

## Maritime aspects on a communication route

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**Abstract.** This article discusses the maritime aspects of the trade route between the Vistula and Dnepr rivers, one of the most important communication routes between the Baltic and Black Sea. Archaeological material, including the remains of ships, from the area is considered and the question of whether these reflect cultural contact and influence is discussed. The problem of portage is central to the possibility of whether this route was used. The results of portage experiments discussed, and the replicas of boats from various periods are evaluated in light of boat building technology, size of ships, and ship portage-adaptations.

The trade route from the Gdansk bay followed the Vistula River, until the Bug tributary, whereafter it joined the larger Pripyat River, which joins Dnepr River just above Kiev. The abundance of Scandinavian artefacts along these rivers indicate that this route was more important than the more frequently discussed route “from the Varangians to the Greeks” by way of the Neva river, Lake Ladoga and Volkhov river. The importance of the Vistula–Dnepr trade route was first proposed by Holger Arb-

man on the basis of finds from Volhynia in Sigtuna. However, since first proposed, this idea was disregarded by modern researchers until Wladyslaw Duczko (2004) and Katarzyna Skrzynska-Jankowska (2006) once again brought it up for discussion.

Excavations in the Trädgårdsmästaren site in Sigtuna have revealed both ornaments and boat remains originating in the West Slavonic region (Larsson 2007). The importance of the route for the maritime contacts of eastern Sweden becomes even more apparent when the remains of boats in Prussia and Pomerania are studied, which in hull shape and construction are similar those found in the central Swedish boat-burials.

### Portages along the route

There are numerous portages along the trade route that have been thoroughly examined by Skrzynska-Jankowska (2006). As she has shown, they are already known from ancient times. Their importance is especially reflected in place names referring to the villages’ positions in relation to the

portages. There are some villages with names like Pod Przewloke which means 'to the portage', and Od Przewloki 'from the portage'. Some settlements are called just Przewloka, Przyvloka, Zavołocze and Wyvloka, which all means 'portage', and Przewłoczka meaning 'little portage'. In total Skrzynska-Jankowska documented 31 names.

Agglomerations of such names are found in the middle Bug area and between the Narew and Biebrza rivers. The last mentioned area connected the Slavic and the Baltic lands by the Vistula, following the Narew and the Biebrza to the Niemen, and thus constituted a trade route from the Baltic centre of Grobina to the Polish lands.

At Brzesc (Brest), situated where the Bug meets another river, which by portages is connected to the Pripyat River, several different types of boats have been found. Beside the ordinary keeled and clinker built ships of the Baltic type, both small log boats and typical Slavonic flat-bottomed ferry-boats were also discovered (Lysenko 2001). The boat remains and oars were preserved in the cultural layers of the stronghold, indicating that boats were brought to the town to be protected within its walls, in a manner mentioned in the Norse sagas.

Of special interest is the river called Przewloka/Perevoloka or 'Portage River', located in the Medieval Polish-Russian border zone close to the main water routes. The source of this river is a nameless lake clearly visible on the 17th century maps as Sarmatica Palus/Lacus (Alexandrowicz 1989: 43, 71; Skrzynzka-Jankowska 2006). Today, this is a forested area with wide swamps, linking the water systems of Bug, Narew, Pripyat and Niemen rivers. It formed an important connection on the Vis-

tula-Dnepr route, as well as from the Dnepr to the Niemen.

Major drainage projects carried out here during the last centuries have lowered the water level to the extent that smaller rivers like the Narewka are no longer navigable today. Such man-made infringements on the river systems have fundamentally changed the communication situation in large parts of northern Europe. This must be taken into consideration in any reconstruction of water routes and the evaluation of experimental journeys with Viking ship replicas.

#### Continuity and change

Ethnic groups and political alliances along the Vistula River route continuously changed throughout the Iron Age. In Podlasie, from the 6th to the 8th centuries the settlements of the early Slavs extended from the southeast along the river Bug. The excavations at the stronghold Hacki has revealed the continued importance of this trade route. The artefacts found there indicate that the system of river routes and portages from the Vistula and the Bug may have been used (Kobylnski 1989).

The Vistula-Dnepr route was one of the main routes in the early Viking Age between Sweden and the Arabic world, as demonstrated by the hoards of Islamic silver coins found along the Bug and Vistula rivers. These hoards date particularly to the period between the end of the 9th and the end of the 10th century (Tyszkiewicz 1974; Perhavko 1983; Losinski 1993).

The route was not only used for trade, but sometimes also for military campaigns. Grand Prince Yaroslav undertook one such campaign in the 1040's against the Mazovians, when he, as was the common practice in Rus, attacked them in boats (RPC 1953).



Fig. 1. Tälja, a reconstruction of the boat from Vik. From the author's portaging trials in 2001. Photo by Rune Edberg.



Fig. 2. Embla, a replica of a boat from Gamla Uppsala. Photo by Rune Edberg.



Fig. 3. The pliability of a 10–12 mm thick plank of radially split wood. Photo by the author.

Trade was flourishing along this water-route, which created the economic base for ports like Truso, Drohiczyn, Brest, Pinsk, Turow, Mozyr, Kiev and Gnezdovo (Lysenko 1985; Musianowicz 1960; Duczko 2004). These trade centres were established or expanded from the 8th to the 13th centuries. Seals found in Drohiczyn prove the trade route's importance; many of these seals were issued by Rus princes (Lewicki 1956).

In the early Viking Age another trade route was also used, its location identical with the famous "amber route" from Roman times (Duczko 2004:74pp). The route followed the Vistula, went through the Morava Gate and then along the Morava river to the Danube. This route probably has had greater importance than has previously been observed, not least thanks to the access to the important commodity salt.

#### West Slavonic and Scandinavian traditions

Boats built with treenails instead of clenched bolts are connected with the West Slavonic tradition. (For all the characteristics of this tradition, see Crumlin-Pedersen 1969; Smolarek 1969; Slaski 1974, 1978; Filipowiak 1994; Skamby Madsen 1989).

The use of clenched bolts in boat building is distributed primarily in central and south Scandinavia. The limited number of finds in Russia, the Baltic area and Prussia have often been discussed in terms of Scandinavian influence, since they are mostly found in occupation layers and burials together with other Scandinavian artefacts (Sorokin 1994, 1997; Larsson 2007).

Smolarek (1969) on the other hand stated that these were indigenous craft and should be regarded as products of local

shipbuilding, an interpretation later also upheld by Indruszewski (2000:196).

Smolarek also stated that clenched-nailed ships with flat bottoms and a mast step in the main floor timber 'represent the boat building of the Balts, or rather the ancient Prussians'. As representative of this type, he mentions finds from Frombork, Bagart and Tolkmicko along the shores of Gdansk Bay and the Vistula lagoons (1991:78)

However, as I have shown, the flat-bottom and a mast stepped in a floor timber are also typical of boat finds in east Sweden (Larsson 2007). The clenched-bolted Prussian boats may have been the result of Scandinavian contacts, but several may also be interpreted as Scandinavian boats, as boats are movable objects, sunken on journeys to the southeast. This may especially be the case for finds of boats with both clenched bolts and caulking with animal hair.

Clenched bolts are also found in cultural layers from the recent excavations in Janow Pomorski at Elblag (Jagodzinski 1988:7; Filipowiak 1994:93). Here there are traces from the building of boats with strakes connected with clenched bolts. The material, similar to the Paviken material from Gotland (Lundström 1981), is comprised of semi-manufactured iron used for rivets, nails and the roves used for clenched vessels. Scraped clenched bolts from ship repairs were also found. Their presence is another expression of the Scandinavian presence in the area, clearly visible in other finds and in the boat burials, which are not a Prussian tradition.

The five wrecks found close to Truso, recognised during excavation, were built at least partly with clenched bolts (Jagodzinski 1988:7; Filipowiak 1994:93).

### The east Scandinavian / Baltic Sea boat type

The intense maritime contact between east Sweden and the south and east shores of the Baltic Sea have resulted in a boat type which shares many common structural traits in construction. Especially east Scandinavia, Pomerania and Prussia have many traits in common regarding boat building which distinguish them from the West Scandinavian boats.

It is useful to define a special tradition, which represents a 'Baltic Sea boat type'. The keel is wide and low (often with a false keel), and has a rounded bottom that is flat amidships. The keel type, as well as the low hull shape, connects the central Swedish ships with, for instance, the west Slavonic finds.

The boats of the Baltic Sea are in general smaller and lighter than the west and south Scandinavian boats. Apart from the Ultuna boat, all of the burials contain boats with 0–6 strakes, where the rowlocks are placed above the gunwale. In east Scandinavia, the intent has been to reduce the size of the ship as much as possible as a means of reducing weight. Another distinctive method to get light boats was to cut extremely thin planking, which, especially in the late Viking Age, could have been reduced to only 10–12 mm, as is seen in the central Swedish boat graves.

The "Baltic Sea boat type", like the well-preserved Vik boat from Uppland, is therefore characteristically light and low, and especially well suited for river traffic on the long distance trade route. The mast step is the same transverse type that we know from the western Slavonic area, which distinguishes it from the south and west Scandinavian boats. The low, rounded section,

without southwest Scandinavian *meginhufr*, is also typical of the western Slavonic boats. In this area we still find beams used as thwarts up to the 11th century. Whereas in southwest Scandinavia the beam has usually been sunk down into the vessel to become a support for the deck planks and an additional set of beams has been put in to secure the need of thwarts, or else loose seats have been used.

### The Problem of portaging

The discussion about portages has been lively during the last decade. The debate has mainly concerned whether or not ships and boats in the late Iron Age, and especially the Viking Age, were pulled along portages between river systems or beside rapids in rivers (Edberg 1993, 1994, 1995a, 1995b, 1996; Westerdahl 1994a, 1994b, 1996). The issue was brought up when trial journeys with Viking ship replicas started in the 1980s on the waterways of Poland, the Baltic countries, and Russia (Nylén 1983, 1986, 1987; Edberg 1998, 1999).

Did travellers leave their boats at the portage and take another boat at the next river? Or did they bring their boats across the portage, pulling or carrying them, launching them when reaching water again? Was this possible at all? The debate has focused on the experiments and a few early written sources, and has never touched on other available material such as what the solution was in historical times in the parts of Scandinavia where roadless land dominated until the 19th century.

### Earlier results

Several experimental journeys have been made with replicas of different ship finds from Viking Age and the early Middle Ages



on the same rivers as was navigated in Iron Age. The results have called into question whether these water routes and boats were really used at all. Especially the land portage was a heavy venture, even for the strongest crews. Edberg concluded:

“As I have shown, ideas about the Viking Age ship-haulings between the rivers in Russia are not only unproven but also rather improbable” (Edberg 2002:85, my transl.).

But is the hauling of ships between the rivers really unproven? And really improbable? Edberg has based his conclusions on experiments using either boats built with modern methods (Krampmacken, Aifur, Havørn) or ships that were considerably larger than those used in eastern Sweden and Russia (Havørn, Helge Ask) (Edberg 1999).

This affects the weight of the ships and consequently also the results, as will be shown. The way in which the hauling was carried out, by moving the logs used as rollers, is not documented either archaeologically or ethnographically. The Master of the “Krampmacken”, archaeologist Erik Nylén, exclaimed:

“Superhuman efforts. The crew exhausted and ready to give up – the captain close to drowning – but the rowing continues.” (1983:95, my transl.)

But does it really need to be in this way? It does not. My opinion is that the results of these experiments are largely due to the fact that they were not performed on the basis of available information on ships, hauling and portages.

By using Viking Age boat building techniques, light and pliable boats can be constructed, being fast to row and seaworthy at sea. As I will now discuss, my experiments

have demonstrated that boats built with Viking Age technology are so easy to handle that even children can pull them relatively quickly on land.

#### The significance of the boatbuilding methods

All the boats used in the earlier experiments were built using sawn planks. In the majority of finds of preserved boats from the 7th century until the Middle Ages, radial splitting of timber was employed instead. This method follows the direction of the natural grain of the wood and results in very strong and flexible planks.

This method made it possible to make the planking very thin and at the same time increase the hull’s flexibility at sea. This in turn resulted in seaworthy, light and fast ships.

When sawing was introduced, the fibres were cut and the planks could also break more easily. This had to be compensated for by two or three times thicker planking, resulting in much stiffer and heavier boats, too heavy to navigate shallow rivers and to pull on land. River traffic ceased and roads were improved all over Sweden less than one hundred year after the appearance of sawing technology in shipbuilding. The strength was no longer in the hull of the ship and therefore at the same time the earlier shell building technique was also replaced with skeleton building.

The weight of the boats is also crucial for the results of the experiments with hauling. Radial splitting as a building method has hardly ever been used when building the Swedish replicas in the earlier experiments, and the thickness of the sawn planking has had to be increased to compensate, resulting in heavier boats.

The use of the building method has clearly influenced the results, since boats built with modern methods have often turned out to be so heavy that a cart or other aids were required. This was the case with the *Krampmacken*, which in 1983 and 1985 made a journey from Gotland through East Europe to the Black Sea. This boat was only 8 m long but had a total weight of almost 1000 kg, and for the long land transports a cart was brought (Nylén 1987; Edberg 1999).

As a comparison, the *Tälja*, which is 9.6 m long, 2.2 m wide and 0.54 m high, and built with the radial splitting method, weighs only approx. 500 kg. The *Tälja* is a replica of boat found at Vik in Söderby-Karl parish, Uppland, which has been preliminarily dated by dendrochronology to the 11th century (Braathen 2006; *fig. 1*). The original find was reconstructed by the author between 1985 and 1994 (Larsson 1997, 2000). It is the only find of a boat of the type found in the Swedish boat burials where most of the wooden hull is preserved.

Midship, the strakes of the Vik boat have an average thickness of c. 15–17 mm, reduced to c. 10 mm closer to the stems. The dimensions of the material had been reduced as much as possible to minimize weight, for example the frames are only 5–6 cm wide and high. The Vik boat had been equipped for portages: it has a false keel, 7 cm high, secured with wooden dowels to the main keel, and three drilled holes in the stems for ropes.

In 1996 the author built another replica, the *Embla*, after the boat in a burial in Old Uppsala (Nordahl 2001). The *Embla* is 7.2 m long, built with original methods and to the same thickness of the planking (only 10–12 mm) as the original, which was de-

termined from the size of the clench bolts. This is also the same thickness as some of the late Viking Age boat burials (e.g., *Valsgärde 11* and *Valsgärde 9*). The *Embla* boat weighs only 250 kg (*fig. 2*). When building the *Embla*, the author tested the strength the 10–12 mm planking. Two men placed themselves on a plank, which bent 35 cm without breaking (*fig. 3*). Both *Tälja* and *Embla* were used in the experiments that are discussed below.

The reduction in the thickness of the strakes meant a reduction in weight, which resulted in ships with very low draught able to navigate into shallow waters and put ashore anywhere, including far up along shallow rivers between Vistula and Dnepr.

The pliable hull meant that the boat was seaworthy. The lightness resulted in boats that were fast and easy to row. These special qualities were the basic prerequisites for the extensive trade network using shallow river systems connected by portages and with portages beside rapids to the areas surrounding the Black Sea and the Caspian Sea, and beyond.

### Small ships

The archaeological material of Central Sweden is dominated by small boats and ships (Larsson 2004a, 2004b, 2007). Despite this however, it has often been the largest ships discovered which have been reconstructed and used in experiments, such as the Norwegian burial ships from Oseberg and Gokstad. The latter were aristocratic prestige boats built to represent the power and glory of chieftains. They were constructed as floating symbols, to be used primarily on open sea. *Havørn*, a 2/3 version of the Gokstad ship, was used in a Norwegian expedition from Riga by the Baltic Sea, up

the river Daugava (Western Dvina) towards the Black Sea. This big ship, 16 m long and with a hull weight of 3.5 tons, was almost impossible to even bring up from the water. It took a whole day with the use of tackles to get her ashore, and then a tractor and truck with crane was the only way to transport the ship the 500 km to Dnepr (Altrock 1993).

A heavy ship is also very heavy to row. It cuts deep into the water, which increases the resistance and thus reduces the distance that is possible to row upstream in shallow rivers. The Havørn expedition had to stop in Latvia, not reaching the Belarus border, as the river was too shallow.

The Gokstad ship also had a V-shaped bottom, in contrast to the boats of the Swedish burials at Valsgårde, Tuna in Alsike, and others, which, like the Vik boat are flat-bottomed with shallow draught. These boats had several adaptations for portaging:

- A false keel known from the Bårset boat (Gjessing 1941), the Årby boat (Arbman 1940) and the Vik boat (Larsson 1997, 2000). This was called drag in Old Norse. The word drag is also used for the portage itself.

- Holes made in the stems for ropes to haul boats on land, or perhaps for attaching some kind of runner, but also for pulling the boat upstream from the shore in shallow waters. Similar holes are not found in younger boats or contemporaneous heavy merchant vessels.

A drag may also refer to a mead or runner placed under the keel on the portage, as was also used until the 19th century on the dry road portage at Listeid, Norway. This technique has also been successfully tried with the replica Himingläva in 2003 and 2004 (Altrock 2006). Makarov has record-

ed several portages with such dry roads. In the case of the Slavensky portage in Russia, he quotes the Land Cadastre Book of 1585 which states: 'boats and goods were transported by horses across the portage along a dry road' (1994:18).

### Scandinavian portages

Portages documented from Scandinavia in archaeological, ethnographic, and historic sources were constructed in various ways. In the Skaldic poetry and the sagas, the most common solution for facilitating the pulling of boats on land were logs placed as rollers, which was called lunar (plural: hlunnr) in Old Norse (Falk 1995:37; Jesch 2001:173). The related word lunnar is sometimes even used today for logs as rollers, especially in the north where both Sami people and log drivers have used them to facilitate the transportation of boats.

The Sami boats were built to be very light, like the Late Iron age boats of 'the Baltic Sea boat type', with a very thin hull. Spruce timber was used to make them as light as possible. In earlier times the seam between the strakes was sewn with roots, instead of using iron nails, thus further reducing the weight.

### Portaging experiments

In 2001 the author organised an experiment on the shores of Lake Erken in Roslagen. A trail prepared with logs as runners was laid, inspired by the documented portages of Lapland. It was 900 m long, with curves and a height difference of c. 10 m. The ground consisted of both flat grass and uneven meadow ground with tussocks, as well as a bog and a riding trail. (Larsson 2006)



The logs, mostly of aspen and maple, varied between 3 cm and 15 cm in diameter, and between 0.6 m and 1.2 m in length. They were placed at an internal distance of 0.5–1.5 m. In the wet, boggy area the ground was partly covered with thin branches.

The replica boats used for the experiments were the above-mentioned Tälja and Embla, which like the originals were built with the contemporary radial splitting method, resulting in light and pliable boats.

Tälja was the first boat to be tried, and the first crewmen were sixteen 15-year-old school boys. A straight 100 m trail with similar sizes of logs as on the Sami portages, c. 10 cm thick, was covered, without pause, in only 2 minutes. On other parts of the trail which were covered with branches instead of logs, and/or with thinner logs of 3–4 cm, caused delays as the logs broke. However, it should be noted that such a portage surface is not known from the ethnographic or archaeological records.

The 15-year olds were followed by seven 17-year-old boys from Roden high school. Together with two teachers they took the Tälja along the whole trail in approximately 1 hour. The keel was well protected by a false keel, which got most of the wear at a place with uneven ground and stones.

Five of the high school students took Embla around the same track at such speed that their classmates who were trying to take photos had difficulties following. In 15 minutes they had made the round of 900 m, sometimes aided by their teacher.

Later in the day team of seven adults took Tälja around the whole trail in approx-

imately 1 hour and 15 minutes. The stops were quite frequent and caused by either fatigue or because the boat had slipped off the rollers in the curves. As with the first team, the highest speed was achieved when the boat was going straight on logs c. 10 cm thick. At these places, 100 m were covered in 2 minutes. It was also an advantage if the logs were sunken into the ground so that they were not so easily moved to the sides. (The results of the experiments are presented in detail in Larsson 2007.)

### Conclusions

Experiments have shown that hauling is considerably easier if the same kind of boats are used as those known from the archaeological record. It is also evident that the boat-building technology of the late Iron Age and early Middle Ages has been a significant factor for reducing the weight of the ships, without losing the strength and elasticity of the hull.

The boats from archaeological record found in East Sweden and Poland were built in a way that made them especially suitable for river routes, like the trade route between Vistula and Dnepr.

On the basis of the analyses of ship-building methods, and the resulting qualities of ships and ships performance observed in experimental archaeology, the expansion in maritime contacts, seen in excavated material from the 8th to the 11th century, can be determined to be a consequence not of bigger ships, but of lighter and more seaworthy ships of “the Baltic Sea type”.

As I have shown, Viking Age ship hauling between rivers and lake systems is not only probable, but also possible to prove.

## References

- Alexandrovicz, S. 1989. *Roswój kartografii Wielkiego Księstwa Litewskiego od XV do połowy XVIII wieku*. Poznan.
- Altrock, H. 1993. *Med vikingaskepp till Ukraina. En reseberättelse*. Unpublished manuscript.
- Altrock, H. 2006. *Expedition Vittfarne. Ett vetenskapligt experiment i Ingvar den vittfarnes kölvatten*. Seminar paper. Dept. of Archeology and Classical Studies. Stockholm University.
- Arbman, H. 1940. Der Årby-Fund. *Acta Archaeologica* XI. Copenhagen.
- Braathen, A. 2006. *Dendrokronologisk analys av Viksbåten*. Unpublished manuscript.
- Conwenz, H. 1896. Das Wikingerboot von Baumgarth. *XVI Amtlicher Bericht. Westpreussischen Provinzial-Museums* 1895. Danzig.
- Conwenz, H. 1924a. Das Wikingerboot von Baumgarth, Kr. Stuhm. *Blätter für Deutsche Vorgeschichte*. Heft 2. Leipzig.
- Conwenz, H. 1924b. Das Wikingerboot von Baumgarth, Kr. Stuhm, Ostpreussen. *Blätter für Deutsche Vorgeschichte*. Nr 3. Leipzig.
- Crumlin-Pedersen, O. 1969. Das Haithabuschiff. *Bericht über die Ausgrabungen in Haithabu*, 3. 1969. Neumünster.
- Duczko, W. 2004. *Viking Rus. Studies on the Presence of Scandinavians in Eastern Europe*. Boston.
- Edberg, R. 1993. *Vikingabåtar i Sverige i original och kopia. Något om de experimentella båtprojekten Krampmacken och Aifur, deras bakgrund och förutsättningar*. Seminar paper. Dept. of Archeology, Stockholm University.
- Edberg, R. 1994. *Expedition Holmgård. Vikingabåten Aifurs färd från Sigtuna till Novgorod. Ett arkeologiskt äventyr*. Sigtuna.
- Edberg, R. 1995a. Låt det gunga om båtarkeologin. Några erfarenheter från Expedition Holmgård. *Fornvännen* 90.
- Edberg, R. 1995b. Vikingabåt på rullar – rapport från ett experiment. *Marinarkeologisk tidskrift* 3/1995. Stockholm.
- Edberg, R. 1996. Vikingar mot strömmen. Några synpunkter på möjliga och omöjliga skepp vid färder i hemnavatten och i österled. *Fornvännen* 91.
- Edberg, R. 1997. Skenheligt om båtarkeologi. Ett svar till Ch. Westerdahl. *Fornvännen* 92.
- Edberg, R. (ed.) 1998. *En vikingafärd genom Ryssland och Ukraina*. Sigtuna.
- Edberg, R. 1999. Askeladden i österviking. Saga och verklighet på de ryska floderna. *Aktuell Arkeologi* VII. Red. P. Nordström & M. Svedin. Stockholm.
- Edberg, R. 2002. *Färder i österled. Experiment, källor, myter och analogier*. Stockholm.
- Falk, Hj. 1995. *Fornnordisk sjöfart*. Skärhamn.
- Filipowiak, W. 1994. Shipbuilding at the mouth of river Odra. *Crossroads in ancient shipbuilding. Proceedings of the Sixth International Symposium on Boat and Ship Archaeology*. Ed. Ch. Westerdahl. Oxford.
- Gjessing, G. 1941. Båtfunnene fra Bårset og Øksnes. *Tromsø museums årshefter* nr 8, vol. 58. Tromsø.
- Heydeck, J. 1900. Das Wikingerschiff von Frauenburg, Kr. Brauensberg. *Sitzungsberichte der Alterumsgesellschaft Prussia für 1896–1900*. Königsberg.
- Indruszewski, G., 2000. *Man, Ship and Landscape. Ships and Seafaring in the Oder Mouth Area 400–1400 AD. A case-study of an ideological context*. Copenhagen.
- Iwicki, W. 1993. *Toponimia bylego powiatu slupskiego*. Gdansk.
- Jagodzinski, M. 1988. *Wczesnosredniowieczna osada rzemieślniczo-handlowa w Janowie Pomorskim nad jeziorem Druzno – poszukiwane Truso? Elbląg*.
- Jesch, J. 2001. *Ships and Men in the Late Viking Age. The Vocabulary of Runic Inscriptions and Scaldic Verse*. Woodbridge.
- Kobylinski, Z. 1989. An ethnic change or a socioeconomic one? The 5th and 6th centuries AD in the Polish lands. *Archaeological approaches to cultural identity*. Ed. S.J. Shennan, London.

- Kowalczyk, E. 1995. Powracający temat "przewłoka". *Kwartalnik Historii Kultury Materialnej*, no 4.
- Larsson, G. 1997. *Viksbåten. En kort beskrivning av båtfyndet från Söderby-Karl*. Norrtälje.
- Larsson, G. 1998. Embla – a viking ship has been reconstructed. *Viking Heritage Newsletter*. Nr 4/1998.
- Larsson, G. 2000. The reconstruction of the Viksboat. *Proceedings of the Eight International Symposium on Boat and Ship Archaeology, Gdansk 1997*. Gdansk.
- Larsson, G. 2004a. Skepp och sjöfart i Mellansverige under yngre järnålder. *Bottnisk kon-takt XI*. Härnösand.
- Larsson, G. 2004b. The Ships and Seafaring of Central Sweden In Late Iron Age: Myth and Reality. *By the Water. Archaeological Perspectives on Human Strategies around the Baltic Sea*. Ed. J. Rönnby. Huddinge.
- Larsson, G. 2006. An Ethnoarchaeological Approach to the Problem of Portages. *The Significance of Portages. Proceedings of the First International Conference on the Significance of Portages, 29th Sept–2nd Oct 2004 in Lyngdal, Vest-Agder, Norway*. Ed. Ch. Westerdahl. Oxford.
- Larsson, G. 2007. *Ship and Society. Maritime Ideology in Late Iron Age Sweden*. Uppsala.
- Lemcke, H. 1911. Das Wikingerboot von Charbrow. *Bau- und Kunstdenkmäler des Reigerungsbezirks Köstlin*. Stettin.
- Lewicki, T. 1956. Znaczenie handlowe Drohiczyzna nad Bugiem we wczesnym sredniowieczu i zagadkowe plomby ołowiane znalezione w tej mejscowosci. *Kwartalnik Historii Kultury Materialnej*, no 4.
- Lienau, O. 1934. Die Bootsfunde von Danzig-Ohra aus der Wikingerzeit. *Quellen und Darstellungen zur Geschichte Westpreussens*. Band 17. Danzig.
- Lienau, O. 1939. Ausgrabung und Zeichnerische Wiederherstellung des frühgeschichtlichen Bootes vom Ufer des Lebasees bei Lebafelde, Kr. Lauenburg. *Drittes Beiheft*. Pommersches Landesmuseum. Stettin.
- Lindberg, A. 1988. *Riddarholmsskeppet*. Stockholms medeltidsmuseum. Stockholm.
- Lindberg, A. 1990. *Blanka*. Stockholms medeltidsmuseum. Stockholm.
- Lindberg, A. 1993. Medeltida båtbyggeri. Skepp och båtar i Stockholms medeltidsmuseum. *Samfundet S:t Eriks Årsbok*. Stockholm.
- Losinski, W. 1993. Chronologia, skala i drogi naplywu monet arabskich do krajów europejskich u schyłku I w X w. *Slavia Antiqua*, vol. 84.
- Lysenko, P. F. 1985. *Bereste*. Minsk.
- Lysenko, P. F. 2001. *Turovskaja zemlya IX – XIII vv*. Minsk.
- Makarov, N.A. 1994. Portages of the Russian North. *Fennoscandia Archaeologica XI*. Helsinki.
- Manker, E. 1939. *Under samma himmel. Strövtåg och studier bland samer söderut*. Stockholm.
- Musianowicz, K., 1960. Granica mazowszedrehowicka na Podlasiu we wczesnym sredniowieczu. *Materialy Wczesnosredniowieczne* Vol. 5.
- Nordahl, E. 2001. *Båtgravar i Gamla Uppsala. Spår av en vikingatida högreståndsmiljö*. Uppsala.
- Nylén, E. 1983. *I österled. Med vikingaskepp mot Miklagård I. Uppströms genom Polen*. Visby.
- Nylén, E. 1986. The "Krampmacken" Project. *Sailing into the past. The International Ship Replica Seminar Roskilde 1984* (eds. O. Crumlin-Pedersen & M. Winner). Roskilde.
- Nylén, E. 1987. *Vikingaskepp mot Miklagård. Krampmacken i Österled*. Borås.

- Olsen, O. & Crumlin-Pedersen, O. 1967. The Skuldelev Ships (II). A report on the final Underwater Excavation in 1959 and the Salvaging Operation in 1962. *Acta Archaeologica* vol. XXXVIII. Copenhagen.
- Perhavko, V.P. 1983. Opyt kompleksnovo ispolzovanija pismennykh i materialnykh istotnikov dla rekonstrukcii istorii Pripiatsko-Bugskovo puti v IX–XIII vv. *Problemy istoricheskoj geografii Rossii* vyp. IV. Istochnikovedenie istoritseskoj geografii. Minsk.
- Reitan, E. 1927. Die Neuaufstellung des Wikingerbootes aus Baumgarth. *Blätter für deutsche Vorgeschichte*, Heft 5.
- Prosnak, M. 1963. Zachodnio-slowianska sztuka korabnicza wczesnego sredniowiecza, *Materialy Zachodnio-Pomorskie* 9.
- RPC = *The Russian Primary Chronicle*. Laurentian text. Eds. S. H. Cross & O. P. Sherbowitz-Wetzor. 1953. Cambridge, Mass.
- Skamby Madsen, J. 1989. *Fribrödre å – en vaerftplads fra slutningen af 1000-talet*. Roskilde.
- Skrzynska-Jankowska, K. 2006. Early Medieval portages on the trade route between the Baltic and Black Sea: a case study from the Polish–Rus’ borderlands. *The Significance of Portages. Proceedings of the First International Conference on the Significance of Portages, 29th Sept–2nd Oct 2004 in Lyngdal, Vest-Agder, Norway* (Ed. Ch. Westerdahl). Oxford.
- Smolarek, P. 1969. Studia nad szkutnictwem Pomorza Gdanskiego X–XIII w. *Prace Muzeum Morskiego w Gdansku*. Tom III. Gdansk.
- Smolarek, P. 1986. Wraki z Czarnowska. Ladu i Tolkmicka. *Nautologia* nr 1.
- Smolarek, P. 1991. The underwater investigations of the Polish Maritime Museum in Gdansk from 1982–1985. *Acta Universitatis Nicolai Copernici*, t. X. Torun.
- Smolarek, P. 1994. Aspects of Early Boatbuilding in the Southern Baltic Region. *Crossroads in ancient shipbuilding. Proceedings of the Sixth International Symposium on Boat and Ship Archaeology*. Ed. Ch. Westerdahl. Oxford.
- Sorokin, P. 1994. Some results of the study of medieval boatbuilding traditions in north-west Russia. *The International Journal of Nautical Archaeology*. Nr 23:2.
- Sorokin, P. 1997. *Vodnie puti i sudostronie na severo-zapade Rusi i v srednevekove*. St. Petersburg.
- Stepien, W. 1984. Archaeological excavations in Puck Harbour, Gdansk District, Poland. *The International Journal of Nautical Archaeology*.
- Stepien, W. 1986. Odkrycia archeologiczne w Zatoce Puckiej. *Nautologia* XXI 1986:1 (81). Gdynia.
- Stepien, W. 1987. Wczesnosredniowieczny wrak lodzi klepkowej w-2 z zatoki Puckiej. *Prace i materialy Muzeum archeologicznego i etnograficznego w Lodzi. Seria Archeologiczna* 34. Lodz.
- Slaski, B. 1930. Słownik rybacko-zeglarski i szkutniczy. *Slavia Occidentalis*. Vol. 9.
- Tyszkiewicz, J. 1974. *Mozovzce północno-wschodnie we wczesnym średniowieczu*. Warsaw.
- Slaski, K. 1974. Die Schiffe der Ostseeslawen und Polen vom 9. bis 13. Jahrhundert im Lichte neuer polnischer Forschungen. *Zeitschrift für Archaeologie des Mittelalters*, Bd 2.
- Slaski, K. 1978. Slawische Schiffe des westlichen Ostseeraumes. *Offa* 35. Neumünster.
- Wedzki, A. 1970. Przewłoka. *Słownik Starożytności Słowiańskich*, vol 4, part 1:390.
- Westerdahl, Ch. 1985a. Treenails and History. A Maritime Archaeological Hypothesis. *In Honour of Evert Baudou. Archeology and environment* 4. Umeå.
- Westerdahl, Ch. 1985b. Holznägel und Geschichte. Eine schiffsarchäologische Hypothese. *Deutsches Schiffsarchiv* 8.

- Westerdahl, Ch. 1987b. *Norrlandsleden II. Beskrivning av det maritima kulturlandskapet*. Arkiv för norrländsk hembygdsforskning XXIII 1987.
- Westerdahl, Ch. 1994a. Synpunkter på nybyggen av gamla fartyg. *Fornvännen* 89. Stockholm.
- Westerdahl, Ch. 1994b. Vikingatida transportteknik i Ryssland. *Elfte tvärfaglige vikingasymposium*. Århus.
- Westerdahl, Ch. 1996. Maritim arkeologi – båt- arkeologi i gungning? Kommentar till Rune Edbergs artikel 'Låt det gunga om båtarkeologin'. *Fornvännen* 1996:4.