 5 per cent of them depicted wheelbarrows.[62] A more general spread outside of the core region came in the fifteenth and sixteenth centuries, but still they were mainly used in large building construction and mining. The cost is the main explanation for the wheelbarrow's restricted spread among the rural population.

A single piece of evidence from Greece dating from around 400 BCE has been interpreted as a one-wheeled vehicle, presumably a wheelbarrow.[63] We have no evidence in the fifteen hundred years between this evidence and the general breakthrough in medieval Europe. To construct a vehicle with one wheel is a possibility as soon as the wheel is available. As it had to fit into a technological system it could be invented, abandoned, forgotten and then reinvented centuries later.

To summarize. The centrally wheeled cart is a different vehicle, and when it became known in Europe it did not spread. It was a part of a manpower-intensive Chinese transport system that did not exist in Europe. We can leave this type aside when discussing the

[58] Needham, *Mechanical Engineering*, 260 dated the first evidence to the third century CE, but ibid., 759 he presented earlier evidence, dating from the two centuries around the beginning of Common Era.

[59] M. J. T., Lewis, "The origins of the wheelbarrow," *Technology and Culture* 35:3 (1994): 453.

[60] Temple, *The Genius*, 86, wrote that the wheelbarrow with a central wheel is an invention the West "has yet to discover", without considering the context, in which draught animals and beasts of burden have been of immense importance in Europe.

[61] Matthies, "The medieval"; Lewis, "The origins".

[62] Matthies, "The medieval," 357–358. Vault paintings in fifteenth-century Nordic churches depict how souls are being transported to hell in wheelbarrows, an image which also occurs in other European countries. The Devil seemingly could pay for expensive equipment.

[63] Lewis, "The origins," 471–472.

diffusion of the wheelbarrow.[64]

The wheelbarrow with a wheel at one end occurred only in the eastern and western parts of Eurasia. Its absence in West Asia, Central Asia and India makes it less likely that it was transmitted along the trade routes. If merchants or travellers were the agents of transmission the wheelbarrow would have occurred in ports and towns along the routes. That it existed in China more than a thousand years before the general spread in Europe is a weak or, in fact non-valid, argument for a transmission. The general spread in Europe relates to the large-scale building activity in the thirteenth century, and to more developed mining. Short-distance transports became a bottleneck on such sites, and the wheelbarrow was invented and spread. Only when it was used constantly could this labour-saving device pay for its higher cost. In the industrial period, the price of a wheelbarrow decreased relatively, and it could spread widely.

We have a single piece of evidence in Europe from an early period, and from the period so well covered by anthropological investigations, the nineteenth and early twentieth centuries, just one occurrence outside western and eastern Eurasia has been documented, in a remote part of Asia. Presumably this vehicle was invented several times, as it was a part of thinking about how to use the wheel. The wheelbarrow generally spread only in two widely separated regions: China and Europe, and then when this invention could fit into a system of intensive use.

The arguments for the European wheelbarrow as an independent innovation and not a part of the East–West spread of influence are: 1. There was no continuous spread over Eurasia in the nineteenth century; 2. It is a relatively simple invention, presumably made several times; 3. It fitted into a system of large constructions, which contributed to technological inventiveness concerning short-range transport in Europe and in China; 4. There is not a single piece of historical evidence outside these regions.

Butter churn

The next example concerns a specific type of a butter churn: the plunge churn. Butter is the fat of the cream and a luxury. It was one of the first food commodities that could pay for its transport, and was paid in tax and rent as well as being produced for sale. With increased efforts to produce butter, increasing production efficacy became an issue that had to be handled.

The plunge churn was more efficient than the shake churn, which dominated earlier. However more cream was needed in a plunge churn for butter making than in a shake churn. The plunge churn is formed as a narrow vessel where the cream is agitated by a staff that at its lower end has a disc with holes or a cross – the plunger. The staff is plunged down into the cream to make it spray up. This is a working principle that differs from shaking or whipping, and this principle is still used in modern churns. It is an example of a "perfect" solution that has lasted for centuries after its invention.

I was brought into this inquiry when working with wooden finds from a Viking Age

[64] In his concluding and long list of Chinese inventions Needham only mentions "Wheelbarrow, centrally mounted", which is what I label a one-wheeled cart. The wheelbarrow proper is not included in this list; see Needham, "Conclusion," 223.

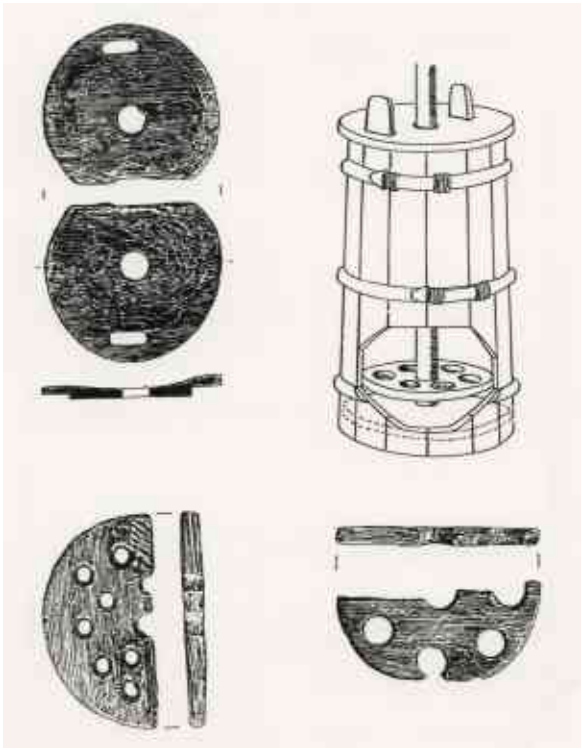

Figure 2.
Plungers, lid and a reconstruction of the plunge churn from Elisenhof; Myrdal, "The plunge churn."

village, where some of the earliest plunge-churn discs in the West have been found.[65] Following the method described above, I started with the distribution of different types of churns in the nineteenth century. Library searches allowed mapping of the Afro-Eurasian distribution.[66] This has largely been confirmed with searches in HRAF, and also by later published literature (see map, Figure 3). An addition to my earlier article is that in Russia the plunge churn spread to larger parts of the country from the eighteenth century, and then replaced a simple heating of the cream.[67]

Three churning methods dominated. The oldest is the shake churn, which has existed for thousands of years. It is spread over much of Africa and Eurasia. Cream, often merged

[65] Mátyás Szabó, Gertrud Grenander Nyberg, and Janken Myrdal, *Die Holzfunde aus der frühgeschichtlichen Wurt Elisenhof* (Frankfurt am Main: Lang, 1985); Janken Myrdal, "The plunge churn from Ireland to Tibet," in *Food and Drink and Travelling Accessories: Essays in Honour of Gösta Berg*, ed., Alexander Fenton, and Janken Myrdal (Edinburgh: John Donald, 1988), 111–137.

[66] I mainly searched the libraries of Nordiska museet and the Ethnographical Museum, both in Stockholm. The map is published in Myrdal, "The plunge churn," 126.

[67] Russia is not covered by the digital HRAF. In large tracts of Russia cream was heated to separate butter fat; see Myrdal, "The plunge churn," 117. This is confirmed by Darra Goldstein, "Gastronomic Reforms under Peter the Great: Towards a Cultural History of Russian Food," in *Jahrbücher für Geschichte Osteuropas* 48 (2000): 481–500, where she demonstrates that the plunge churn begun to be spread to larger parts of Russia with the reforms of Peter the Great in the beginning of the eighteenth century, ibid.: 503. This heating to make butter is not the same as clarifying already churned butter, such as the ghee in southern Asia. Clarifying was the standard method for preservation of butter in south-eastern Europe (and also in Russia), instead of salting the butter, as was done in northern and western Europe; see U. Dirlmeier, "Butter," in *Lexikon des Mittelalters*, vol. 2 (München: Taschenbuch Verlag, 2003), 1162.

Figure 3.
The distribution of the plunge churn in preindustrial Afro-Eurasia. Note that the plunge churn gradually spread into the rest of Russia from the eighteenth century. Myrdal, "The plunge churn."

with sour milk, was shaken in a container: a sack, a calabash or a small wooden barrel – even a ceramic vessel could be used.

In India, instead another type was used: the drill churn, where the basic principle is that the cream is whipped by a rotary drill. Its history has not been researched but the earliest evidence known to me is medieval.[68] It is another solution than the plunge churn to the problem with handling larger quantities. Clarified butter, ghee, is quite important in India, which formed the backdrop for the demand for an invention of a more efficient butter churn than the shake churn.

The plunge churn dominated in a broad band stretching over Eurasia, from Tibet to Europe. Shake churns still existed in the early twentieth century in a few regions of Europe, such as in parts of Estonia and Ireland, but then only as a subordinate and rare technology. As southern Europe used olive oil instead of butter the churn was not much in use there. In the Far East butter was not consumed, so there was no need for any churns. The plunge churn was used for butter, but in Asia also for koumiss (made from mare's milk). It was related to these products being produced on a rather large scale for trade and taxes, such as in Tibet.

A fourth method is whipping. I will show this has existed as an alternative, and a way to develop shake churning. As already mentioned, heating of cream was used in much of Russia.

[68] The history of the drill churn ought to be studied. The only old evidence that I have encountered is a medieval image; see Susmita Pande, "History of agriculture as reflected in the art of India," in *History of Science, Philosophy and Culture in Indian Civilization* vol 5:1, *History of Agriculture in India (up to c. 1200 AD)*, ed., L. Gopal, and V. C. Srivastava (New Delhi: Centre for Studies in Civilization, 2008), 823. Around 1800 this type was ubiquitous, and the only one in use, according to English travel reports.

In form and function the plunge churn was very similar in the East and the West: the staff ended in a disc with holes or in a cross, the vessel was stave-built, tall and narrow. In my mapping, it was especially important to show the connection between the two main areas: northern and western Europe on the one hand, and Central Asia, Tibet and Mongolia on the other. I could demonstrate that the plunge churn had been common in a belt from the northern coast of the Black Sea and Caucasus to the north of the Caspian Sea and around the Aral Sea, down to northern Afghanistan. Thus, I had proven a continuous spatial distribution.

In presenting the historical evidence I first give a summary of those I presented in an earlier text, thirty years ago, and then discuss evidence I have come across since.

Europe. Archaeology provides the bulk of information, and showed a first breakthrough along the North Sea coast from the Netherlands to Denmark in the ninth to tenth century, followed by a general spread in northern Europe up to the twelfth to thirteenth century.

As the plunger, the disc or the cross, is easy to identify among wood finds, *e silentio* reasoning is allowed. Along the North Sea coast some sites yield considerable quantities of wood from circa 100 BCE to 500 CE. There is no evidence of the plunge churn that must have been rare, or more plausibly – non-existent. Also in northern Germany Slavic forts from the tenth century yield many wooden objects, but provided no evidence of plunge churns. From Ireland shake churns (identifiable because the whole vessel has been preserved) have been dated to the Early Medieval period (c. 500–1000 CE). The spread of the technology could thus be fairly well dated to around 800–1200 CE.

The earliest images of plunge churns illustrate Carolingian hymns, and confirmed the period of breakthrough. From the Late Middle Ages (c. 1350–1500), a large number of images depict churning of butter, as the witch's butter theft was a popular motif, but then the plunge churn was already well established. These images demonstrate the importance of the plunge churn, but they cannot be used in a discussion on the introduction of this technology.

Central Asia. The earliest written evidence (i.e. European travel reports) for the plunge churn I found dates from the eleventh to the thirteenth centuries. Very weak evidence, potsherds claimed to have belonged to shake churns, comes from the region south of the Aral Sea, dated to the eighth to tenth centuries.[69] I now think that one ought to ignore these until further archaeological evidence emerges. A possible plunger was identified in the Edsen-Gol region in the eastern part of Inner Mongolia, dating from c. 1000–1200 CE.[70]

My conclusion in the earlier article was that after a first breakthrough along the North Sea coast around the ninth century, in the following centuries the plunge churn spread generally in Germany, Scandinavia and Russia. The technology was connected to a growing trade in butter. A prerequisite for increased butter production in northern Europe was access to salt through production and trade, which allowed the preservation of butter.

This plunge churn was transmitted along the trade routes crossing Eurasia, but I concluded that more precise knowledge of where it originated or when it spread in Asia was not possible.

[69] Myrdal, "The plunge churn," 119, 136 with a reference to a Russian excavation report published in 1959.
[70] Myrdal, "The plunge churn," 125.

Looking at new evidence. I will focus on three fields where new results have challenged or supplemented my earlier interpretations. 1. Images and archaeological artefacts from Roman Britain have been interpreted as plunge churns; 2. Evidence from northern Europe during the High Middle Ages has grown, especially from England and Ireland; 3. In Asia more evidence allows a firmer dating and a discussion about the origin of the plunge churn.

Roman Britain (c. 100 BCE–400 CE). A hypothesis is that the plunge churn existed in the British Isles around the beginning of the Common Era.[71] The most important evidence is images of the Celtic fertility goddess Rosmerta.[72] In a relief from Corbridge Museum she stands with a tall, stave-built vessel, and she is holding a staff inserted into the vessel. However, she is holding the staff with only one hand, while a staff in a plunge churn is always operated with two hands. If the staff were for butter production it would be for some kind of whip churn, where the cream was agitated in a circular movement with one hand.[73] This type can be regarded as a prototype because the idea of using a staff for whipping the cream is one step away from the shake churn.

Another relief from Gloucester City Museum shows a woman standing beside the god Mercury. On one side, she has a rather small stave-built vessel, and in the other hand she is holding a staff ending in a spade-like form, i.e. a square with two protruding corners. Such spades were later used in brewing, and the form of the staff also indicates a whip churn. In one more relief from Bath she has a stave-built vessel in one hand and a staff in the other.[74] This could be the same type as in Gloucester, but the relief is damaged.

The vessels, and Rosmerta being a fertility goddess implies that butter churns are referred to, and if this is the case, whip churns and not plunge churns are depicted.

Further, archaeological finds have been identified as plunge churns. I only discuss possible cases.[75] A tall and narrow vessel, a hollowed trunk, from the well-known Glastonbury site, dates from 200 BCE to 100 CE.[76] It could have been used as a whip churn of the type just mentioned, or have had other functions, so it cannot be taken as a firm evidence of a plunge churn. Dating from the same period, a round disk with a hole in the middle, found at the hill fort Breiddin, has been interpreted as a lid of a plunge churn.[77] A round disk with a hole in the middle could have other functions, for example if food is stored on a

[71] I have previously accepted this assumption, Myrdal, *Boskapsskötseln*, 139–144.

[72] Myrdal, *Boskapsskötseln*, 142. I was put on this track by Urban Morén who referred to Hilda Ellis Davidson, "Milk and the northern Goddess," in *The concept of the Goddess*, ed., Sandra Billington, and Miranda Green (London: Routledge, 2002), 91–106.

[73] Caroline Earwood, "Bog butter, a two thousand year history," *The Journal of Irish Archaeology* 8 (1997): 33 refers to whipping cream by hand in Ireland in the seventeenth century.

[74] Bath: http://northstoke.blogspot.se/2008/04/bath-museum.html, accessed March 2016.

[75] From York an assumed "churn-dasher" dated to the Anglo-Scandinavian period consists of a short board with a bulge around a central hole. There is no sign of this being a part of a cross, and judging by the published picture it does not belong to a plunge churn at all. Carole A. Morris, *Craft, industry and everyday life: wood and woodworking in Anglo-Scandinavian and medieval York* (York: Council for British Archaeology, 2000), 2276–2277.

[76] Caroline Earwood, *Domestic wooden artefacts in Britain and Ireland from Neolithic to Viking times* (Exeter: Univ. of Exeter Press, 1993), 239; Caroline Earwood, "Wooden containers and other wooden artifacts from the Glastonbury Lake Village," *Somerset Level Papers* 14 (1988): 87.

[77] W. J. Britnell and C. Earwood, "Wooden artefacts and other worked wood from Buckbean Pond," *The Breiddin Hillfort, Council for British Archaeology research report* 76 (1991), 168–169.

hanging shelf a disk around the rope blocks rodents.

The same kind of *e silentio* reasoning can be applied to England as I have done in relation to other parts of north-eastern Europe. We have rather many wood artefacts from England dated to the centuries around the beginning of the Common Era. However, no plunger has been found,[78] and that is the only part of a plunge churn that can be identified with certainty. The lack of such finds indicates that the plunge churn was uncommon or non-existent. The prototype where sour milk or cream was whipped with a spade-like staff is nearly impossible to identify in archaeological material.

Medieval England and Ireland (c. 500–1500 CE). In York a disc has been found with a central hole and four other holes evenly distributed around the central hole. This is a disc to a plunge churn. It can be dated to the sixth century at the earliest, but is probably more recent.[79] Similar discs with holes, for plunge churns, dating from the ninth to the eleventh century, have been found in Dublin and Winchester.[80] A lid with a central hole, from Gloucester, dated to the ninth century, has been interpreted as a part of a plunge churn.[81] Also in York a lid from the thirteenth century could belong to a churn. As the plunge churn existed at this time it is more plausible that they in fact belonged to such churns.

Bog butter, butter preserved in bogs, is quite a common find in Ireland and Scotland. Such butter has been found together with shake churns from earlier periods up to the High Middle Ages, but from around 1000 CE the churns have a hole in the lid.[82]As these lids have been found with butter it indicates that they were for plunge churns, which then would demonstrate the common use of this technology at the time.

Written sources are often less informative when it comes to details and working methods. The churn has a few pieces of textual evidence in Old English, for instance in Gerefa from the eleventh century.[83] This may relate to a shake churn, but more likely it is a plunge churn. In manorial accounts from the twelfth and thirteenth century churns are often mentioned, and they were certainly plunge churns. The plunger itself is very rarely mentioned.[84]

However, two texts in Old English provide indications. The earliest is an English–Latin glossary, the Èpinal-Erfurt Glossary, dating from the seventh century. A butter churn is mentioned, a vessel in which butter is made, and the word used (a derivative of *wiellan*), indicates that it was rolled, so this is a shake churn. In the famous list of riddles in the

[78] Britnell, and Earwood, "Wooden artefacts," 169.

[79] Morris, *Craft, Industry*, 2277–2278.

[80] Morris, *Craft, Industry*, 2277.

[81] Morris, *Craft, Industry*, 2276; Carole A Morris, "Wooden objects: Excavation at Westgate Street, Gloucester," *Medieval Archaeology* 23 (1979): 199.

[82] Earwood, "Bog butter," 29–32. No staffs have been preserved in connection with bog butter.

[83] Allen Frantzen, *Food, eating and identity in Early Medieval England* (Woodbridge: The Boydell Press, 2014), 167, mentions that there are three occurrences of "cyrn" in Old English. About Gerefa, see Mark Gardiner, "Implements and Utensils in Gerefa and the Organization of Seigneurial Farmsteads in the High Middle Ages," *Medieval Archaeology* 50 (2006): 260–266.

[84] The words used in English dialects are dasher or plunger, but searches in the electronic Middle English Dictionary (http://quod.lib.umich.edu/m/med/), did not yield any evidence. When scrutinizing the Swedish sources, I just found one occurrence. The Swedish word for the plunger is "törel"/"tyrel", and the evidence is from a Latin–Swedish glossary dated to c. 1345, see Myrdal, *Boskapsskötseln*, 135.

Exeter book, which dates to the tenth century, the answer to one of the riddles is "plunge churn".[85] These two texts confirm the archaeological evidence on the introduction of the plunge churn in England.

To summarize: In Roman times a prototype probably existed in Britain where the cream or soured milk was whipped with a spade-like staff. The shake churn was still used at that time and during most of the first millennium of the Common Era. Not until the ninth century do we have firm evidence of the plunge churn in England.

Medieval western and northern Europe, except the British Isles (500–1500 BCE). The earliest archaeological evidence of plunge churns is from the village Elisenhof, dating from the eighth to the tenth century. Two plungers were recovered and also one lid, which not only had a central hole, but also a hole on the side which showed that it belonged to a stave-built vessel and thus presumably was a lid to a plunge churn. These finds indicate an extensive butter production in this marsh village. In nearby Haitaby (Hedeby) one plunger from the ninth century has been recovered. From the eleventh to twelfth centuries plungers have been found in towns all over northern and western Europe. Excluding the finds from Elisenhof and Haitabu, the numbers of published plungers are (see also the Appendix): two from northern and southern Germany, three from Norway, two from Denmark and two from Russia (Novgorod). I have published sixteen from Sweden, but this rather large number of finds is not because the plunge churn was especially common in Sweden, but because I have gone through nearly all the finds in different museums.[86]

A rather large number of wood finds from a Swedish village dated to the twelfth and thirteenth century is a unique spotlight on agrarian conditions. The collection comprises many agrarian objects but no plungers. This may indicate that the plunge churn was introduced later in more remote rural areas,[87] though the Elisenhof case indicates that this new technology was common in rural areas from its first introduction.

Early finds in Central Asia. The British Library in 2004 had an important exhibition on the Silk Road, and the catalogue became a standard work. This catalogue comprised new evidence on the history of the plunge churn. Since I wrote my article many years ago I also realized that the wooden finds in the Tarim Basin were so extensive that they permitted *e silentio* reasoning, and also that Stein's publications contained a very interesting artefact, a kind of missing link in the plunge churn's history. Furthermore, an important piece of information was presented to me at the symposium "New perspectives on the Early Medieval Silk Roads" (September 11th, 2015).

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[85] Ann Hagen, *Anglo-Saxon Food & Drink* (Hereward: Anglo-Saxon Books, 2010), 262–263. About the seventh century evidence see J. D. Pheifer, *Old English Glosses in the Épinal-Erfurt Glossary* (Oxford: Clarendon Press, 1974), 50, 174. About the Exeter riddle see also Frantzen, *Food*, 167–168.

[86] For a summary see Myrdal, *Boskapsskötseln*, 142–145. The German finds are from Lübeck and Konstanz. From Novgorod, my interpretation is that what Kolchin assumes are "wooden rings" to support spoons are in fact two plungers from the thirteenth and fourteenth centuries. Kolchin interprets high and narrow staves as an indication of plunge churns, which is weak evidence. Myrdal, *Boskapsskötseln*, 143; Boris A. Kolchin, *Wooden artefacts from medieval Novgorod* (Oxford: B.A.R., 1989). In a follow-up publication this interpretation is repeated: Mark Brisbane, and Jon Hather, eds., *Wood use in medieval Novgorod* (Oxford: Oxbow, 2007), 140.

[87] Janken Myrdal, "Träföremål," in *Vardagsliv i en medeltida bondby. Fynd från Västannorstjärn i Leksand, Dalarna*, ed., Janken Myrdal (Leksand: Leksands kommun, 1984), 1–43.

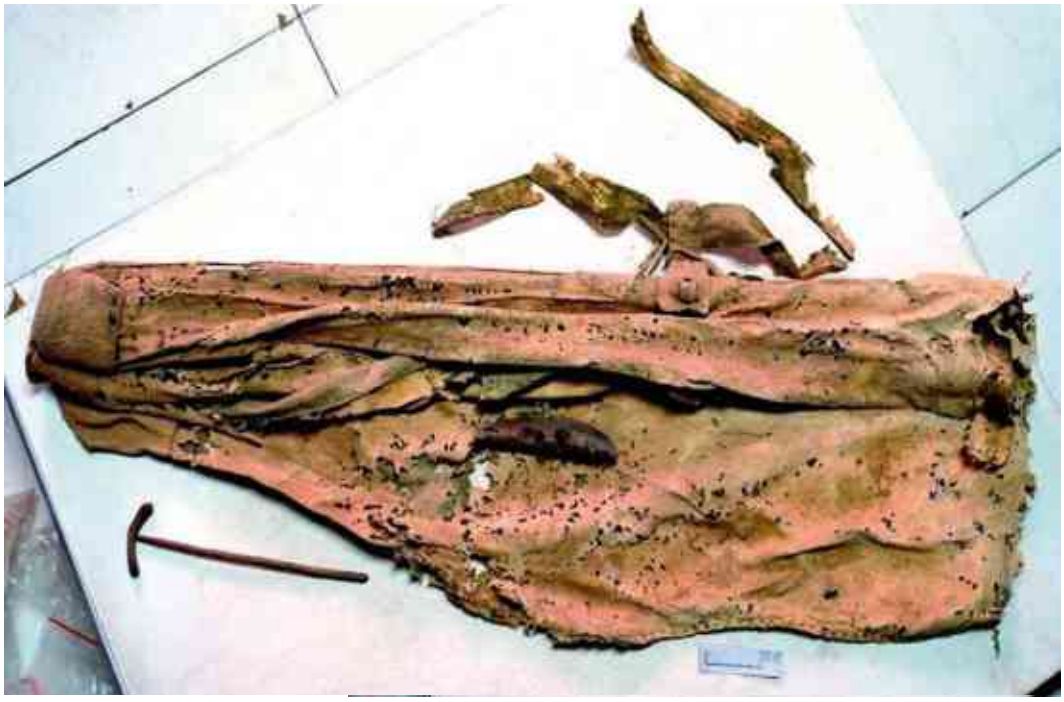
Figure 4. *The women from Gaochang, miniature. Object number TAM201:16. Now in the Xinjiang Uygur Autonomous Region Museum in Urümqi (photo: courtesy of Lü Enguo).*

Figure 5.
Detail showing the woman churning. The artist intends to show how big the churn is and how strenuous the work is – much koumiss (or butter) is made for the feast (photo: courtesy of Lü Enguo).

Decisive evidence is a small model of butter churning depicted in The Silk Road catalogue. It belongs to a whole group of women doing household chores. This group of clay models was found in Gaochang, on the route north of the Lop desert, northwest of Dunghuang and east of Turfan, in a tomb dated to 600–800 CE. The series includes four women and a baker's stone hearth. One of them grinds on a rotary grindstone, one is sifting flour, one is baking by rolling out the dough to form flat bread, and one is churning. Furthermore,

Figure 6.
The short staff to a plunge churn from Murtuk. From Stein, Innermost Asia.

Figure 7.
Staff to whip cream or sour milk, Late Bronze Age or Early Iron Age, Xinjiang (photo courtesy of Guo Wu).



the flat bread is baked on the stone hearth. The woman churning is holding a staff with both hands. The churn is a stave-built vessel and large; it reaches up to her chest. This is a plunge churn for butter or koumiss. The women prepare a feast, with bread and koumiss or butter, and as the catalogue explains, they "serve the dead in the underworld".[88]

Aurel Stein published a staff with a cross, found at Murtuk, just south of Turfan, and identified it as a "four-limbed wooden beater for churn (?)". The diameter of the cross is 15.5 cm. The staff is very short, only 15 cm.[89] This is a plunge churn on the verge of finding its perfect form. The working principle is there, plunging down into the liquid, but not the tall and narrow vessel that allows a larger amount of cream to be agitated efficiently. It was

[88] Susan Whitfield, ed., *The Silk Road: Trade, Travel, War and Faith* (Chicago: Serindia Publications, Inc., 2004), 328–329.

[89] Aurel Stein, *Innermost Asia: Detailed Report of Explorations in Central Asia, Kan-Su and Eastern Iran* vol. 1–4 (Oxford: The Clarendon Press, 1928), ibid., 2: 638, pl. 6.

found in ruin M B 1 and possibly dates to the eighth or ninth centuries.[90]

A third piece of evidence comes from Xinjiang. It shows a kind of T-formed implement, found together with a leather sack. The dating is from 1000 BCE–1CE (Late Bronze Age, Early Iron Age). It probably belongs to a type of churn where a staff is used to stir the cream or sour milk, so it is a whip churn and can be regarded as an alternative to the shake churn. In this respect it is a prototype, similar to the English examples from about the same period. I was told about this at the symposium "New perspectives on Early Medieval Silk roads", by Guo Wu, who then had already interpreted it as an implement to make butter.[91]

Interestingly this prototype has similarities with the English from about the same period or a little later, where the cream was whipped. However, differences in form indicate independent inventions, though the lack of evidence in intermediate areas makes this an assumption.

Early on, butter became an important commodity in Central Asia. From the third and fourth centuries a number of documents written on wood have been preserved at the Niya site.[92] Ghee, clarified butter, is often mentioned in these documents, mostly in relation to cows but also sheep and occasionally goats. Ghee was produced and transported in large quantities, as tax or payment, and was an essential part of luxury food products.[93] The documents give no hint as to how ghee was produced. Several wood implements have been preserved from this period (see Appendix), but no wood piece that can be identified as a part of a plunge churn. Ghee was produced with shake churns or by using the prototype just mentioned.

To summarize: *E silentio* reasoning is possible for the Tarim Basin during the first centuries of our era, with many finds of wooden items, but none of plunge churns. The plunge churn was rare or non-existent. Probably a prototype, a whip churn, existed, and the shake churn was in continuous use until the modern period in many areas. The plunge churn existed at least since around the eighth century, where we have one image and one archaeological artefact. The latter, the archaeological find, is interesting as it obviously is a plunger but not for a tall vessel, so this plunge churn had not yet achieved the perfect form.

Summarizing Eurasian evidence. A key conclusion is that both in the west of Eurasia (England) and in the centre/east prototypes existed long before the breakthrough of the plunge churn proper. The problem was an increased production of butter, and the solution was searched for in the same direction, by using various forms of staffs to stir the liquid.

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[90] Other finds from Murtuk are from the eighth to ninth centuries; see Whitfield, *The Silk Road*, 123.

[91] Guo Wu was kind enough to send me information about the find, with photos, dating and maps, and Michel Lee translated from Chinese. The wood piece on the leather sack does not belong to a churn; the holes do not go through. Similar pieces have been found in Niya, dated to the early part of the Common Era, but they seem to be too small to have had the same function, see Stein, *Innermost*, vol. 1, 153; 3, pl. 16.

[92] Whitfield, *The Silk Road*, 174. The documents have been translated by Thomas Burrow, *A Translation of the Kharoṣṭhi Documents from Chinese Turkestan* (London: The Royal Asiatic Society, 1940).

[93] Li Yanling, "The Study of agricultural production in the oasis kingdoms of the Western Regions in the third and fourth centuries: Case studies of the Shanshan Kingdom based on Kharosthi documents," *Eurasian Studies* 2 (2014), 222, 225 analyses the agricultural production in these documents and in a strange way regards livestock and ghee as not agricultural products. Indeed, these goods belonged to the core of agricultural products in the region.

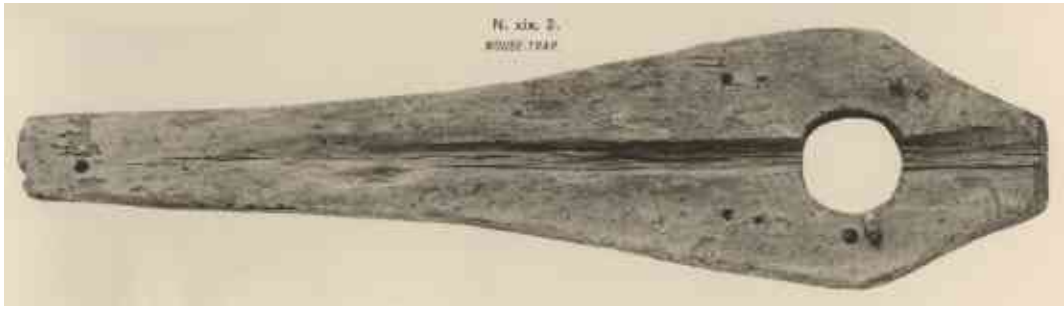

Figure 8a.
The wood piece, interpreted as a part of a mousetrap from Niya. Stein, Ancient Khotan.

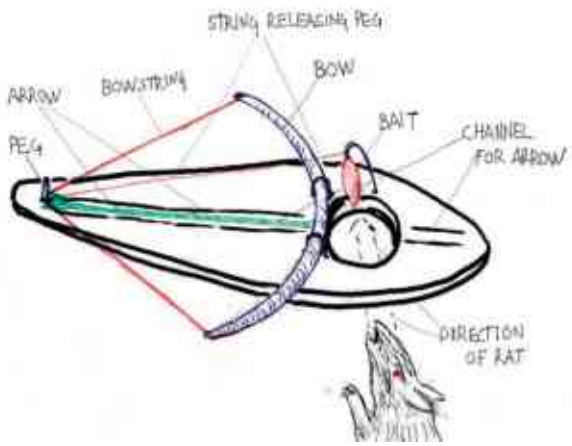

Figure 8b. *A reconstruction of the trap.*

However, the principle of plunging something down so that the liquid splashes up in a narrow container was probably not figured out until the second half of the first millennium of the Common Era.

In the west, images and archaeology demonstrates its use in the ninth century, which is confirmed by written sources. In the east images and archaeological finds show that the plunge churn was already used around the eighth century. The most probable scenario is that it was invented in Central Asia just before or in the eighth century and then spread fast, so that it existed around the southern North Sea coast in the ninth century. Less plausible is that we have very similar inventions in form and function that occurred in two widely separated places simultaneously. Besides the slightly earlier dating in Central Asia the not fully developed plunge churn, with very short staff, points at Central Asia as the region where the plunge churn originated.

The remaining question is how it spread, and the answer has to wait until we have more evidence from western Asia and eastern Europe.

The case of the plunge churn provides important contributions to a theory of technological change. When a problem is identified, prototypes will be developed. Eventually the "perfect" solution is found, after which the diffusion often can be extremely fast, and the implement then remains in use for a very long time practically unchanged.

Mousetrap

As pointed out in the theoretical section, a basic problem is understanding solutions not familiar to the scholar, and that is how my investigation of the mousetrap started. Susan Whitfield showed me a wooden piece found by Aurel Stein in Niya, dated to the second or third centuries. Stein wrote that the piece "was recognized by the men from Niya as a mousetrap, similar to those still in use, but I had no opportunity of ascertaining its arrangement".[94] It was found in an agricultural store room with remnants of threshing, grain and implements for handling the grain such as a pitchfork. Obviously, this mousetrap was meant to protect the grain.

As Stein did not ask how the trap functioned the question was: how was the rodent caught? As the locals had no reason to fool Stein we can assume that it is indeed part of a mousetrap. Its size indicates that the trap was intended for rats rather than mice.[95] I could identify it as a bow trap, but those I had seen from Scandinavia were intended for larger animals, not small rodents.

I made a reconstruction of the whole trap (Figure 8b). A detailed description is needed. The narrow end of the piece has a small hole for the peg that held the bowstring. This peg was connected to the bait and was released when the prey tried to take the bait. The bow was attached to the four small holes just before the round opening. The arrow was placed under the bow to run in the channel. The bait must have been placed over the opening (the diameter of opening is circa 5 cm), so that the rat had to insert its head to reach the bait. The small holes on the other side of the opening are for the device for the bait, and this device had a connection to the peg holding the bowstring.

The large bow traps I knew of plunged the arrow with great force towards an elk or a bear. These animals have a huge body mass and the arrow would hit them somewhere. In a bow trap for small prey the technical problem is to aim the arrow precisely. The solution to the problem in this specific trap is to force the rat to put its head into the opening, and functional details are the opening and the channel for the arrow.

I turned to HRAF, not in the first instance to map the distribution but to see if I could find a similar trap. A basic rule of all reconstructions is that evidence of equivalent technique somewhere strengthens the interpretation. I found three references to bow traps for rodents. One of them was an exact equivalent to my reconstruction.

The evidence comes from the Ainu people, now living on the island Hokkaido in northern Japan, but formerly inhabiting a larger region. The trap uses an arrow with a straight edge to decapitate the rat. John Batchelor, who had personal experience of this trap, explained its function in a book from the 1920s. The bait is in a small chamber, and the rat has to put its head into a hole to reach it. An arrow with a straight edge is released when the rat has its head inside the chamber, cutting off its head. Batchelor wrote about the efficiency of the trap: "There is no noise made by the animal. I have taken as many as seven, one after the other, in the course of one evening, and found another caught in the morning". Rats are suspicious and rather intelligent, so they avoid traps if they can see other rats being caught,

[94] Aurel Stein, *Ancient Khotan: Detailed Report of Archaeological Explorations in Chinese Turkestan*, vol. 1 (Oxford: The Clarendon Press, 1907), 376, 412.

[95] The piece of wood had dried and cracked over the years, and I used the photo in Stein's publication from 1907 for my reconstruction: Aurel Stein, *Ancient Khotan*, vol. 2, pl. 53; Whitfield, *The Silk Road*, 178.

and Batchelor remarked that it was a bad plan to allow other rats to see a guillotined rat.[96] The Ainu people used many bow traps, but most were used for larger prey and this is the only one for rats.

The Niya trap functions best when the arrow has a straight edge, but it could also have had a pointed edge. Stein has not reported arrowheads from Niya, but from a number of other sites in the region, and none of them had a straight edge – they are all pointed.[97] However, the basic functioning is the same: the head of a rat, positioned in a hole, was hit by an arrow running in a channel, and the rat was immediately killed.

The other two traps mentioned in HRAF are from the Malay peninsula and north-eastern India, and they are of a different type. *It cannot be overemphasized that two implements superficially resembling each other, but utilizing different principles for technical solutions, are separate implements.* Diffusion is ruled out.

As already mentioned I reject the simplified idea of "stimulus invention". The idea of making a bow trap for small prey is not something that must be taught from the outside. However, the specific solution to the problem of making the arrow hit precisely is a technique that can be learnt from other people, and therefore spread.

Details are again of importance. Richard Winstedt wrote in the 1920s about the Malay people and their hunting and trapping, and he described several traps. One rat trap consisted of a bamboo tube, with a hole, which allowed the rat to take the bait inside the tube. A bow was arranged to fire an arrow to hit the rat from behind when it took the bait. Other similar traps hit the rat from the side. A bow could also be arranged without bait, as the arrow was released when the rat ran along a large split bamboo cane.[98]

The Lepcha inhabit the Himalayas in Sikkim and Darjeeling. They have a number of rat traps, one of them a small bow trap. The rat is lured into a bamboo tube, which is closed at the other end, and when the bait is taken the arrow is released.[99]

In this type of trap, the solution to the problem with hitting a small prey is to lure the rat inside a tube where it cannot move to the side and having an arrow aimed at the open side of the tube. There is no channel for the arrow and no hole for the head of the rat. This type was invented in and spread in southern Asia.

The next step in the investigation is mapping the distribution. There are a number of ways to get rid of rats, and the types discussed here were uncommon. HRAF indicates that a common trap in Asia was the dead-fall trap, where a weight falls onto the prey. This is easy to construct but rather inefficient. Also used were snares to strangle them, torsion to crush them and cages to catch them. Other means used were poison, drowning, training dogs and cats to kill them and even hunting them with clubs.

For Europe and North America information from HRAF can be complemented with a rather rich literature, largely because mousetraps are collectibles. Several devices were in

[96] John Batchelor, *Ainu Life And Lore: Echoes Of A Departing Race* (Tokyo: Kyobunkwan 1927), 84.

[97] Stein, *Innermost*, vol. 3, pl. 23, 47, 111. Arrows with a straight edge did exist in regions around the Tarim Basin, and are known for instance from Mongolia; see Lucien-Jean Bord, and Jean-Pierre Mugg, *L'arc des steppes: Étude historique et technique de l'archerie des peoples nomads d'Eurasie* (Paris: Gerfault, 2005), 64–65.

[98] Richard Winstedt, *Fishing, Hunting and Trapping*, Papers on Malay Subjects. Malay Industries, pt. 2. (Kuala Lumpur: J. E. Wallace at the F. M. S. Govt. Press, 1929), 37.

[99] René de Nebesky-Wojkowitz, "Hunting And Fishing Among The Lepchas," *Ethnos* 18 (1953): 26.

use. Dead-fall traps were common, as were cages that fell over the prey. A trap that seems to be specific to the West was the bucket trap, in which a tilting ramp leads the rodent to fall into a container filled with water.

The currently ubiquitous trap, well known to all readers, is the snap trap. It was developed around 1900, and is a good example of new goals being added to an implement. A steel wire releases a spring-loaded striker, a bow that hits the rat's neck and breaks it. It does not cause any sticky mess of blood, and the rodent can easily be removed without being touched by humans. The snap trap can also be hidden out of sight of humans, in a way that other traps, such as a cage trap, cannot. This was a trap for an urbanized population with a new demand for cleanliness.[100]

Compared with all other pre-industrial types the small bow trap is efficient though complicated to construct. It also required more monitoring as the killed rat should be removed immediately.

The limitation of the HRAF database is that though much literature is included just a small fraction of all anthropological publication has been encompassed. An unusual type, such as this mousetrap gives few data. I turned to library research, reading the literature on hunting and traps, going from reference to reference. I soon came across renowned scholars: Sture Lagercrantz and Béla Gunda.

It turned out that bow traps had received some scholarly attention. Sture Lagercrantz summarized the discussion and also presented an overview of the spread of the bow trap in Eurasia.[101] He had identified the Niya trap as a bow trap, nearly sixty years before I did.[102] He called it a "crossbow trap". In his typology a fundamental distinction is made between large traps where the bow is shooting at distance, and smaller short-range traps. The former is probably the older and it is spread over most of Afro-Eurasia: Europe, northern Central Asia, Siberia, China, South East Asia, east and west Africa.

The type discussed here had a distribution from Japan to Russia, and was different from the short-range bow traps in South East Asia.[103] This confirmed the few references in HRAF. Even before Lagercrantz, the Hungarian ethnologist Béla Gunda discussed the Niya-type bow trap and traced its distribution from Japan to Hungary.[104] The type thus had a distribution along the Silk Road. Maybe it was well suited to cultures where grain was precious, and it was also easy to take on journeys. Most other mousetraps were less well designed and often of temporary nature.

Turning to historical evidence I do not know of any written evidence or images. We only have the archaeological wood pieces from the Tarim Basin. Here, on the other hand, this type of trap seems to have been common. In a publication from 1928, twenty years after his first about Niya, Stein presented three more mousetraps.[105] Four pieces among

[100] For an overview of modern research see Joachim L Dagg, "Exploring mouse trap history," *Evolution: Education and Outreach* 4.3 (2011): 397–414.

[101] The chapter "Crossbow traps" in Sture Lagercrantz, *Contribution to the Ethnography of Africa* (Uppsala: Studia Ethnographica Upsaliensia, 1950).

[102] Lagercrantz, *Contribution*, 114.

[103] Lagercrantz, *Contribution*, 112–117.

[104] Béla Gunda, "Die Armbrustfallen in Nordasien und ihre ethnologische Bedeutung," *Ethnos* 5:1-2 (1940): 35–53.

[105] Stein, *Innermost*, vol. 1, 150, 153; vol. 3, pl. XVI, Pl XXVI, and Aurel Stein, *Serindia: detailed report of*

the wood finds is quite considerable. An interesting detail is that two of these pieces have owner's marks,[106] which are uncommon among the wood finds depicted in Stein's publications. These mousetraps represented a value because making such a trap required skill and they must have been relatively expensive.

When and where this mousetrap was invented eludes our knowledge, but nevertheless it is one of the clearest examples we have of technology that spread along the Silk Road.

Conclusions

The theoretical introduction started with a discussion about large and small, with the intention to show that the difference is not absolute. Large inventions must be developed, and when they are transformed from inventions to innovations they will be a part of a technological complex of interrelated technological elements. Never just one invention (or a few) forms the single hub of a technological complex, and in fact a major invention in itself consists of a combination of details. From this the idea of the detail was explored and explicated, with reference to French scholars.

Technological change follows certain paths, and is at the same time extremely variable. To understand a specific solution, one has to investigate the "functional detail". This term refers to a detail of an implement or method on which human creativity is focused.

"Stimulus" diffusion has been discussed and basically rejected, at least in its more simplified form. To be clear: I doubt that "stimulus" from a general idea can directly lead to individual inventions. Stimulus exists in a general sense, but on the level of thought systems regarding the mundane and also ideology such as religion.

In the methodological section rules have been set up for investigating diffusion. Superficial resemblance, and that a technique appears in one part of the world and later in far distant place is not enough proof of diffusion. Three steps in an investigation of diffusion have been proposed. 1. To identify the technical details, which is not least important when comparing innovations from different regions; 2. To map the spatial distribution, to see whether it is continuous, as this may indicate diffusion; 3. To find historical evidence in written records, images or archaeology.

Extension of an innovation is not always continuous. Sometimes innovations can "jump" over long distances, such as the winnowing machine that spread from China to Sweden in the eighteenth century. The prerequisite is a well-established contact, and in this case, it was the Swedish East India Company, trading with China in the eighteenth century, which gave opportunity for an innovation jump.

The three examples elucidate different aspects of the theory and the method.

The wheelbarrow (and the one-wheeled cart) was chosen to illustrate that proof of

explorations in Central Asia and westernmost of China vol. 4 (Oxford: Clarendon Press, 1921), pl XIX. The three traps are: N.III.x01, N.III.x.08 and N.XLV.01, and the trap published 1907 has catalogue number N.III.X.09. Regarding the latter Stein suggested that a hole in one end was for fastening it to the ground, which is certainly wrong, because then the rat would not be able to stick its head into the larger hole. The trap had to be placed above the ground.

[106] One has a five-pointed star, the other has two marks, one a Swastika-like sign and the other rhomboid-formed with a line. An alternative interpretation is that these are magic signs to protect the implement and make it more efficient. However, that would also imply that these traps were loaded with extra value.

nonexistence of diffusion is at least as important as the opposite. The wheelbarrow, with a wheel instead of a man at one end, is a simple invention, made and abandoned several times in history. General spread only occurred in two separated regions, East Asia and Europe. The breakthrough in Europe came long before direct trade between these regions, and an innovation "jump" is less likely. In Europe the wheelbarrow proper remained an expensive technology and was for a long time related to large construction sites, such as cathedrals.

The butter churn can be counted among large inventions, because it facilitated the production of one of the most important products in many regions: butter. I present an earlier study, which is combined with new evidence. One important finding was that prototypes, with staffs to whip the liquid, were developed in the West (i.e. England) and in the East (i.e. Central Asia) before or around the beginning of the Common Era. After many hundred years of such attempts a new principle was invented: the liquid was made to splash up in a narrow vessel when a staff with a disc or a cross was plunged down. This was a perfect solution (still used), and it spread extremely fast. In the ninth century it existed from the North Sea to Central Asia. Probably it originated in Central Asia, which underlines that technological inventiveness was not restricted to Europe or China.

In Europe, the further spread can be followed. After a first breakthrough around the North Sea it soon became common in all parts of western and northern Europe where butter was produced for sale.

The last example is that of a well-designed mousetrap, which kills the prey immediately and can be used several times repeatedly. Again, analysis of the functional detail and spatial spread is crucial for the interpretation. This type of trap had a spread along the Silk Road, from Hungary to Japan, and presumably it was connected to cultures where grain and other food had to be carefully protected. The earliest, and so far, only, historical evidence is from the Tarim Basin, where it was already a common device in the first centuries of the Common Era.

These examples also illustrate the necessity of discussing the introduction of an innovation in context. In Europe, both the wheelbarrow and the plunge churn were parts of the huge economic leap forward in 1000–1300 CE. The plunge churn made production for a growing market more efficient. The wheelbarrow was being used on enormous building sites, such as the erection of cathedrals. It was also used in an expanding mining industry that served a fast-growing trade with iron and other metals. The same kind of contextualization is relevant to the wheelbarrow in China and the plunge churn in Central Asia.

One of the cases, the plunge churn, opens for an understanding of the development process. Throughout cultural history humans have encountered problems to be solved. It can be an increased demand for and production of a good, such as butter, or new fields taken into cultivation for which prevailing implements were not designed. Instead of The Invention solving such problems coming at once we have to conceive it as a much longer process. Different solutions, "prototypes", are tested but often with restricted success. However, when a "perfect" solution emerges, suited to a specific cultural and technological context, it can spread very fast. The invention of solutions, from the prototypes to the perfect form, can be separated by hundreds of years. The pace increases with a growing population and specialization, but even today some technological solutions remain surprisingly constant, such as the basic form of a car or an aeroplane. In pre-industrial society, a perfect

solution could persist for hundreds of years, not because of conservatism, but because it was functional. It must be added that more than one "perfect" solution could emerge, for example the plunge churn in much of Eurasia and the drill churn in South Asia.

A number of other examples could be listed, such as the rake and the wheel plough, and from modern times the bicycle, for instance. This indicates that the stepwise process here described could be the typical way of technical change.

Appendix – Wood archaeology in Eurasia, especially Europe

In the text, I use *e silentio* reasoning, which calls for the presentation of all the finds. There is a further reason for including this Appendix. It is well known that excavations yielding wood artefacts are important for our understanding of material culture,[107] so I want to give an instrument to archaeologists and world historians researching the history of everyday life. I also hope that this could be an inspiration for a renewed interest in wood in archaeology.

This survey does not include America, and it covers wood archaeology from 500 BCE to 1500 CE, so for instance the famous finds from Neolithic lake villages in Switzerland are excluded.[108] A category that I have not addressed is ship-wrecks, which are rather common from the classical to modern periods.[109] Other organic materials such as textiles and leather (e.g. shoes) have been left aside, though they are the subject of important research, often using natural science methods. The list below includes sites with much wood, and I do not mention excavations where only a few wooden objects have been found.

Three regions stand out when it comes to preserved wooden finds: Egypt, the Tarim Basin and north-western Europe. Archaeological wooden objects certainly have been preserved outside these regions, and a search in the HRAF archaeology database provides a number of excavations with much wood. In Japan, waterlogged sites from 300 BCE to 300 CE (the Yayoi period) yielded a lot of wooden objects, including spades and hoes.[110] Some nomadic graves from north of the Black Sea c. 700–300 BCE, and also in frozen ground in Northern Siberia c. 500–200 BCE, have yielded organic material, such as bowls and harness details.[111]

Egypt and the classical world: My text mainly deals with the East–West axis in Eurasia, and I have not used the rich finds from Egypt. Nearly all these are from graves, and an important part are miniature models depicting everyday activities. The literature is quite

[107] Bryony Orme, *Anthropology for Archaeologists* (London: Duckworth, 1981), 38–40 presents an illustrative comparison. One picture shows fishing equipment: a spear, fishing net, etc. In all it comprises nine different pieces. The next picture shows what is left when all organic material has disappeared: two small iron pieces and decorative beads.

[108] For overviews about wood artefacts during all of prehistory see for example, Colin Renfrew, and Paul Bahn, *Archaeology: Theories, Methods, and Practice*, 2nd ed., (London: Thames and Hudson, 1996), 55–66. Grahame Clark, *Archaeology and Society*, 3rd ed. (London: Methuen, 1957), chapter 3 about "survival of evidence"; Ibid., 74–106, has a still quite useful methodological reasoning.

[109] Writing about ship-wrecks is a genre of its own, with both popular and scholarly books.

[110] http://ehrafarchaeology.yale.edu/ehrafa/, with several cited works, such as, Aikens C. Melvin, and Takayasu Higuchi, *Prehistory of Japan* (New York: Academic Press, 1982), 214.

[111] Tamara Talbot Rice, *The Scythians* (London: Thames & Hudson, 1957); Sergej Ivanovič Rudenko, *Frozen tombs of Siberia: the Pazyryk burials of Iron Age horsemen* (London: Dent & sons, 1970).

rich.[112] Mediterranean archaeology is a huge field of research, and some wood has been found. A large collection of furniture and household items comes from Herculaneum, Italy, buried by a volcanic eruption in 79 CE.[113]

Central Asia: Here I rely mainly on Aurel Stein's comprehensive publications, and on the impressive catalogue of the Silk Road exhibition. There is also a publication about Keriya, which Susan Whitfield told me about when I asked about wood artefacts.[114] A comprehensive survey of excavation reports where wooden objects have been recovered remains to be done and has to be written by someone with knowledge of at least Russian and Chinese.

Some specific objects have been researched, especially bows and arrows,[115] but many objects are waiting for a scholarly treatment. Among the finds are wooden keys, implements for handling grain after threshing (including shovels and many of the brooms), textile equipment, furniture, etc. An interpretative survey would be a major contribution to the world history of everyday life.

Northern and western Europe: The main part of my review is about northern and western Europe. Archaeologists have been somewhat reluctant to work with this material, as the interpretation of the finds is demanding. The wealth of forms is rich and many tools with separate functions have similar appearances. A detailed knowledge of recent folk culture is a necessity.[116] After a peak in the 1980s, interest in wooden objects waned.

An example is the *Ruralia* series, the publications from conferences on rural archaeology, in which objects of wood are almost never mentioned. *The Archaeology of medieval Europe*, a research overview in two volumes, has a few entries mentioning wood and a short section is concerned with this.[117] There is certainly research on objects such as wagons,

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[112] See for instance Geoffry Killen, *Egyptian Woodworking and Furniture* (London: British Library, 1994); Mogens Jørgensen, *Tomb treasures from Ancient Egypt* (Copenhagen: Ny Carlsberg Glyptotek, 2002).

[113] Roger B Ulrich, "Woodworking," in *The Oxford handbook of engineering and technology in the Classical world*, ed., John Peter Oleson (Oxford: Oxford University Press, 2008), 439–465. Eva Rystedt helped me with references about the Classical World.

[114] Stein, *Ancient Khotan*; Stein, *Serindia*; Stein, *Innermost Asia*; Whitfield, *The Silk Road*; Corinne Debaine-Francfort, and Abduressul Idriss, eds., *Keriya, mémoires d'un fleuve: archéologie et civilisation des oasis de Taklamakan* (Suilly-la-Tour: Findakly, 2001).

[115] Andrew Hall, and Jack Farell, "Bows and arrows from Miran, China," *The Society of Archer-Antiquaries* 51 (2008): 89-98; Michaela R Reisinger, "New Evidence about composite bows and their arrows in Inner Asia," *The Silk Road* 8 (2010): 42–62. The bow/arrow finds are from the Tarim Basin and western Mongolia, and the discussion concerns small details, which is possible when wood finds are available. Vehicles have also been studied, see for instance Bryan Miller, "Vehicles of the steppe elite: Chariots and carts in Xiongnu tombs," *The Silk Road* 10 (2012): 29–38.

[116] HRAF is incomplete for Europe, but I have made a map where major works on the material culture have been laid out according to the regions they cover, see Janken Myrdal, "The perfect," 7. In this article I also discuss the methods for comparing anthropological with archaeological sources regarding objects.

[117] James Graham-Campbell and Magdalena Valor, eds., *The Archaeology of Medieval Europe*, vol. 1 *Eighth to twelfth centuries AD;* vol. 2 *Twelfth to Sixteenths Centuries* (Aarhus: Aarhus University Press, 2007–2011). Wooden implements and furniture are mentioned in vol. 1, 82, 161–4. 176–7, 190–2, 238, 245–248, 280, 308 and vol. 2, 191, 194–6, 212. The section about wood is John Hather "Wooden artefacts," *The Archaeology of Medieval Europe*, vol. 1 *Eighth to twelfth centuries AD*, ed., James Graham-Campbell, and Magdalena Valor (Aarhus: Aarhus University Press, 2007), 246–247.

where wood finds have been presented in detail.[118]

Britain and Ireland 500 BCE–1000 CE: Caroline Earwood has written a general overview of domestic wood items in Britain and Ireland, published in 1993 and reprinted in 2006. An earlier catalogue of sites with wood in Ireland and Britain was published in 1978.[119] Glastonbury in south-west England has a great deal of wood from c. 200 BCE to 100 CE, published as early as 1911.[120] These finds were later partly republished and discussed by Caroline Earwood.[121] Another settlement with wood is Stonea, dated to c. 100–400 CE, with for instance a spade and a rake.[122] Vindolanda in Scotland is from the same period but mainly with wood from building constructions.[123]

From Ireland, wetland sites called crannogs have yielded wood. One site with a large number of wooden objects is Lagore from the seventh to tenth centuries and another is Ballinderry from the seventh century.[124]

The Continent 500 BCE–1000 CE: In 1923 Paul Vouga published wooden finds from La Tène, dating from the fifth to the first centuries BCE in western Switzerland, including shafts to scythes.[125] A famous settlement in Poland is Biskupin, dating from the eighth and seventh centuries BCE (thus slightly before the period covered here). Most of the wood is from buildings but there are also some implements and household utensils.[126]

Along the southern coast of the North Sea wooden artefacts have been recovered, especially from settlements in the marshland. The most important early settlement is Feddersen Wierde in north-western Germany, dated to 100 BCE–500 CE. The excavation was published by Werner Haarnagel. From the Netherlands, several settlements with smaller amounts of wood have been described in publications by van Giffen.[127]

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[118] For wagons and other vehicles see: Per Ole Schovsbo, *Oldtidens vogne i Norden: arkæologiske undersøgelser af mose- og jordfundne vogndele af træ fra neolitikum til ældre middelalder* (Odense: Odense Univ., 1987).

[119] Earwood, *Domestic*; J M Coles, S V E Heal, B J Orme, "The use of and character of wood in prehistoric Britain and Ireland," *Proceedings of the prehistoric society* 44 (1978): 1–45.

[120] Arthur Bulleid and Harold St. George Gray, *The Glastonbury lake village: a full description of the excavations and the relics discovered, 1892–1907*, vol. 1 (Taunton: The Glastonbury Antiquarian Society, 1911). Objects of wood are described from page 310.

[121] Earwood, "Wooden containers and other wooden artifacts," 83–90.

[122] R. P. J. Jackson, and T. W. Potter, *Excavations at Stonea Cambridgeshire 1980–1985* (London: British Museum, 1996).

[123] Ulrich, "Woodworking," 444.

[124] Hugh Hencken, "Lagore Crannog: An Irish royal residence of the 7th to 10th century AD," *Proceedings of the Royal Irish Academy*, vol. 53, section C, no. 1 (Dublin, 1950-1951), 1–247, for wooden objects see pages 151–164; H. Hencken, "Ballindery crannog 1," *Proceedings of the Royal Irish Academy*, vol. 43, section C, no 5 (London, 1936–1937), 103–239, for wooden objects see pages 110–141; H. Hencken "Ballinderry crannog 2," *Proceedings of the Royal Irish Academy*, vol. 47, section C, no. 1 (Dublin, 1941–42),1–76; for wooden objects see page 58 and forward.

[125] Paul Vouga, *La Tène: monographie de la station* (Leipzig: Karl W. Hiersemann, 1923). Wooden objects from about the same period have been recovered in the salt and copper mines in Austria, but these finds are dated to a very broad period, from the Bronze Age to the third century BCE.

[126] Zdzislaw Rajewski, *Biskupin Polish Excavation* (Warsaw: Polonia, 1959).

[127] Werner Haarnagel, *Die Grabung Feddersen Wierde: Methode, Hausbau, Siedlungs- und Wirtschaftsformen sowie Sozialstruktur* (Wiesbaden: Steiner, 1979). Regarding van Giffen, see M. Bierma, "Bibliography of the published works of AE van Giffen," *Palaeohistoria* 15 (2016): 15–34. One example is A.E. van Giffen, "Iets over terpen," *Derde Jaarverslag van de Vereeniging voor Terpenonderzoek* (Groningen, 1918), where he pre-

In southern Scandinavia, a few hoards with offerings contain many wooden objects: Nydam and Thorsbjerg in Jutland, Vimose on Fyn in Denmark, and, Sweden. The first three sites mainly contain weapons, but also spades, axes, a large rake for tillage, etc. The fourth site has only everyday objects, such as hay-rakes and household items. The Danish sites, from Jutland and Fyn, were excavated in the nineteenth century and excavation circumstances are not totally clear, but they have been dated to c. 100–500. The Swedish find, in Halland, was excavated later and is well dated to c. 200–300 CE.[128]

An important collection of household items and furniture, found in graves at Heidenheim an der Brenz in southern Germany, is dated to c. 500–700.[129]

A most interesting combination of a village and a town with much wood is from the Viking Age in southern Jutland. The village is Elisenhof, in south-western Jutland on the coast. Many objects of wood had been preserved, dated to c. 700–1000, including plungers for churns, and rakes and spades.[130] The contemporary town Haitabu on the eastern side of southern Jutland has very rich wooden material, and many of the finds have been published.[131] From the same region and period Grith Lerche has published spades found in fortifications and graves.[132]

Wooden objects have been recovered in some Slavonic fortifications, in north-eastern Germany: Gross Raden; Behren Lubchin; Grodich. The finds are dated to the tenth century.[133]

Finally, we have the famous Oseberg and Gokstad ship burials in southern Norway, dated to the ninth century, with rich grave goods intended for the afterlife including household utensils of various kinds.[134] Other ship burials from the second part of the first mil-

sented finds of a spade and other objects.

[128] The Danish finds were published in the 1860s and have been republished with informative introductions by Mogens Ørsnes: Conrad Engelhardt, *Sønderjyske og fynske mosefund*, vol. 1–3 (København: ZAC, 1969–1970). Vol. 1 is on Thorsbjerg, vol. 2 on Nydam, and vol. 3 on Kragehul and Vimose. The publication about the excavation in Sweden is Holger Arbman, *Käringsjön: studier i halländsk järnålder* (Stockholm: Wahlström & Widstrand, 1945).

[129] Peter Paulsen, and Helga Schach-Dörges, *Holzhandwerk der Alamannen* (Stuttgart: Kohlhammer, 1972).

[130] Mátyás Szabó, et al., *Die Holzfunde*.

[131] Kurt Schietzel, "Hölzerne Kleinfunde aus Haitabu," in *Das archäologische Fundmaterial der Ausgrabung Haithabu. 1, 1963–1964*, ed., Torsten Capelle (Neumünster: Wachholtz, 1970), 77–91 and with a different selection of items Florian Westphal, *Die Holzfunde von Haitabu* (Neumünster: Wachholtz, 2006).

[132] Grith Lerche, "The spades from Dannevirke and Jelling," in *Folk & farm*, ed., Caoimhín Ó Danachair (Dublin: Royal soc. of antiquaries of Ireland, 1976), 110–126.

[133] Ewald Schuldt, *Behren-Lübchin: eine spätslawische Burganlage in Mecklenburg* (Berlin: Akademie-Verlag, 1965); Ewald Schuldt, and Manfred Jährig, *Gross Raden. Ein slawischer Tempelort des 9./10. Jahrhunderts in Mecklenburg* (Berlin: Akademie-Verlag, 1985); Heinz-Joachim Vogt, "Altslawische Ackerbaugeräte vom Gelände des Burgwalles 'Grodisch' in Wiesenau Kr. Eisenhüttestadt," *Veröffentlichungen des Museums für Ur- und Frühgeschichte Potsdam* 10 (1976): 205–220. The dating of these finds is somewhat controversial, with suggestions of rather early dates, but Joachim Henning has, with good arguments, dated them to around the tenth century; see Joachim Henning, "Archaäologische Forschungen an Ringwällen in Niederungslage," in *Frühmittelalterlicher Burgenbau in Mittel- und Osteuropa*, ed., Joachim Henning, and Alexander T. Ruttkay (Bonn: Habelt, 1998), 9–29. Henning also helped me with references regarding wood archaeology in Germany.

[134] Sigurd Grieg, "Kongsgaarden," in *Osebergfundet*, vol. 2 (Oslo: Den Norske Stat, 1928); Sigurd Grieg, *Gravkamrene fra Oseberg og Gokstad* (Oslo: Norsk arkeologisk selskap, 1937); Nicolay Nicolaysen, *Langski-*

lennium, such as Sutton Hoo in England and Årby in Sweden, have only a small number of wooden objects.

Northern and western Europe 1000–1500 CE: From the period after 1000 CE we have a number of towns with wood finds. Normally the lower layers are better preserved, so finds from c. 1000–1300 dominate, especially for organic materials. Wooden objects from the fifteenth century are rarer and from later periods nearly non-existent. Rural sites are less well represented.

Starting in the east, many wooden items have been preserved from Novgorod in north-western Russia. They are published by Kolchin in a volume translated into English in 1989, and this publication was followed up by an anthology nearly twenty years later, but discussing mainly the same finds.[135]

Scandinavia has a fair number of recovered medieval wood artefacts. For Norway, an extensive chapter about wood from medieval Oslo was written by Birthe Weber in 1990. Bergen also has much wood, but only specific groups of objects have been researched and published; the most important is by Ingvild Öye on textile equipment.[136]

In Sweden excavations in a number of towns have revealed wooden objects, and some objects have been published, mainly from Lund and Lödöse.[137] I have gone through most of the unpublished material and published the finds relevant for my research on agriculture. Later when working on the history of the cheese I sent a questionnaire to Swedish medieval archaeologists asking about moulds for hard cheese (the earliest were from the thirteenth century). [138]

An important find comes from a village in Dalarna, in mid-Sweden: Västannortjärn, with a considerable amount of wooden objects from the twelfth and thirteenth centuries.[139] Cattle were of importance here (as in Elisenhof), with finds of rakes and low stave-built vessels for milk, but no plungers to butter churns. (Low and wide vessels were common in Västannortjärn, so cream could more easily be skimmed, and they indicate that skimming of cream from milk probably was an important activity.)

In Denmark also, several medieval towns have wooden finds, but these finds remain

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bet fra Gokstad ved Sandefjord: The Viking-ship discovered at Gokstad in Norway (Kristiania: Cammermeyer, 1882).

[135] Kolchin, *Wooden Artefacts*; Brisbane, and Hather, *Wood Use*.

[136] Birthe Weber, "Tregjenstander," in *De arkeologiske utgravninger i Gamlebyen, Oslo*, vol 7, *Dagliglivets gjenstander*, ed., Gerd Færden, Erik Schia, and Petter B. Molaug (Oslo: Universitetsforlaget, 1990), 11–180; Ingvild Øye, "Textile equipment and its working environment, Bryggen in Bergen c 1150–1500," in *The Bryggen papers*, vol. 2 (Bergen: Bergens Univ., 1988). When I discussed the Norwegian research on wood archaeology with Øye she also mentioned publications about medieval ships, but in this survey, I have excluded the rather rich literature on shipbuilding.

[137] Ragnar Blomqvist, and Anders W. Mårtensson, *Fynd från Ultima Thule: en berättelse om vad grävningarna för Thulehuset i Lund avslöjade* (Lund: Kulturhistoriska museet, 1963); Anders Mårtensson, and Claes Wahlöö, *Lundafynd: en bilderbok* (Lund: Kulturhistoriska museet, 1970); Rune Ekre, Carl Hylander, and Rolf Sundberg, *Lödösefynd: ting från en medeltidsstad* (Lödöse: Stödföreningen för Lödöse museum, 1994).

[138] Myrdal, *Medeltidens åkerbruk*, 172, 183–4, 191; Myrdal, *Boskapsskötseln*, 123–126; Janken Myrdal, "Ostar på medeltiden," in *Biskop Brasks måltider: svensk mat mellan medeltid och renässans*, ed., Magnus Gröntoft, et al (Stockholm: Atlantis, 2016), 238–257.

[139] Janken Myrdal, "Träföremål".

mostly unpublished. An exception is Viborg in northern Jutland.[140] A rural site is castle Boringholm in eastern Jutland, where several wooden items from the fourteenth century were recovered.[141]

In England, a large number of wooden objects were found in York, and Carole Morris, in her publication of the finds in 2000, also mentions other medieval towns in Britain where wooden objects have been found, such as Southampton, as well as Dublin in Ireland.[142]

From Germany and surrounding regions, a number of publications mention wood from different towns – in northern Germany, from[143] Schleswig,[144] Wismar,[145] Lünenburg,[146] and Höxter.[147] In the Netherlands, from Amsterdam.[148] In southern Germany, from Heidelberg,[149] Freiburg and Konstanz.[150] Barbara Scholkman presented wooden finds from several towns in southern Germany and Switzerland: Basel, Wurzburg and Strassburg. In this article she also recorded wooden finds dated to the fourteenth and fifteenth centuries from a rural settlement in Sindelfingen just south-west of Stuttgart.[151] Most of these towns and the rural site yielded a significant but limited number of wooden objects, but there are exceptions, such as Heidelberg with a considerable number of objects, for instance a typologically important find of a rake.

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[140] Fredrik Callesen, Jesper Hjermind, and Morten Søvsø, "Genstande af trae," *Viborg Søndersø 1018-1300: arkeologi og naturvidenskab i et værkstedsområde fra vikingetid*, ed., Mette Iversen et al. (Højbjerg: Jysk Arkæologisk Selskab, 2005), 439–456, with further references. Lars Agersnap Larsen helped me with literature about Denmark.

[141] Jan Kock, and Jan Roesdahl, eds., *Boringholm: en østjysk træborg fra 1300-årene* (Højbjerg: Jysk Arkæologisk Selskab, 2005).

[142] Morris, *Craft, industry*. Among other texts about artefacts of wood can be mentioned, for example, Derek Kerne, "Wood working: The use of wood in medieval Winchester," in *Artefacts from medieval Winchester. Vol 2: Object and economy in medieval Winchester*, ed., Martin Biddle (Oxford: Clarendon, 1990), 270–273.

[143] W. Neugebauer, "Arbeit der Böttcher und Drechsler aus den mittelalterlichen Bodenfunden der Hansestadt Lübeck," in *Rotterdam papers: a contribution to medieval archaeology. Vol 2: Teksten van lezingen, gehouden tijdens het symposium 'Woning en huisraad in de middeleeuwen'*, ed., J. G. N. Renaud (Rotterdam, 1975); Alfred Falk, "Holzgeräte und Holzgefässe des Mittealters und der Neuzeit aus Lübeck," *Zeitschrift für Archäologie des Mittealters* 11 (1983): 31–48.

[144] Ingrid Ulbricht et al., *Holzfunde aus dem mittelalterlichen Schleswig* (Neumünster: Wachholtz, 2006).

[145] Rita Buchholz, "Die Holzfunde aus einer Schwindgrube beim Wismarer Beguinenkonvent," *Wismarer Studien zur Archäologie und Geschichte* 4 (1994): 62–89.

[146] Friedrich Laux, "Holzgeschirr und Holzgerät aus Lünenburger Schwindgruben," *Zeitschrift für Archaäologie des Mittelalters* 10 (1982): 85–100.

[147] Hans-Georg Stephan, "Beiträge zur archäologischen Erforschungen der materiellen Kultur des hohen und späten Mittelalters im Weserbergland: Funde aus zwei Kloaken in der Altstadt von Höxter," *Neue Ausgrabungen und Forschungen in Niedersachsen* 17 (1986): 219–308.

[148] Jan M Baart, "Mittelalterliche Holzfunde aus Amsterdam: Der Zusammanhang zwischen Holzart und Geräteform," *Zeitschrift für Archäologie des Mittelalters* 10 (1982): 51–62.

[149] Sascha Schmidt, "Mittealterliche Holzfunde aus Heidelberg: Die Kleinfunde der Grabung 'Kornmarkt'," *Fundberichte aus Baden-Württemberg* Bd. 28 (2005): 663–774.

[150] Ulrich Müller, *Holzfunde aus Freiburg/Augustinereremitenkloster und Konstanz: Herstellung und Funktion einer Materialgruppe aus dem dem späten Mittelalter* (Stuttgart: Theiss, 1996).

[151] Barbara Scholkmann, "Mittealterliches Holzgerät aus Südwestdeutschland: Zu Forschungsproblematik und Forschungsstand eines Sachgutkomplexes," *Zeitschrift für Archäologie des Mittealters* 10 (1982): 101–131.

Insufficient language skills (knowledge of Slavonic languages and Hungarian is a necessity) have prevented me from covering eastern Europe, but wood artefacts certainly are found, for example, a considerable collection of medieval wood artefacts from Budapest.[152]

To summarize: From c. 500 BCE to 1000 CE England, northern Germany and southern Scandinavia have a reasonable coverage, and several of the finds comes from settlements. In the High Middle Ages, c. 1000–1300, towns in Britain, Scandinavia, Germany and northern Russia provide a spatial and chronological sequence. Household utensils are well represented but there are also agricultural implements such as rakes and butter churns. Rural sites are less common. The period from the fifteenth century and later is decreasingly well covered. Folk life museums have early items from the eighteenth century, but the period 1500–1800 lacks larger quantities of preserved everyday objects. Ship-wrecks, which I have not included in this survey, partly fill this gap, by supplying household and carpentry objects but not much related to other rural activities such as agriculture. From the nineteenth century we enter a period with lots of items and descriptions in folk life museums, but at the same time we leave the archaeological finds.

[152] Imre Holl, *Mittelalterliche Funde aus einem Brunnen von Buda* (Budapest: Akadémiai Kiadó, 1966).

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The Bulletin of the Museum of Far Eastern Antiquities

Founded by Johan Gunnar Andersson

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