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JASON S. ROGERS

## **CZECH LOGBOATS: EARLY INLAND WATERCRAFT FROM BOHEMIA AND MORAVIA<sup>1</sup>**

### **Logboat Studies**

Dugout logboats (called ‘monoxylys’ in many European languages, from Greek μονόξυλον or *mono* – single and *xylon* – tree) are one of the most ancient types of watercraft. Logboats are found on every inhabited continent, and it has been suggested that a majority of boat types the world over has logboats as their remotest ancestor. Development of other ancient watercraft roots – rafts, skin boats, and bark boats – is inherently limited by the raw material and the nature of the structure. Dugout vessels too are limited by the raw material. They can, however, be expanded and enlarged with additions such as washstrakes and spray deflectors. Many scholars propose that this led to the development of planked vessels (JOHNSTONE 1980; MCKEE 1983; and GREENHILL – MORRISON 1995).

The oldest known European logboat, from Pesse in the Netherlands, dates from ca. 6315 BC (MCGRAIL 1987, 86). The Pesse vessel is relatively simple, but by the 4<sup>th</sup> millennium BC, quite sophisticated logboats were being built with multiple components such as transom end inserts, for example the Tybrind Vig vessel in Denmark (3310 BC) (ANDERSON 1987), and the late Bronze Age logboats from Germany’s Federsee (PARET 1930). Dugout vessels were still in use in parts of Poland, Slovakia, and lakes of the Alpine region as late as the 1950s and 1960s. Logboats have never gone out of use in some regions, and are still commonly found in areas of Africa, South America, and Southeast Asia. Dugout vessels have thus been utilized over a longer span of time, in more parts of the world, than any other form of transport. Logboats appear deceptively simple, yet many aspects of their construction and usage call for further investigation: for example, the purpose of the transverse ridges found in many vessels, their intended cargo and utilization, and the socio-economic significance to their builders. Even a relatively simple vessel such as a logboat may represent a large investment of capital

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<sup>1</sup> This article is an expanded version of one that appeared in *The International Journal of Nautical Archaeology* (ROGERS 2010).

and time to the builder and user. In his study of Polish dugout vessels, Waldemar Ossowski (1999, 221) noted: “*Logboats are a particularly valuable group of artifacts, which can tell us a great deal about navigation in former times. The forms of logboats were dependent primarily on their purpose, conditions of operation, and the sophistication of the boat-building technology. On this basis we can make inferences about the extent to which waterways were utilized.*”

Recognizing the importance of prehistoric watercraft, researchers have documented and recorded logboat discoveries across Europe: for example Great Britain (MCGRAIL 1978; MOWAT 1996), Italy (BONINO 1983), France and Switzerland (ARNOLD 1995), Denmark (CHRISTIANSEN 1990), Russia (OKOROKOV 1995), and Poland (OSSOWSKI 1999; 2000). Logboats have recently been published from Germany (WESKI 2005) and Austria (STRADAL – DWORSKY 2002). The Czech lands, centrally located at the heart of Europe, also provide valuable specimens for such research.

### **Background and Previous Work**

As with most archaeological resources, the geographic and environmental context is important for an understanding of the objects being studied. The Czech Republic is of course a land-locked region, and much of the country consists of uplands and mountains. The constituent regions correspond closely to the drainage areas of the country’s most important rivers: the Vltava-Labe system in Bohemia, and the Morava system in Moravia. This is also one of Europe’s main watershed divisions: the Labe empties into the North Sea, and the Morava joins the Danube, eventually flowing to the Black Sea. A small part of the Oder watershed, including the river’s source, is also contained in the territory of Czech Silesia.

The presence of sophisticated prehistoric watercraft in this land-locked territory is quite informative, perhaps reflecting some unexpected skills and traditions of the area’s early inhabitants. More than 40 logboats are known from the Czech Republic, and the 20 surviving vessels are significant evidence of aquatic resource utilization as well as waterborne trade and exchange.

Almost without exception, the early logboat finds came while dredging, digging, or quarrying along riverbanks. Many logboats were discovered during canalization of river courses, while others were uncovered in the course of construction along the rivers, or while digging for sand and gravel. Only a very few escaped subsequent destruction. As the discipline of archaeology developed and spread through the Czech lands, reporting of logboat discoveries became more frequent and widespread (for example AXAMIT 1915; NIEDERLE 1923; HANÁK 1930).

Progressing from simple site or discovery reports, two longer surveys examining early Czech watercraft were written in the post-war period. In 1951 Dr. Bohuslav Novotný, working mainly on the basis of Bohemian logboats, wrote his seminal

piece entitled “Nejstarší plavidla na Českých vodách” (NOVOTNÝ 1951). This far-reaching article draws on a wide range of historical and ethnographic research to describe a general development of European logboats. Novotný further sought to describe and explain archaeological logboat finds in Bohemia by means of ethnographic comparison with vessels still in use in Slovakia, on Austria’s Alpine lakes, and as far afield as Papua New Guinea. Novotný articulated well the main problem with Czech logboat studies (then as now): the lack of accurate dating, which hinders development of a well-articulated chronology. The article concludes with an attempt at a basic typology, separating Czech logboats into two categories: vessels with pointed bows, used for fishing and carrying people; and those with flat, square ends, used to carry cargo (NOVOTNÝ 1951, 283). While further discoveries and recent research have shown that this typology is likely an over-simplistic assessment, the importance of Novotný’s early work endures.

In Moravia, Dr. Vilém Hrubý of the Czechoslovak Academy of Sciences, Institute of Archaeology researched and collected information on logboats since the 1940s, although he did not publish his work until the mid-1960s. Hrubý’s article “Staroslovanské čluny na našem území” catalogues and describes vessels found in Moravia, almost all in the context of regulating the Morava River (HRUBÝ 1965). Hrubý’s assertion that most if not all Moravian logboats date to the early Slavonic period resulted in a nearly institutionalized belief in this assumption, at least insofar as regards dating assessments for surviving specimens.

In the 1950s and 60s, further logboat finds were often published as short journal reports. Discoveries from Labětín (HRALA 1969), Poděbrady (JUSTOVÁ 1969), Skorkov (NECHVÁTAL 1969), and Oseček (NOVOTNÝ 1950) were published in this fashion. Others were reported in regional or museum newsletters (HANÁK 1930; BEDNAŘÍK 1957; JUSTOVÁ 1965). Many of these vessels were recovered and conserved, and exist today in museums or repositories.

Reliable dating is unfortunately lacking for most specimens. Only five examples have been dated by absolute methods, and until recently, little analysis had been carried out on these vessels. The four dugout logboats discovered at Mikulčice in the 1960s and 70s were described in the multi-volume excavation report (POLÁČEK – MAREK – SKOPAL 2000). The newest discoveries have also been recently published: the 10m boat recovered at Mohelnice in 1999 (KUČEROVÁ – PEŠKA 2004), and the unusual fir vessel found at Otradovice in 2002 (ŠILHOVÁ – ŠPAČEK 2004). Also in 2004, the current author completed an MA thesis describing and analyzing Moravian logboats (ROGERS 2004).

### **Surviving Bohemian and Moravian Logboats**

More than 40 logboats are known from the Czech Republic, and at least 20 boats are preserved in repositories or regional museums (7 in Moravia and 13 in Bohemia). Two further vessels are known to remain buried *in situ*. The following catalogue is presented geographically, examining surviving vessels from Bohemia



and Moravia separately, starting with those discoveries located furthest upriver within the respective watershed system. Vessel measurements, discovery locations, and current repositories are summarized in a table following the catalogue (Table 2).

### Bohemia

Of more than 20 reported dugouts from Bohemia, at least 13 still exist, in whole or portion. The majority of Bohemian vessels come from the region's dominant waterway, the Labe River. A large number of historically documented examples were also found in the same area, although they have now been lost or destroyed. Two vessels from Bohemia have been dated by radiocarbon analysis.

#### Jaroměř-Josefov

The vessel found farthest upriver on the Elbe is a 6.22 m oak dugout recovered during bridge construction at Černožice, now held in the Jaroměř-Josefov museum. This logboat is unique among Czech examples in that it has a nearly square profile in cross-section. The square overhanging platform ends are perforated by rectangular holes, one at the bow and two at the stern. Width at the bow is 46 cm, stern width is 56 cm, and maximum height is 31 cm. Vessel walls are 3–5 cm thick, and there are no bulkheads or transverse ridges (Fig. 1).

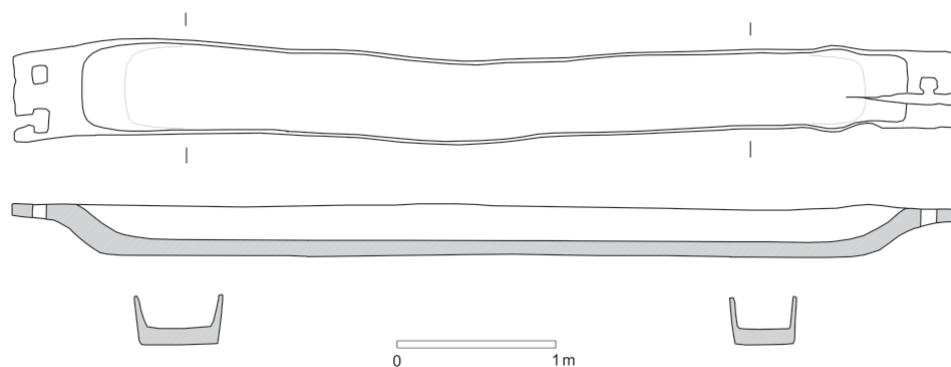


Fig. 1. Jaroměř logboat plan (all the drawings by author, when not mentioned otherwise).

Nearly identical vessels have been found in adjacent areas of Poland, especially the upper reaches of the Oder River. Three such vessels (boats from Lewin Brzeski, Koźle, and Roszowicki Las) survive in Poland, although many more are known from historical sources. These logboats, known as *Lewin*-type vessels, are characterized by square or trapezoidal cross-section, rectangular hull-ends, and low height of the sides in relation to vessel length. In addition, nearly all the *Lewin*-type boats have a single hole in the bow and two at the stern. The low

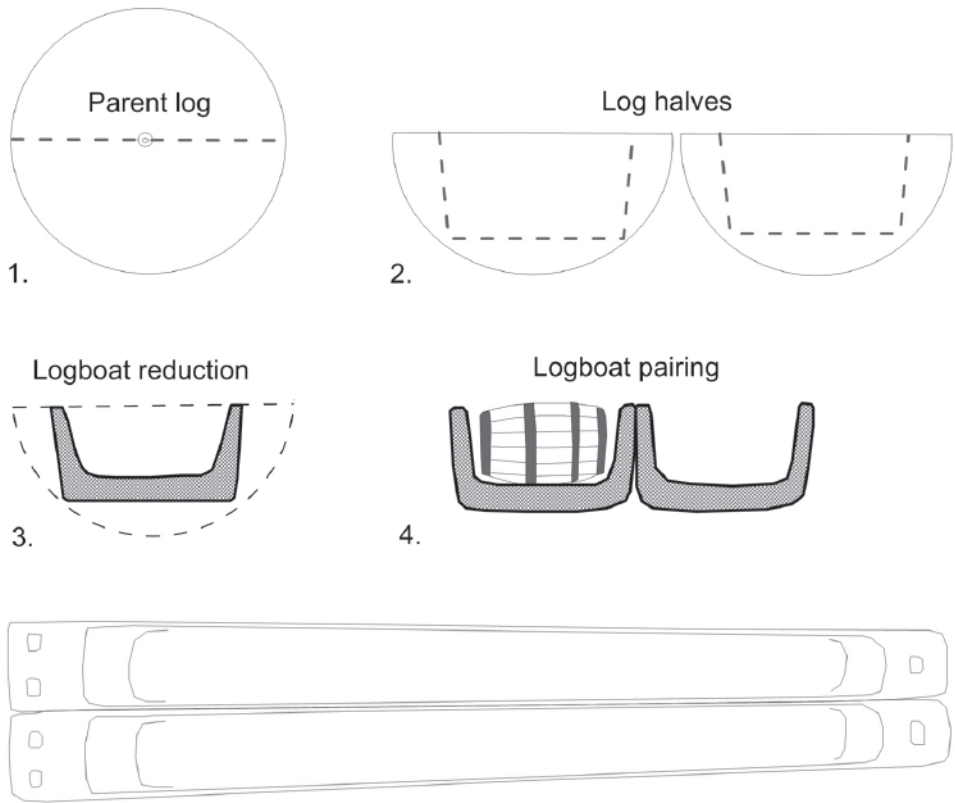


Fig. 2. Construction sequence for a paired *Lewin*-type vessel.

height is a result of the parent log being split lengthwise in half, in order to obtain two identical timbers from a single trunk. The advantage of splitting the parent log in this fashion lies in the resulting identical twin hulls, which are then joined to form a raft (Fig. 2). The paired hulls were joined by transverse poles, which did not go through the holes in the platform ends but were fastened to the top walls or in special grooves at the hull ends. The sloping transition from the open bow and stern may have facilitated rolling barrels into and out of the vessel.

These vessels were typically 7–12 m in length, and the largest of them could carry up to 1.5 tons of cargo. Several logboats of this type have been excavated with the twin hulls still joined, for example the vessel from Roszowicki Las in Poland, whose joining lath broke during recovery. The Polish vessels date from the early centuries AD, and are associated with the Przeworsk culture (OSSOWSKI 2000).

#### Labětín

Several vessels from Bohemia's central Elbe region share a different construction and morphology. Logboats from Labětín, Kolín, and Přerov nad Labem were

all hollowed from single oak logs, retain a circular or semi-circular shape in cross-section, and lack bulkheads and transverse ridges.

The Labětín vessel was discovered on the Elbe River in 1957 by workmen excavating sand, and was brought to the attention of the local schoolmaster and village historian. The boat was initially transported to the small museum in the village of Přelouč, and then to the Eastern Bohemian Museum in Pardubice. The vessel's stern is missing and was likely broken off when the boat was pulled from the riverbed. The remaining torso measured over 10 m in length at the time of recovery (ŠENK 1994), although the loss of several fragments from the aft end meant that the length in 1969 was only 8.35 m (HRALA 1969, 813). Today the boat measures exactly 8 m in length, approximately 70 cm wide, with a maximum height of 62 cm (Fig. 3). Several 4–5 cm holes perforate the sides, and wall thickness varies from 5 cm to 9 cm. The vessel form closely follows that of the original trunk, and was constructed by stripping the bark from the parent tree, and hollowing the interior. The bow was cut to a rough wedge shape, with no overhang or platform, leaving a massive portion of solid wood at the vessel's forward end. There is no chine, and the hull profile is semi-circular in cross-section. Attempts to date the Labětín boat by dendrochronology are so far unsuccessful.

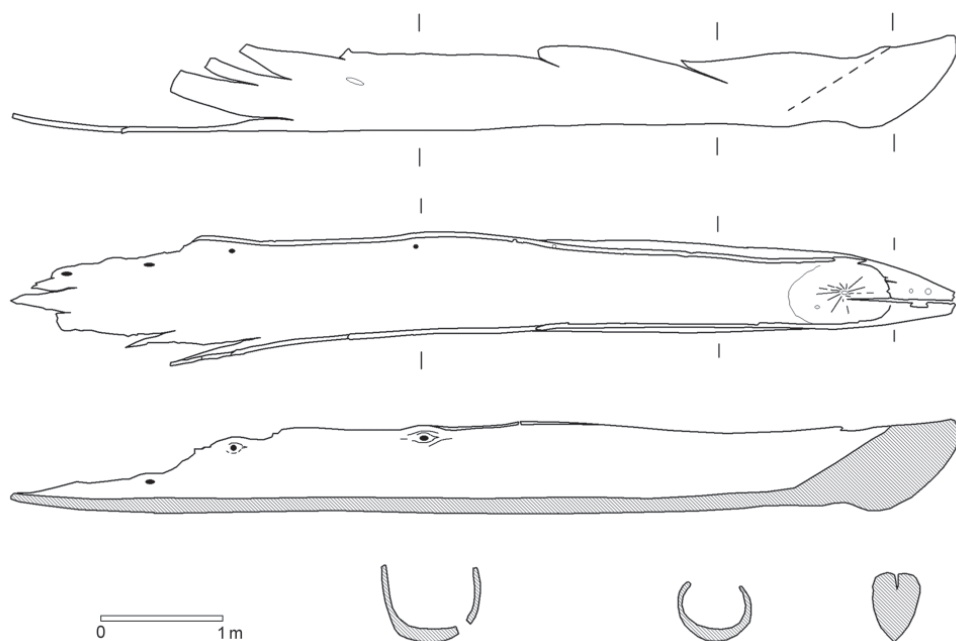


Fig. 3. Labětín logboat plan.

### Kolín 1

A logboat discovered in the city of Kolín in 1921 was recovered and is now displayed in the National Museum in Prague. The boat was uncovered approximately 3 m below the riverbed during canal construction on the Elbe River. A number of iron implements from various periods were also discovered during the excavation. As a result of the personal attention of Lubor Niederle, the boat was raised and brought to Prague for conservation.

Niederle initially measured the vessel at 9.45 m in length, 66 cm in width, and 55 cm high. Some degradation has apparently occurred, although the original measurements may have been inaccurate. When recorded in December 2007, the vessel measured 7.96 m in length, 62 cm in width, with a height of 50 cm (Fig. 4). Similar to the Labětín boat, the Kolín 1 vessel was constructed from a whole tree trunk by removing the bark and hollowing the interior. There are no bulkheads or transverse ridges, and a number of round holes (2–3 cm in diameter) perforate the vessel's upper sides. The holes were initially interpreted as outrigger attachment locations (NIEDERLE 1923, 34). The bow and stern taper to narrow overhanging ends, both of which are incised by narrow slots. The stern slot is cut in the shape of a 'T', possibly a niche for a steering oar. Hrubý (1965, 127) described a nearly identical feature on a Moravian vessel (Staré Město), which was later destroyed. Niederle suggested that the bow slot was intended either for a figurehead or to hold a torch during nighttime fishing.

In 2007, radiocarbon analysis (Beta-235738) on a sample from the Kolín 1 logboat resulted in a date of  $980 \pm 40$  BP (Cal AD 990 to 1160).

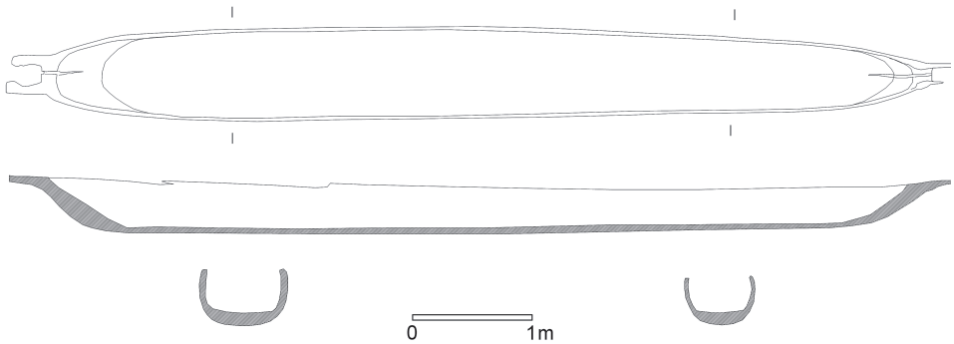


Fig. 4. Kolín 1 logboat plan.

### Kolín 2

The second logboat recovered from Kolín was pulled from the Labe during canalization works in the 1920s. The vessel has been on display since 1990 at the Oblastní muzeum in Děčín as part of the "Sailing on the Elbe" exhibit. The boat currently measures just over 9 m in length, although some damage to the stern

means that the original length was somewhat greater (Fig. 5, 6). The maximum width is 81 cm, and maximum height is 38 cm. Two transverse ridges are apparent, one at a distance of 110 cm from the stern, the other 201 cm from the bow. Although relatively flat-bottomed, there is no appreciable chine and the transition to side walls is rounded. Floor thickness varies from 10 to 15 cm, side walls are thinner, 4 to 5 cm. The vessel ends are squared in plan view, although tapering upward in profile. Although damaged, it appears that the stern end likely had an overhang.



Fig. 5. Kolin 2 logboat at the time of recovery (Photograph courtesy of the Kolin Regional Museum).

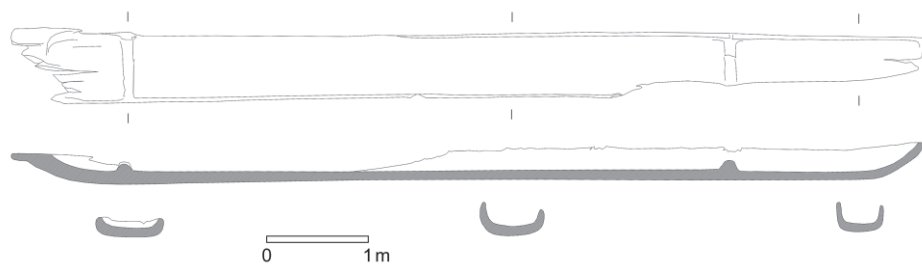


Fig. 6. Kolin 2 logboat plan.

The Kolín 2 logboat is similar in form to those vessels identified by Ossowski (2000) as being used for rapid transport in the early Slavonic period. Long, low, and narrow, the Polish vessels of this type date from the 8<sup>th</sup> to the 14<sup>th</sup> centuries AD. The Kolín 2 vessel was conserved in the early 1990s and has not been dated by absolute methods.

#### Oseček

In October 1949 workmen digging for sand found an oak logboat in the Labe River between Kolín and Poděbrady (NOVOTNÝ 1950, 231). The discovery location, near the village of Oseček, is approximately 1 km from the Labe's confluence with the Cidlina River. Most of the vessel was pulled free of the sandy bottom, although one end, likely the stern, broke off and remained stuck in the riverbed. The recovered piece measured just over 9 m in length, 85 cm wide, and 30 cm high. Five curving transverse ridges cross the floor. In September 1950, "by happy coincidence", the remaining portion of the vessel, over 4 m in length, was dug from the river bottom. With the recovered stern, the dugout measured 14 m in total length, with seven transverse ridges. Two rectangular holes perforated both the overhanging bow and stern platforms, similar to the Jaroměř boat. As fragments of another vessel had been found in 1940 in exactly the same location (later cut up for firewood), Novotný (1950, 233) suggested that the two had been joined as a raft.

The remains of the Oseček vessel (three large pieces and several smaller fragments) were recently measured and documented (Fig. 7). The stern portion measures 6.76 m in length, with a maximum width of 84 cm. The bow portion, broken longitudinally in half, is 7.94 m long and only 78 cm wide. A piece 4 m long and 30 cm wide has broken off the bow, along with several much smaller fragments. The floor thickness of 6 cm and the 4 cm sidewalls are very consistent. Six transverse ridges are apparent across the floor, and possibly a seventh running through the area where the vessel was torn in half. The ridges are relatively wide

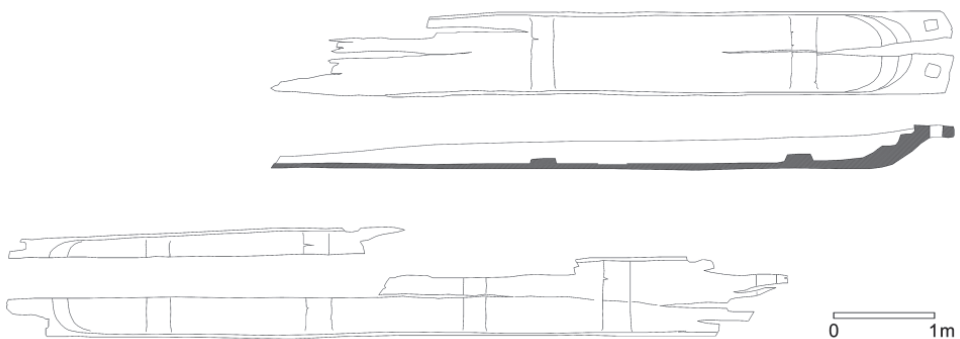


Fig. 7. Oseček logboat plan.

(20–30 cm) and low (2–3 cm). The two holes perforating the overhanging stern platform are approximately  $10 \times 10$  cm. The stern platform itself has split and opened longitudinally. The bow has also deteriorated to such an extent that the holes, initially with similar dimensions to those at the stern, have become open slots. Although measurement is difficult because the two halves no longer fit precisely together, the vessel's original length was at least 13.75 m, and easily could have been 14 m, as originally stated by Novotný. The Oseček boat is thus the longest vessel known from the Czech Lands, and indeed one of the largest in Europe.

### Poděbrady 1–3

At least five logboats have been found along the Labe near Poděbrady. Portions of three vessels have survived, and are held in the cellars of the Poděbrady castle (Fig. 8). All three Poděbrady logboats differ markedly from the previously de-

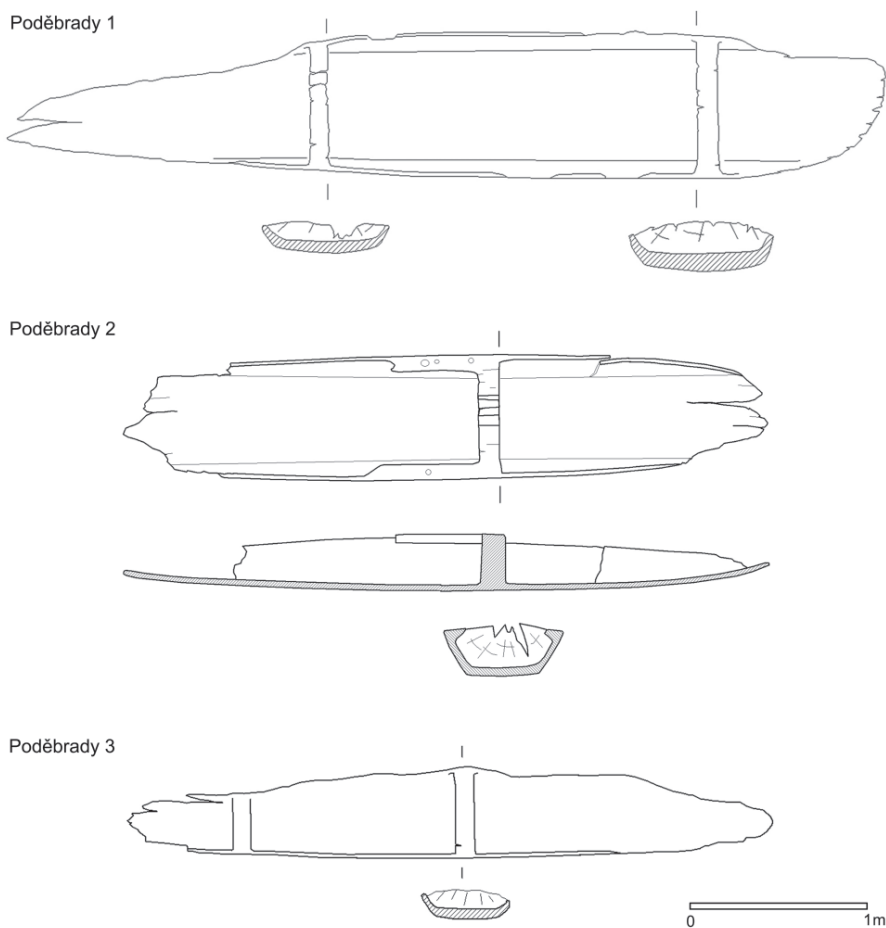


Fig. 8. Poděbrady 1, 2, 3 logboat plans.



scribed Bohemian examples in that they feature bulkheads or transverse ribs. One vessel (Poděbrady 2) is nearly complete, and features thwarts and a bulkhead carved from the solid. This combination of features is apparent on at least two other Czech logboats (Spytihněv and Příkazy, both from Moravia) and on similar vessels across Europe. According to Ossowski (2000, 65), these are one-man boats used for fishing, where the bulkhead functionally divides the boat into two halves. The ‘dry’ half was reserved for the fisherman, and the ‘wet’ portion was used for storing tackle and fish. This type of vessel developed in the early Middle Ages, and in some areas of Poland has survived nearly to the present day.

Poděbrady 2 measures 3.62 m in length, 68 cm in maximum width, and is 40 cm high. The hull is trapezoidal in cross-section, with a sharp chine. Little is known about the provenience of the vessel. It was not a part of the museum’s collections as of 1931, although by 1951 it was included (HELLICH 1931; NOVOTNÝ 1951, 290). The two other logboats (Poděbrady 1 and 3) survive only as floor segments, one measuring 4.96 m and the other 3.64 m in length. The fragmentary boats are similar in construction, each with two transverse ridges and a clear chine where the walls meet the floor. Widths of these vessels may be estimated at 70 cm and 60 cm respectively, although original lengths cannot be determined from the surviving fragments. Dr. Jan Hellich, the museum’s founder, likely collected Poděbrady 1 sometime in the 1920s or 1930s, and there are indications that it was found by workers digging sand below the castle (NOVOTNÝ 1951, 290). Poděbrady 3 was discovered in 1964 during construction of the town’s hydroelectric station (JUSTOVÁ 1965; 1969).

#### Přerov nad Labem

An oaken logboat was found along the banks of the Labe near Přerov nad Labem in September 1954, where workers had been clearing the river of fallen trunks. Due to its substantial size and weight, the boat (in three pieces) was recovered only in March of 1957 (Fig. 9). When fitted together, the three pieces measured 10.3 m in length. Maximum width was 1.3 m, and height 90 cm. The vessel’s form is quite similar to the Labětín logboat. In construction, the bark was scraped from the parent tree, and the inside hollowed. The floor is smooth without ridges or bulkheads, and there are holes through the upper walls. At the time of recovery, “a notch for a rudder” was clearly visible (BEDNARÍK 1957, 152).

The logboat was taken from Přerov nad Labem to the museum in Český Brod. As the vessel was too large to fit into the building, it was kept outside in the museum’s yard. As a result of these storage conditions, the vessel has considerably disintegrated and today consists of a number of indistinct fragments. The remaining pieces were conserved with PEG in 2003. Following conservation, a low shed was built to offer some protection from the elements.

There are records of other finds from the same location; in 1915 a researcher investigating early ceramic shards recorded how “...years ago a roughly worked boat, more than 10 m long, was found here in an oxbow lake” (AXAMIT 1915, 81). The scanty description indicates similarity to the above vessel: no ridges or





Fig. 9. Přerov nad Labem logboat at the time of recovery (Photograph courtesy of the Kolín Regional Museum).

other interior features were apparent. The boat fell apart as it dried, and only the bow, used as a doghouse, survived for a time.

### Skorkov

In August 1963, the schoolmaster from the village of Skorkov reported the discovery of a dugout logboat. Skorkov is located on the Jizera River 7km from the confluence with the Labe. The vessel protruded from beneath a house on the river's right bank, beneath an old mill (NECHVÁTAL 1969, 812). The vessel had been discovered during low water in July, although at the time it was thought to be a piece of felled timber. Children playing in the river uncovered more, and only then did Skorkov's inhabitants realize that the wood had been worked and that the find was a boat. The vessel extended some 2.3 m from the mud, and was about 80 cm wide. A transverse ridge approximately 15–20 cm wide was located 70 cm back from the boat's pointed end. The vessel was eventually reburied as the river rose, and is presumed to remain in-situ.

### Otradovice

In the spring of 2002, the Czech Hydro-Meteorological Institute undertook a survey of Bohemian rivers following the floods of the previous winter. In

the course of the survey, an unusual logboat was discovered near the village of Otradovice on the Jizera River only 4.5 km from its confluence with the Labe. Only a small portion of the vessel protruded from the water, most of the hull was submerged nearly 2 m below the river's surface, pinned by the trunk of a fallen tree (ŠILHOVÁ – ŠPAČEK 2004, 29). Further reconnaissance of nearby terrain revealed that a 5 m section of the riverbank had been washed away by floodwaters, and investigators speculated that this had loosened the monoxyl from its original resting place (ŠPAČEK 2003, 224). As the water level was forecast to rise by over 1 m, archaeologists from the Městské muzeum in Čelákovice secured the vessel with a rope. Water levels receded by the end of April, and the logboat was pulled from the river by an all-terrain vehicle. After five days on the riverbank, the vessel was brought to the museum for conservation. After considerable deliberation, sucrose bulking was chosen as the method of treatment. Following a final surface application of polyethylene-glycol in July 2003, the vessel was placed in the museum's permanent exhibition gallery (ŠILHOVÁ – ŠPAČEK 2004). A wood sample analyzed in 2007 (Beta-235739) resulted in a date of  $780 \pm 50$  BP (Cal AD 1170 to 1290).

The surviving portion, most probably the bow, measures 6.65 m in length, 80 cm in maximum width, with a height of 40 cm (Fig. 10). This vessel also lacks bulkheads or transverse ridges across the floor. The boat's interior is fairly roughly hewn, leaving ripples or waves in the floor's surface. There are two vertical holes drilled into the bow's starboard side, although they do not completely perforate the bottom surface. Other holes are apparent along the vessel's upper sides. Most interestingly, however, this vessel is the single example of a Czech logboat not made from oak (*Quercus sp.*); the wood species employed to build this boat is silver fir (*Abies alba*). There are very few European logboats made of fir; this timber is not cited on McGrail's list of ethnographic and archaeological logboats (MCGRAIL 1987, 60). Among the few published examples are several early modern vessels from Switzerland's Aegerisee (ARNOLD 1983, 276). Steffy (1998, 257) notes that silver fir, although not as durable as other timbers,

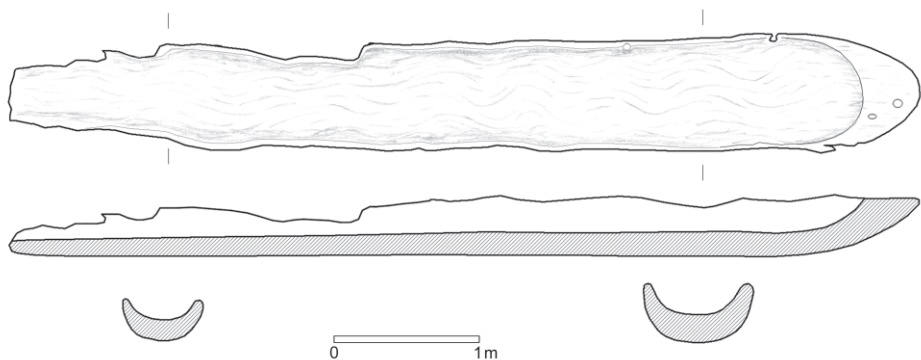


Fig. 10. Otradovice logboat plan.

was used for building ancient Mediterranean triremes because of its light weight and availability in great lengths.

In the Czech Republic silver fir grows only at elevations above 300 m, meaning the vessel was likely constructed along the Jizera's upper reaches, and then sailed downriver to the Labe basin (ŠILHOVÁ – ŠPAČEK 2004, 30).

### Čelákovice

The second logboat at the Čelákovice museum was recovered locally on the Labe in 1943, during completion of the river course canalization (ŠPAČEK 2004, 154). This vessel has a central transverse ridge and two bulkhead walls at either end. The stern does not survive; the bow is completely hollowed and comes to a point. The hull is trapezoidal in cross-section, narrowing to a V-shape at the bow. Surviving length is 6.72 m, maximum width is 62 cm, and height is 34 cm (Fig. 11). The walls have a very uniform 2–3 cm thickness. Several 2 cm holes perforate the vessel's sides, and there is a 5 cm oval opening near the point of the bow. A roughly rectangular hole has been hewn into the vessel's floor just aft of the first bulkhead. Novotný (1951, 284) suggested that this hole was intended to let water into this area of the boat and thus create a fish-well; however, given that there is not a bulkhead but a transverse ridge aft of the hole I consider this explanation unlikely. The hole may have been intended to symbolically 'slay' the boat for deposition or disposal, or it may have been cut during the (undocumented) recovery. This vessel is not dated.

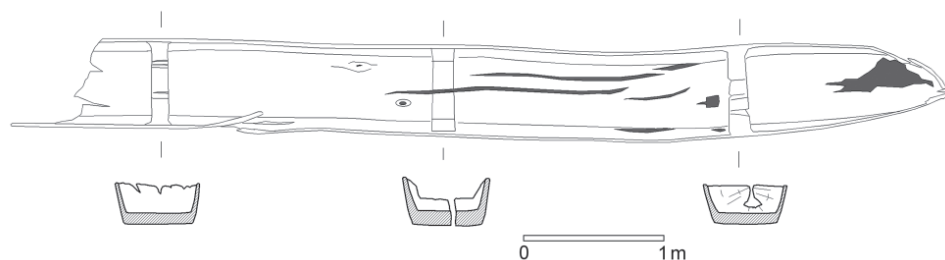


Fig. 11. Čelákovice logboat plan.

### Toušěň

The nearly complete Toušěň logboat was recovered from the left bank of the Labe around the beginning of the Second World War (NOVOTNÝ 1951, 291), and is now kept in the Oblastní muzeum Praha-východ in Brandýs nad Labem. The surviving length is 6.35 m, although missing portions at the bow and stern mean the vessel was originally nearly 7 m long. Constructed from a trunk split lengthwise in half, the U-shaped hull closely follows that form of the parent tree (Fig. 12). There are two large bulkheads, one near the bow and one at the stern.

Maximum width is approximately 70 cm, and the vessel's height is 30 cm. Like the Kolín 2 logboat, the Toušeň vessel is similar in form to the long, low, narrow Polish vessels identified by Ossowski (2000) as being used for rapid transport in the early Slavonic period. The Toušeň logboat has not been dated.

#### Brandýs nad Labem

A logboat fragment of unknown provenience is also held in Brandýs nad Labem. The floor portion is nearly 5 m in length, and a maximum width of 56 cm survives. Remains of two transverse ridges and a distinct chine are apparent (Fig. 13). The vessel would thus have a trapezoidal profile in cross-section, similar to the Čelákovice boat and Poděbrady 1 and 3. This logboat has not been dated.

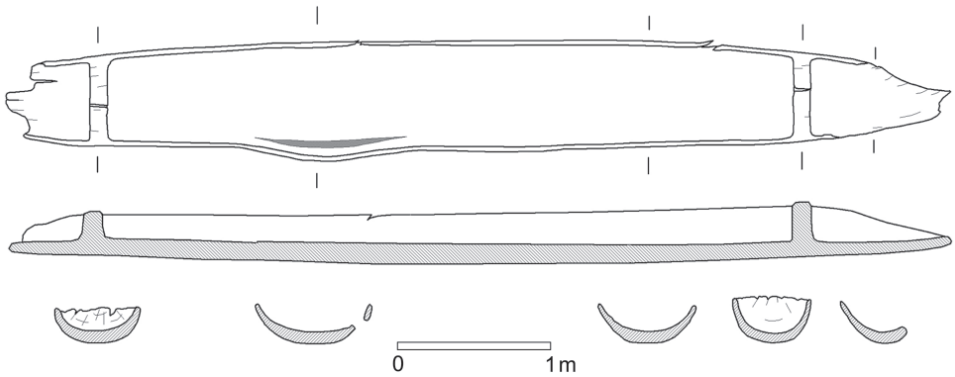


Fig. 12. Toušeň logboat plan.

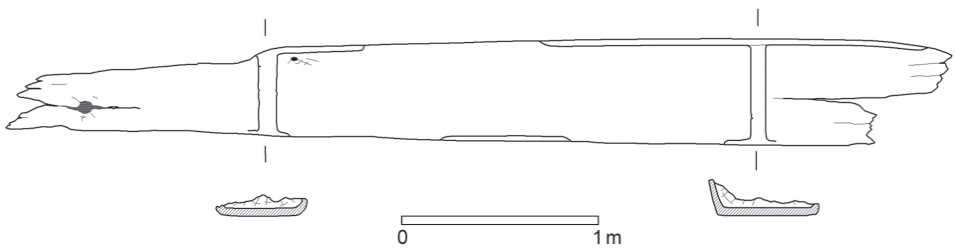


Fig. 13. Brandýs nad Labem logboat plan.

### Moravia

Eight logboats are preserved in Moravia. All known Moravian vessels were discovered along the Morava River. Five boats are accessible in museums, two are in state repositories, and one remains buried in-situ. A number of further vessels are known from literature or antiquarian sources.

### Mohelnice

In the spring of 1999, a large oaken logboat was discovered by Dr. Jaroslav Peška in Mohelnice Lake in northern Moravia. The discovery location is a former meander of the Morava River, which today is channeled approximately 50 m from the site. The vessel was buried too deeply in the bank to be pulled out by hand, and was finally extracted using two mechanical excavators. As land access to the site was difficult, floats were attached to the vessel and it was pulled across the lake by a small barge. Finally it was lifted with a crane to a flatbed lorry, and transported to the Vlastivědné muzeum in Olomouc. There being no space in the museum large enough to house the vessel, a special shed was constructed in the courtyard. The vessel was conserved for five years in PEG (KUČEROVÁ – PEŠKA 2004).

This vessel measures 10.46 m in length, 1.05 m in width, with a maximum height of 60 cm. Neither bow nor stern are elevated above the level of the gunwales, and there are four transverse ridges carved from the solid across the floor. Both bow and stern have overhanging platform ends; the bow tapers slightly in plan view, the stern not at all (Fig. 14). The vessel's overhanging platform ends may improve sailing performance as well as providing extra flotation and shielding the crew from spray. There is a structural advantage as well; a dugout end shaped like a "duck-bill" resists splitting and cracking caused by differential drying of wood fibres. Analysis of the Mohelnice vessel by both dendrochronology and radiocarbon methods revealed a construction date of 281 BC, making it the oldest dated specimen in the Czech Republic (KUČEROVÁ – PEŠKA 2004, 34). Using the minimum freeboard method (FRY 2000), the estimated carrying capacity for this vessel was calculated to be approximately 1077 kg (ROGERS 2004, 113).

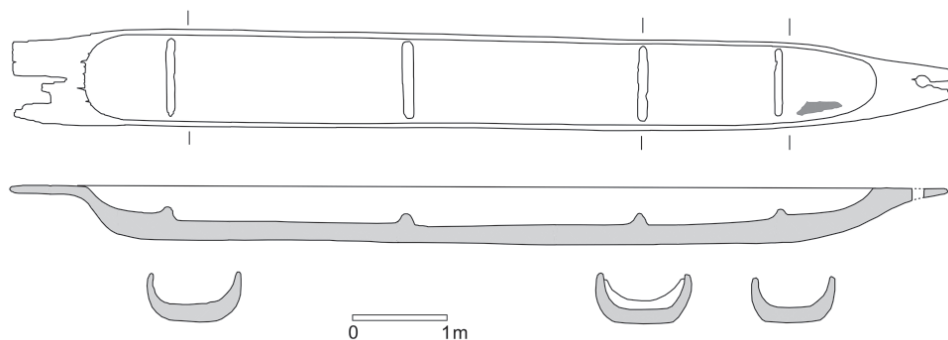


Fig. 14. Mohelnice logboat plan (re-drawn after KUČEROVÁ – PEŠKA 2004).

### Příkazy-Hynkov

A much smaller logboat was discovered in August 1962 at the village of Příkazy-Hynkov, along the Morava River northwest of Olomouc. Local inhab-

itants pulled the vessel to shore, and found a wide-bladed iron axe inside the boat. Investigators concluded that the artifact dated the boat to the Middle Ages (TRŇÁČKOVÁ 1963). In 2006, dendrochronology samples from the vessel were analyzed at the Agricultural University in Brno, revealing a construction date after 1537 AD (RYBNÍČEK 2006).

The vessel has only minor damage on the stern, and is quite similar to the boats from Spytihněv and Poděbrady with a bulkhead to separate the ‘wet’ and ‘dry’ functional spaces. Vessel length is 4.18 m, maximum beam is 65 cm, and height is 30 cm (Fig. 15). Walls are a very uniform 2–3 cm in thickness.

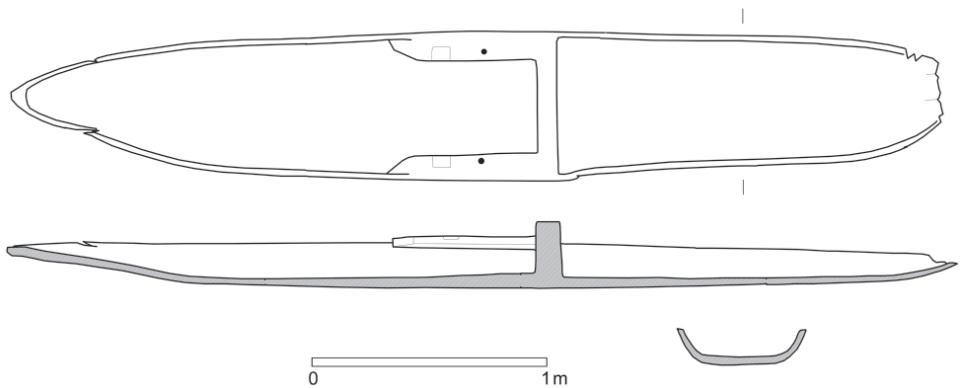


Fig. 15. Příkazy-Hynkov logboat plan (after R. Frait).

### Spytihněv

In June of 1929, an oaken monoxyl was discovered in the bank of the Morava in the village of Spytihněv. The boat lay buried in sand beneath the trunk of an enormous fallen oak. The vessel's surface had a blackened appearance, and had suffered minor damage on the stern from the fallen tree (HANÁK 1930, 19). The vessel currently measures 3.83 m in length, with a width of 60 cm and height of 30 cm. In form the Spytihněv boat is quite similar to the Příkazy vessel above, featuring a bulkhead and thwart carved from the solid, with apparent grooves for a seat-board (Fig. 16). The boat's ends are slightly elevated above the level of the gunwales. Estimated carrying capacity for the Spytihněv boat was calculated to be around 220 kg (ROGERS 2004, 113).

Hanák (1930, 20) suggested that this vessel is associated with the Slavonic stronghold at Spytihněv, which was founded in 1028 AD by duke Břetislav and named after his first-born son. The supposition may be essentially correct, as Ossowski (2000, 65) has assigned this type of logboat to the Middle Ages on the basis of numerous dated Polish examples. The similar vessel from Příkazy was dated by dendrochronology to 1537 AD.

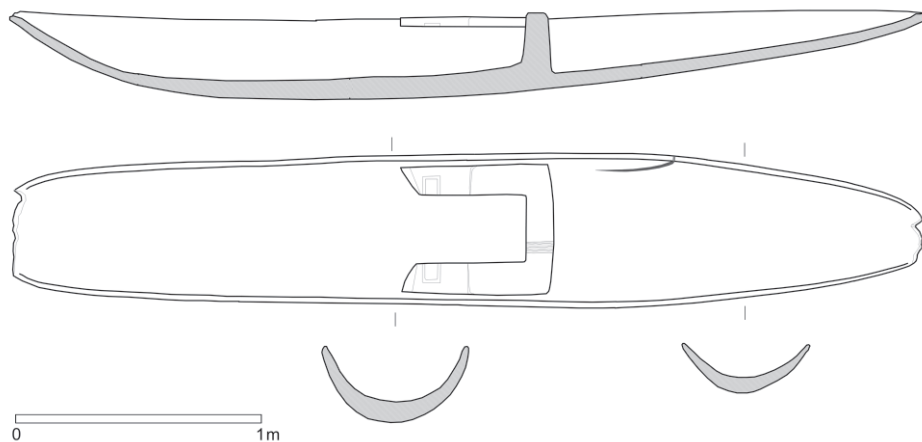


Fig. 16. Spytihněv logboat plan.

### Uherské Hradiště

In June of 1946, a dugout boat was found in the Morava River at Uherské Hradiště. The vessel, though damaged on the stern, was essentially whole and was pulled from the muddy riverbed by members of the Uherské Hradiště rowing club (HRUBÝ 1965, 126). It measures 5.22 m in length, with a maximum beam of 60 cm and a height of 34 cm. The floor is thickest in the middle (13 cm), and the transition to the sides is rounded with no appreciable chine. The side walls narrow to 2 cm thick on the upper portions. A tapering 'block' carved from the solid protrudes from the floor near the bow, and there are two similar blocks near the stern (Fig. 17). The

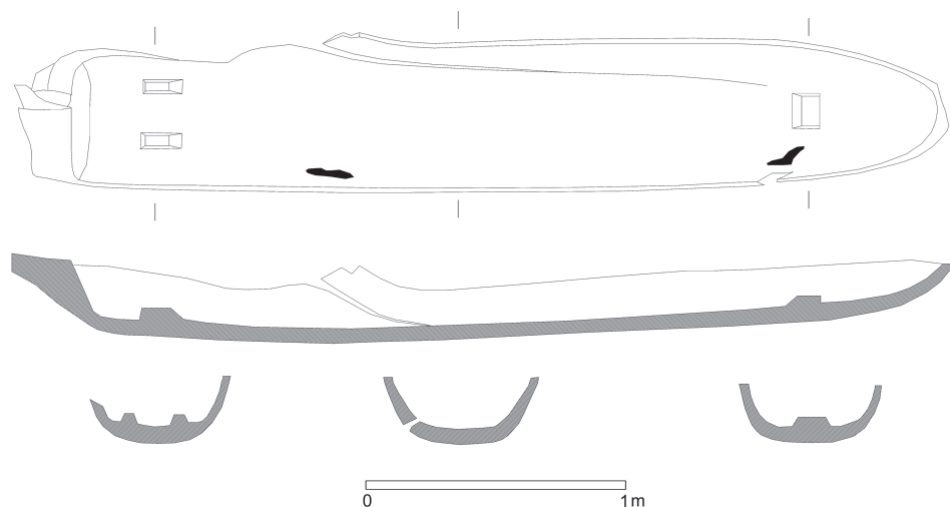


Fig. 17. Uherské Hradiště logboat plan.



stern terminates with an overhanging platform end. Estimated carrying capacity for this vessel was calculated to be around 285 kg (ROGERS 2004, 114). This boat has not been dated.

#### Mikulčice 1–4

Among the hundreds of thousands of discoveries at the Great Moravian stronghold at Mikulčice were four oaken monoxyl logboats and an assortment of related objects such as paddles, fishhooks, and fish traps. During the 1967 season, the citadel's northwest entrance was uncovered. The bow of a dugout boat (Mikulčice 1) was found inside the palisade walls near the end of the causeway. The fragment measured 2.83 m in length, 75 cm in beam, and 26 cm high and included a transverse ridge curving from wall to wall (Fig. 18).

Also uncovered during the 1967 season, two large, well-preserved dugout vessels were found lodged against the causeway pilings. The first of these (Mikulčice 2) was 8.83 m long, 66 cm wide, and 36 cm high. Two transverse ridges cross the floor, and a square hole 8 cm per side perforates the bow (Fig. 19).

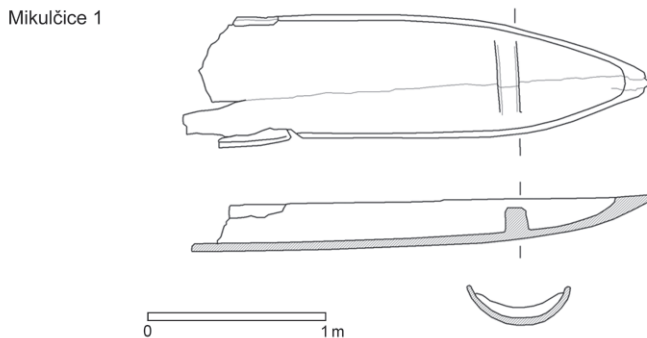


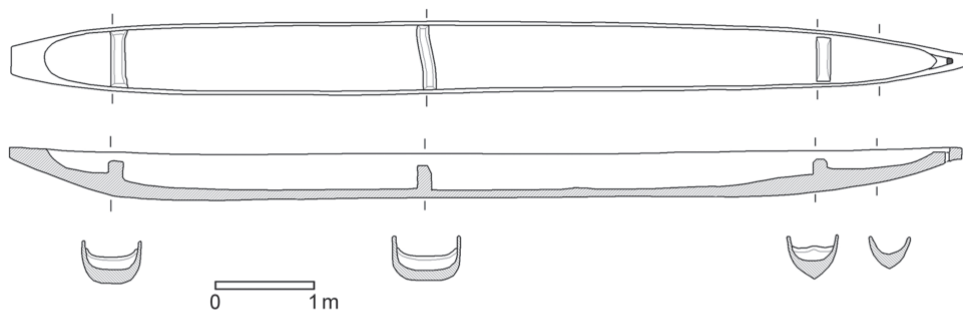
Fig. 18. Mikulčice 1 bow fragment (after POLÁČEK – MAREK – SKOPAL 2000).

The second vessel found in the causeway (Mikulčice 3) was located immediately beneath the first, lodged against a bridge piling. It was 9.88 m in length, 71 cm at the broadest point, and 45 cm high. There are three transverse ridges across the floor, and a 12 cm peg was found inserted through the hole in the bow (Fig. 19).

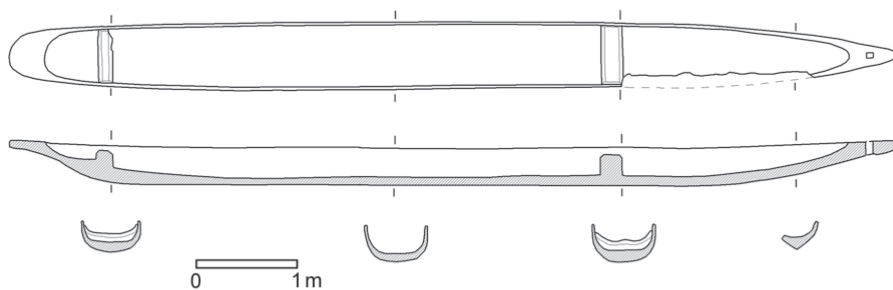
Both Mikulčice 2 and 3 have U-shaped cross-sections sloping to V-shaped ends. Small platform ends overhang both bow and stern. Dendrochronology analysis dates wood from the causeway pilings to the last three quarters of the 9<sup>th</sup> century AD. River and flood sediment began filling the channels around the fortified islands by the first half of the 10<sup>th</sup> century providing an age estimate for the logboats as well (POLÁČEK – MAREK – SKOPAL 2000, 206). The bow fragment and both complete vessels were conserved in PEG, and put on display at the Mikulčice Nation Cultural Monument museum.



Mikulčice 2



Mikulčice 3



Mikulčice 4 (reconstruction)

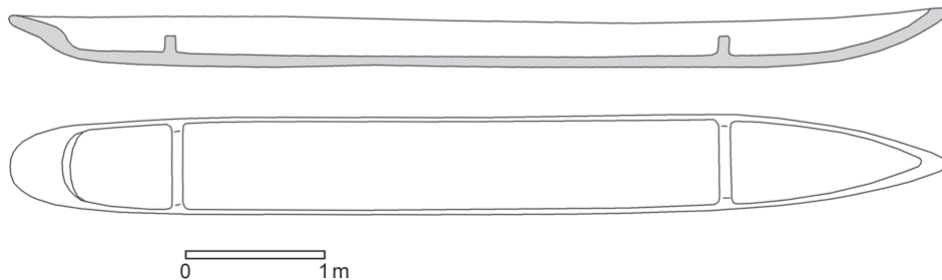


Fig. 19. Mikulčice 2–4 logboats (after POLÁČEK – MAREK – SKOPAL 2000).

The fourth and final logboat found at Mikulčice was uncovered in 1984, nearly 30 years after the first discoveries. It was located some distance from the previous boats, in the former river channel near a small bridge. The vessel, measuring 6.72 m in length, was exceptionally fragile and in some places consisted of little more than an imprint in the soil. Despite the poor state of preservation, the boat's form was for the most part visible. The vessel appears similar to Mikulčice 2, with a pointed bow, two transverse ridges, and a rounded, overhanging stern plat-

form. In cross-section it is somewhat flatter than vessels 2 and 3, with a more fully hollowed-out stern. Due to its extremely delicate nature, Mikulčice 4 was left in-situ and reburied. Reconstructed dimensions are 6.72 m in length, 75 cm maximum width, and height 26 cm (Fig. 19). Radiocarbon analysis on wood samples taken from Mikulčice 4 revealed an age of  $1180 \pm 40$  BP (POLÁČEK – MAREK – SKOPAL 2000, 206). Estimated carrying capacities for these vessels were calculated as follows: 563 kg for Mikulčice 2, 635 kg for Mikulčice 3, and 492 kg for Mikulčice 4 (ROGERS 2004, 113).

There are many other logboats in both Bohemia and Moravia known from historical sources, which have disappeared or were destroyed. It is likely that many vessels were lost during deepening and straightening of the rivers channel in the 1920's and 30's. Logboat discoveries known only from literature include several found during coal mine excavation at the Komořany Lakes in northern Bohemia (NOVOTNÝ 1951, 288), and at least five from Moravia that “fell to dust” or were destroyed (HRUBÝ 1965). Several examples were burned for firewood, and one was used as a doghouse.

### Analysis

Currently, the main difficulty in proceeding with a description of chronological development lies in the lack of dating for Czech logboats. Logboat chronology, as ascertained by many researchers (i.e. MCGRAIL 1987, 57; CHRISTENSEN 1996, 72), is difficult or impossible to ascertain solely from typology. While logboats may have functioned as prototypes for some types of planked vessels, a strictly evolutionary interpretation should be discarded. Logboats of various forms have been built and used in Europe from at least the Mesolithic until modern times. A non-linear evolution perspective is even more significant when the vessels' contexts (inland terrain and topographic transport zones) are taken into account (WESTERDAHL 1992; NYMOEN 2008). I regard this to be especially important when considering the Czech Republic's inland geography. Vessel dating analysis should therefore be understood within the context of the local transport landscape. Despite the lack of chronology for Czech logboats, some remarks can be made concerning vessel dating, morphology, distribution, and use.

### Dating

Only five Czech vessels (two from Bohemia and three from Moravia) have been analyzed by  $^{14}\text{C}$  or dendrochronology (see Table 1). Several more vessels have been assigned tentative dates on the basis of context or close similarity to other dated vessels. The oldest dated example is the Mohelnice boat, constructed from a tree felled after 281 BC. It is certain, however, that dugout vessels were in use on Central European waterways far earlier. The oldest Polish logboats are dated to the Bronze Age, for example the vessels from Chwalimskie Bagno and

Ciešle (both ca. 3700 years old) (OSSOWSKI 2000, 61). On the basis of pollen analysis, Novotný (1951, 280) claimed that the destroyed Jiretín boats dated from the Bronze Age.

Dates have been tentatively assigned to several vessels on the basis of close morphological and constructional similarity to dated examples. The Jaroměř logboat, for example, closely resembles Polish *Lewin*-type vessels, dating from the early centuries AD (OSSOWSKI 2000). This identification is supported by the geographic proximity of the discovery location to those of the vessels. *Lewin*-type logboats were previously known from three finds along the upper Oder. The identification of the Jaroměř logboat as a *Lewin*-type vessel extends the spatial range of this category to Bohemia.

The Mikulčice 2 and 3 logboats, excavated in 1967, were conserved in PEG and were not sampled for radiocarbon dating analysis. Ceramic vessels and an assortment of iron axes and blades found in close proximity to the boats were “safely dated to the eighth and ninth centuries” (KLANICA 1968, 63). The boats were lodged against causeway pilings in a former arm of the Morava River. Wood from the causeway bridge was dated by dendrochronology to the last three quarters of the 9<sup>th</sup> century AD, and the river channel began filling with sediment and debris during the first half of the 10<sup>th</sup> century. The vessels can be roughly dated by this context, and Mikulčice 4, the final logboat discovered at the stronghold, was radiocarbon dated to  $1180 \pm 40$  BP (POLÁČEK – MAREK – SKOPAL 2000, 206).

The Kolín 1 and Otradovice vessels have been radiocarbon dated to the 11<sup>th</sup> and 12<sup>th</sup> centuries (Cal AD 990–1160 and Cal AD 1170–1290, respectively). Constructional similarities between these two vessels as well as a number of other logboats from the Labe River are apparent. The Kolín 1, Otradovice, Labětín, and Přerov nad Labem vessels were all constructed with little or no exterior shaping aside from the bow and stern, and retain a circular or semi-circular shape in cross-section. As with many vessels from the Labe watershed, these boats all lack interior partitions such as bulkheads or transverse ridges.

The logboats from Spytihněv and Poděbrady (2) were likely constructed during a period from the Middle Ages to early modern times. The features indicating use as a one-person fishing vessel (i.e. bulkheads with thwarts, ‘wet’ and ‘dry’ internal partitions) are well documented from other regions (i.e. OSSOWSKI 2000, 65), and well preserved on these particular vessels. Constructional features of these boats are very similar to those of the Příkazy vessel, dated after 1537 AD (RYBNÍČEK 2006).

The Příkazy vessel is the youngest surviving dated Czech logboat. Dugouts were recorded on the Labe as late as the 1940’s, when Novotný (1951, 257–258) observed a vessel belonging to ‘grandfather’ Hulík in Kolín, who said the boat had belonged to his grandfather. Logboats were also used in the modern era on Austria’s Mondsee, the Váh River in Slovakia, and the Dunajec River in Poland. The results of dating analyses demonstrate that Czech logboats were built and utilized over a tremendous span of time.

Vessel	<sup>14</sup> C Age	Date	Method	Lab. No. or Reference
Kolín 1	1030 ± 40 BP	Cal AD 990 to 1160	Radiocarbon	Beta-235738
Mikulčice 4	1180 ± 40 BP	Cal AD 710 to 980	Radiocarbon	GrA-9465, POLÁČEK – MAREK – SKOPAL 2000
Mohelnice		After 281 BC	Dendrochronology	KUČEROVÁ – PEŠKA 2004
Otradovice	780 ± 50 BP	Cal AD 1170 to 1290	Radiocarbon	Beta-235739
Příkazy		After 1537 AD	Dendrochronology	RYBNÍČEK 2006

Table 1. Results of dating analysis for Czech logboats.

### Distribution and Geography

Geographically, Czech logboat sites and remains are clustered along the country's two dominant rivers, the Elbe and the Morava. In Moravia, the discovery sites range from the foothills of the Jeseníky Mountains in the north nearly to the Morava's confluence with the Dyje. The major concentration of Moravian logboats (10 existing or historically known vessels) occurs between Uherské Hradiště and Mikulčice. Nearly all logboats in Bohemia have been found along the Labe River, extending from Jaroměř to Litoměřice, and concentrated between Pardubice and Mělník.

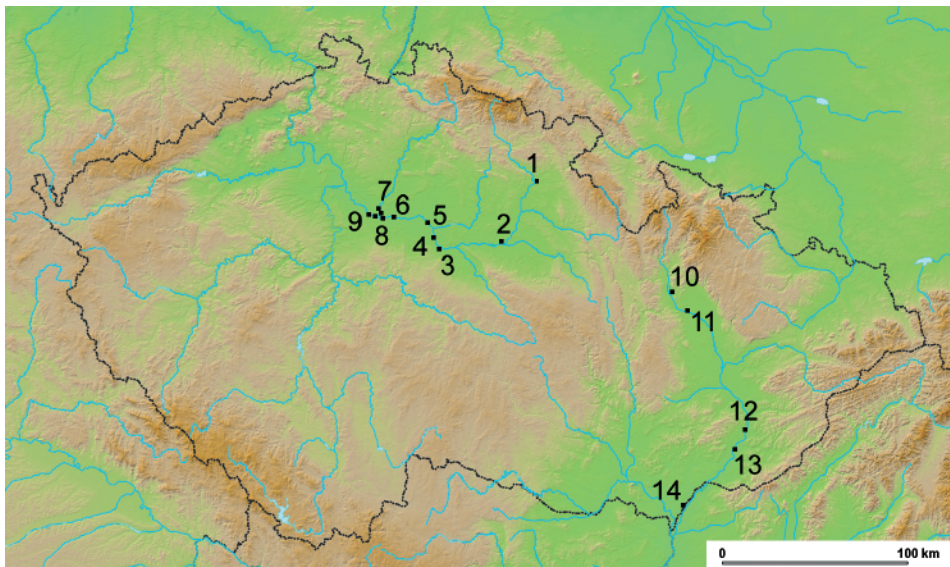


Fig. 20. Distribution map – discovery locations for surviving Czech logboats: 1 – Jaroměř; 2 – Labětín; 3 – Kolín 1, 2; 4 – Oseček; 5 – Poděbrady 1–3; 6 – Přerov nad Labem; 7 – Skorkov; 8 – Čelákovice; 9 – Otradovice, Toušeň and Brandýs nad Labem; 10 – Mohelnice; 11 – Příkazy-Hynkov; 12 – Spytihněv; 13 – Uherské Hradiště; 14 – Mikulčice 1–4.

## Size, Morphology and Features

Dimensionally, the complete and reconstructed vessels range in length from 3.62 m to 14 m, in breadth from 50 cm to 130 cm, and in height from 26 cm to 90 cm. Several incomplete vessels (Labětín, Přerov nad Labem, Čelákovice, and Otradovice) originally attained lengths of at least 7–10 m. The following table provides summary data for surviving Czech logboats, including overall dimensions and current location (Table 2).

Vessel	River	Current Location	General Description	Wood species	Length (cm)	Width (cm)	Height (cm)
Brandýs nad Labem	Elbe	Oblastní muzeum Praha-východ, Brandýs nad Labem	Floor fragment	Oak ( <i>Quercus sp.</i> )	492	56	14
Čelákovice	Elbe	Městské muzeum, Čelákovice	Stern missing	Oak	672	62	33
Jaroměř	Elbe	Jaroměř-Josefov, radnice	Complete	Oak	622	50	31
Kolín 1	Elbe	Národní muzeum, Prague	Complete	Oak	796	62	50
Kolín 2	Elbe	Oblastní muzeum, Děčín	Nearly complete	Oak	917	81	38
Labětín	Elbe	Východočeské muzeum, Pardubice	Stern missing	Oak	801	70	62
Mikulčice 1	Morava	NKP Mikulčice	Bow only	Oak	283	75	26
Mikulčice 2	Morava	NKP Mikulčice	Complete	Oak	883	66	36
Mikulčice 3	Morava	NKP Mikulčice	Complete	Oak	988	71	45
Mikulčice 4	Morava	Remains in situ	Torso	Oak	672	75	26
Mohelnice	Morava	Vlastivědné muzeum, Olomouc	Complete	Oak	1046	105	60
Oseček	Elbe	Terezín depository (NM)	Two parts	Oak	~1400	84	25
Otradovice	Elbe	Městské muzeum, Čelákovice	Stern missing	Silver Fir ( <i>Abies alba</i> )	665	80	40
Poděbrady 1	Elbe	Polabské muzeum, Poděbrady (zámek)	Floor fragment	Oak	496	80	25
Poděbrady 2	Elbe	Polabské muzeum, Poděbrady (zámek)	Nearly complete	Oak	362	68	40
Poděbrady 3	Elbe	Polabské muzeum, Poděbrady (zámek)	Floor fragment	Oak	364	50	10
Přerov nad Labem	Elbe	Regionální muzeum Kolín (Český Brod)	Fragments	Oak	~1030	130	90
Příkazy	Morava	Chudobín depository, Olomouc	Complete	Oak	418	65	30
Skorkov	Jizera	Remains in situ	Unknown	Oak	?	80	?
Spytihněv	Morava	Slovácké muzeum, Uherské Hradiště	Complete	Oak	383	60	30

Vessel	River	Current Location	General Description	Wood species	Length (cm)	Width (cm)	Height (cm)
Toušeň	Elbe	Oblastní muzeum Praha-východ, Brandýs nad Labem	Nearly complete	Oak	635	70	26
Uherské Hradiště	Morava	Slovácké muzeum, Uherské Hradiště	Complete	Oak	522	76	34

Table 2. Data summary for surviving Czech logboats.

Morphologically, the boats in this study exhibit a wide range of features and constructional styles. However, several observations regarding vessel form and elements can be made. All logboats from the Morava River watershed feature transverse ridges, interior bulkheads, or other floor elements carved from the solid. In Bohemia, nearly half of the surviving vessels (five of 12) have no ridges, bulkheads, or any form of internal division. Moreover, dating shows that at least two of the Bohemian logboats in question (Kolín 1 and Otradovice) are approximately contemporary with the Mikulčice vessels (10<sup>th</sup> to 12<sup>th</sup> centuries AD, all showing evidence of highly developed internal space demarcation). Transverse ridges and other features indicating demarcation of internal space were institutionalized by Moravian boatbuilders, while a separate tradition prevailed in Bohemia. The distribution of vessels with internal partitions reflects local boatbuilding techniques and traditions specific to each region.

Vessel features representing internal partitions are known throughout Europe. Transverse ridges or ribs cut from the solid are seen on many European logboats and have even been reported on dugouts from Asia (MCGRAIL 1987, 75; HORNELL 1946, 187) and North America (WHEELER et al. 2003, 540). The function and utility of transverse ridges remains controversial. Most early investigations asserted that ridges would strengthen the vessel (FOX 1926, 129; NECHVÁTAL 1969, 812). This view was challenged as researchers realized that ridges cut across the grain would have little effect on transverse strength (CLARK 1952, 287; MCGRAIL 1987, 75). Greenhill (1995, 102) considered it likely that ridges provided a toe-hold and helped the crew avoid slipping on wet wood. Alternate explanations include ridges as skeuomorphic representations of boat frames (HORNELL 1946, 187), spacers for floor planks (CLARK 1952, 287), and demarcation of various types of functional space (BEAUDOIN 1970, 76–87). McGrail (1987, 76), while tending towards the latter view, noted, “the precise function of each space may never be known...”.

In any case, the presence or absence of internal features is of great significance when examining the spread of construction styles. These are two quite different conceptual approaches to vessel design, possibly reflecting profound differences in technological and social concepts. All known Moravian vessels were constructed with internal partitions or other internal demarcation features, while nearly half of the Bohemian vessels have none. A clear geographic dichotomy exists, which can be explained as evidence of localized boatbuilding traditions.



### Raw Materials

Nineteen of the surviving 20 Czech logboats were constructed of oak (*Quercus sp.*); the sole exception is the Otradovice vessel, built from silver fir (*Abies alba*). There are many reasons for the prevalence of oak. In comparison with other species, oak has an ideal combination of size, grain, strength, workability and durability for building logboats. Regarding the durability of oak, it may be that this species simply endures longer in the archaeological record, although two of the oldest European logboats, from Pesse in the Netherlands (8265 BP) and Noyen-sur-Seine in France (7960 BP), were made of pine (*Pinus sp.*) (MORDANT – MORDANT 1992, 61). Most pre-Bronze Age logboats were made from softer woods. The two logboats from Tybrind Vig in Denmark, dated to 5370 BP and 5260 BP, were fashioned from lime (*Tilia sp.*) (ANDERSON 1987), as were three Swiss dugouts dating from the sixth millennium BC (ARNOLD 1993, 5).

It has often been assumed that while stone tools may have sufficed to work softwoods, metal tools would be required for hardwoods such as oak. Reappraisal of this view has occurred since the discovery of oak vessels from the Stone Age, for example the ten Neolithic oak logboats found at Paris-Bercy in 1991–1992. In the case of the Paris-Bercy vessels, it is likely that the hollowing process was accomplished at least partly through the use of fire (ARNOLD 2006).

### Utilization

Some logboats were undoubtedly used for resource procurement activities. Fishing, hunting, and other marine resource extraction strategies were made possible or greatly enhanced by the development of suitable watercraft. The likely primary purpose of at least three vessels in this study (Příkazy, Spytihněv, and Poděbrady 2) was fishing. On the basis of net weights and fish traps found nearby, Andreska (1975, 136) asserted that the Mikulčice logboats were mainly used for fishing. However, in view of the Mikulčice stronghold's island location and function as a major market and trade center it is likely that these vessels were also intended for a transport role. A 10 m vessel would be quite unwieldy as a fishing boat on a river; size alone seems to rule out subsistence as the main purpose of the Mikulčice logboats. Recent research at the early Slavonic center of Pohansko has shown that the limestone slabs used to construct the fortifications were quarried in the vicinity of Holíč and Skalica. The tremendous amounts of rock, estimated at 5100 m<sup>3</sup>, or 13 500 tons, were certainly transported by boat along the Morava and Dyje Rivers for a total distance of about 40 km (MACHÁČEK et al. 2007). There are at least eight vessels in this study with lengths of around 8 m or greater (and several more whose original size was likely in the same range). I consider that these boats were intended primarily for transport of goods or people, likely in the context of trade and exchange.

Trade and exchange at a distance requires transport. Water is by far the most efficient medium for transporting cargoes of nearly every type (BASS ed. 1972, 9; TEIGELAKE 2003, 155). In almost every case, it is faster, easier, and cheaper to move loads by water than by land. Archaeological evidence reflects the im-

portance of rivers as arteries of prehistoric trade, for example, transcontinental amber routes or trade in raw materials such as flint (CLARKE 1952, 282). Boats are especially well suited to carry bulky, heavy, and high-volume cargoes such as salt, grindstones, ores and metals (especially tin, copper and iron). Considerable movement of metals, both in ore and ingot form, took place beginning in the Bronze Age (HARDING 2000, 195). Grindstones at Staré Hradisko in Moravia were imported from distant regions such as Lovosice in Bohemia (300 km distant) and Austria's Burgenland (200 km distant) (ČIŽMÁŘ 2002, 45). Salt was being mined at Hallstatt and Dürrnberg in Upper Austria's Salzkammergut since at least the late Bronze Age (HARDING 2000, 253). Massive quantities were produced and exported, requiring reliable bulk transport. Weight capacity analysis of Czech logboats suggests that they were certainly capable of transporting large and heavy cargo. For example, the Mohelnice logboat could carry about 1077 kg, or 880 kg and a crew of three. The vessels from Labětín, Kolín, Oseček and Přerov nad Labem were comparable or larger in size, and could carry similar loads. In the absence of roads, the same load would require 12 men if carried overland, or six horses (and their handlers).

### Conclusion

The technology of boat building and watercraft usage are closely linked to a region's resources and socio-economic history. Building a boat requires a considerable investment of time and energy, with the expectation of a commensurate payback either in local resources or foreign ones via trade and exchange.

The geographical position of Bohemia and Moravia is important in this context, as these lands provide one of very few lowland passages between northern and southern Europe. High mountain ranges oriented east-west (the Alps, Carpathians, etc.) tend to channel transportation in those directions. It is more difficult to move directly north or south. One key north-south route across Europe runs through Moravia, where the headwaters of the Morava River come to within a few kilometers of the headwaters of the Oder. The 'Moravian Gate' is the easiest passage connecting the Polish Plain with Pannonia and the Danube. This corridor has been utilized by humans since at least the Upper Paleolithic (SVOBODA 1994). The Labe River has likewise been an important transportation link for many centuries, providing a useful route from the Bohemian heartland to Saxony and northern Germany (ZÁPOTOCKÝ 1969). Dugout logboats found in the major Czech river systems should thus be seen not only in the context of local riverine resource exploitation, but also medium and long-distance trade, travel, transport and communications.

This article is partly the result of research undertaken by the author for a PhD dissertation in archaeology at the University of Exeter (UK). My deep gratitude is offered to the personnel of the Czech museums and repositories who assisted me



and allowed me to examine and document the logboats of Bohemia and Moravia. Radiocarbon dating analysis was made possible by the University of Exeter, Department of Archaeology.

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## MONOXYLY JAKO DOKLAD NEJSTARŠÍ VNITROZEMSKÉ PLAVBY V ČECHÁCH A NA MORAVĚ

Dlabanky či monoxyly (čluny dlabané z jednoho kmene stromu) jsou jedním z nejstarších typů plavidel. Jsou objeveny na každém osídleném kontinentu a předpokládá se, že většina typů lodí z celého světa má za svého dávného předchůdce právě monoxyl. Vývoj jiných starobylých plavidel – vorů, lodí potažených kůží nebo lodí zhotovených z kůry – je limitován použitým přírodním materiálem a povahou jeho struktury. Také dlabanky jsou omezeny materiálem, ale mohou se rozšiřovat o přídatky jako jsou boční prkna a vodící destička. Někteří badatelé se proto domnívají, že to vedlo k vývoji lodí z prken (např. JOHNSTONE 1980; MCKEE 1983; GREENHILL – MORRISON 1995).

I když byly monoxyly dokumentovány po celé Evropě, stále kolem nich zůstává spousta otázek. Mnoho badatelů zjistilo, že stanovit chronologii pouze na základě typologie je obtížné nebo dokonce nemožné. I když monoxyly mohly fungovat jako prototypy pro některé typy plavidel vystavěných z prken, neměl by být vývoj těchto lodí interpretován lineárně. Pokud jsou plavidla dána do souvislosti s vnitrozemským terénem nebo topografií dopravních cest, ukazuje se mnohem zřetelněji nelineární vývojová perspektiva (WESTERDAHL 1992; NYMOEN 2008).

Z České republiky je známo více než 40 monoxylů, z nichž 20 je uchováno v depozitářích regionálních muzeí (7 na Moravě a 13 v Čechách). Dvě další lodě zůstaly in situ. V českém prostředí zájem o tato plavidla znovu oživilo několik nedávných objevů (monoxyly z Otradovic a z Mohelnice: KUČEROVÁ – PEŠKA 2004; ŠILHOVÁ – ŠPAČEK 2004). Tento článek shrnuje starší bádání (NOVOTNÝ 1951; HRUBÝ 1965), v katalogu prezentuje všechna dochovaná plavidla objevená v České republice a následně je analyzuje.

Monoxyly nám mohou sdělit hodně o navigaci a užívání vodních cest v minulosti. Tvary monoxylů závisely v první řadě na jejich funkci, okolnostech jejich provozování a tradicích a technologiích stavby lodí (OSSOWSKI 1999). I když chronologie u českých monoxylů chybí, můžeme se pokusit o určité srovnání, a to s ohledem na datování plavidla, tvar lodí, způsob využití a zeměpisné rozšíření.

Několik monoxylů bylo předběžně datováno na základě náleзовých okolností nebo blízké podobnosti s jinými datovanými plavidly. Pouze pět lodí (dvě z Čech a tři z Moravy) bylo datováno absolutně (tab. 1). Nejstarším datovaným příkladem (analyzovaným pomocí dendrochronologie) je člun z Mohelnice, vyrobený ze stromu poraženého po roce 281 př. n. l. Některá další plavidla byla datována do středověku. Jeden z monoxylů, objevených na velkomoravském hradišti v Mikulčicích (označen jako Mikulčice 4), byl radiokarbonově datován do 1180 ± 40 BP, tj. po kalibraci do let 710–980 n. l. (POLÁČEK – MAREK – SKOPAL 2000). Čluny Kolín 1 a Otradovice byly radiokarbonově datovány do středověku (po kalibraci 990–1160 n. l. resp. 1170–1290 n. l.). Výroba monoxylu z Příkazu byla datována dendrochronologicky, a to po roce 1537 (RYBNÍČEK 2006), tento kus je tak mezi našimi datovanými monoxyly zatím nejmladší. Výsledky datovacích analýz ukazují, že středoevropské monoxyly byly vyráběny a využívány po dlouhé období.

Dlabanky byly zaznamenána na Labi ještě ve 40. letech 20. století, kdy B. Novotný (1951, 257–258) pozoroval plavidla patřící místnímu rybáři Hulíkovi z Kolína, který tvrdil, že ona loď patří jeho dědovi. Monoxyly byly také používány v moderní době na rakouském Mondsee, na řece Váhu na Slovensku a na řece Dunajci v Polsku.

Geograficky se nálezy českých monoxyly a jejich částí kumulují podél dvou významných řek – Labe a Moravy. Na Moravě jsou místa nálezů rozšířena od úpatí Jeseníků na severu téměř k soutoku s Dyjí na jihu. Hlavní koncentrace moravských monoxyly (10 existujících nebo prokazatelně doložených plavidel) byla objevena mezi Uherským Hradištěm a Mikulčicemi. V Čechách byly téměř všechny monoxyly nalezeny v Labi od Jaroměře po Litoměřice, přičemž se převážně vyskytovaly na úseku řeky mezi Pardubicemi a Mělníkem.

Kompletní nebo rekonstruovaná plavidla vykazovala délku v rozmezí od 3,62 m do 14 m, šířku 50–130 cm a výšku 26–90 cm. Několik nekompletních plavidel (Labětín, Přerov nad Labem, Čelákovice a Otradovice) původně dosahovalo délky nejméně 7–10 m. Devatenáct z dochovaných dvaceti monoxyly bylo vyrobeno z dubu (*Quercus* sp.), výjimku představuje otradovické plavidlo, které bylo vyrobeno z jedle bělokoré (*Abies alba*).

Z hlediska morfologie vykazují lodě zahrnuté v této studii široké spektrum tvarů a konstrukčních stylů. Přesto můžeme nastínit několik závěrů ohledně tvaru plavidel a jejich jednotlivých prvků. Všechny monoxyly z povodí řeky Moravy vykazují příčná žebra, pažení vnitřního prostoru nebo jiné podlahové prvky vyřezané z hmoty stromu. V Čechách nemá téměř polovina dochovaných plavidel (pět z dvanácti) žádná žebra, vnitřní pažení ani jinou formu vnitřního členění. Příkladem mohou být dva zmíněné monoxyly z Čech (Kolín 1 a z Otradovic), které jsou přibližně současné s člunem Mikulčice 4. Na rozdíl od nich vyazuje mikulčické plavidlo známky vysoce vyvinutého vnitřního prostorového členění. Můžeme tedy shrnout, že příčná žebra a další prvky naznačující členění vnitřního prostoru byly užívány moravskými staviteli lodí, zatímco v Čechách převládala tradice odlišná. Rozšíření plavidel s vnitřními přepážkami tak odráží regionální techniky stavby lodí a tradice specifické pro každý region.

Některé monoxyly byly bezpochyby používány jako prostředek pro získání obživy. Rybolov, lov a další využívání vodních zdrojů se mohly z velké části rozšířit i díky vývoji vhodných plavidel. Podle velikosti a tvaru můžeme se značnou pravděpodobností určit, že nejméně tři lodě uvedené v této studii (Příkazy, Spytihněv a Poděbrady 2) sloužily primárně k rybolovu. Naopak nejméně osm lodí s délkou kolem 8 m a větších (a několik dalších, které měly původně srovnatelnou velikost) bylo v prvé řadě určeno pro dopravu zboží nebo osob, zřejmě v souvislosti s obchodem a směnou.

Voda je zdaleka nejefektivnější prostředek dopravy nákladů skoro jakéhokoli druhu. Ve většině případů je rychlejší, snadnější a levnější dopravovat náklad po vodě než po zemi. Archeologické doklady odrážejí důležitost řek jako dopravních tepen pravěkého obchodu. Větší monoxyly jsou dobře uzpůsobeny zejména k převozu těžkého a objemného nákladu, jako jsou kamenné žernovy, sůl, rudy nebo kovy (zejména cín, měď a železo).

Analýzy transportní kapacity českých monoxyly naznačují, že byly převážet schopny objemné a těžké náklady. Např. mohelnický monoxyly mohl uvést kolem 1077 kg nákladu popř. 880 kg a posádku tří lidí (ROGERS 2004). Podobnou kapacitu měla plavidla z Labětína, Kolína, Osečku a Přerova nad Labem, které jsou velikostně podobná nebo ještě větší. Při cestě po souši by srovnatelný náklad vyžadoval dvanáct mužů nebo šest koní a jejich doprovod.

Při úvahách o vodní dopravě je velmi důležitá zeměpisná poloha Čech a Moravy, protože tyto země umožňují průchod jednou z mála nížinných cest mezi severní a jižní Evropou. Vysoká pohorí orientovaná od východu k západu (především Alpy a Karpaty) svádějí dopravu právě v těchto směrech, tzn. znesnadňují přímý pohyb od severu k jihu nebo naopak. Jedna z klíčových severo-j jižních komunikací přes Evropu tak procházela Moravou, neboť Moravská brána je nejschůdnější cestou spojující Velkopolskou nížinu s Panonií a Podunajím a horní tok řeky Moravy se nachází jen několik kilometrů od horního toku řeky Odry. Tento koridor používali lidé nejpозději od mladého paleolitu. Podobně byla po mnoho století řeka Labe důležitou dopravní tepnou spojující střed Čech se Saskem a severním Německem. Monoxyly nalezené na hlavních českých říčních systémech by

proto měly být nahlíženy nejen v souvislosti s místním říčním hospodářstvím, ale také jako prostředek dálkového obchodu, cestování a komunikace.

- Obr. 1. Monoxyly z Jaroměře (všechny kresby autor, pokud není uvedeno jinak).  
Obr. 2. Výrobní postup u zdvojených monoxylyů typu *Lewin*.  
Obr. 3. Monoxyly z Labětína.  
Obr. 4. Monoxyly Kolín 1.  
Obr. 5. Monoxyly Kolín 2 záhy po nalezení (foto Regionální muzeum v Kolíně).  
Obr. 6. Monoxyly Kolín 2.  
Obr. 7. Monoxyly z Osečku.  
Obr. 8. Monoxyly Poděbrady 1, 2 a 3.  
Obr. 9. Vyzdvižení monoxyly z Přerova nad Labem (foto Regionální muzeum v Kolíně).  
Obr. 10. Monoxyly z Otradovic.  
Obr. 11. Monoxyly z Čelákovic.  
Obr. 12. Monoxyly z Toušně.  
Obr. 13. Monoxyly z Brandýsa nad Labem.  
Obr. 14. Monoxyly z Mohelnice (překresleno podle KUČEROVÁ – PEŠKA 2004).  
Obr. 15. Monoxyly z Příkaz-Hynkova (podle skici R. Frait).  
Obr. 16. Monoxyly ze Spytihněvi.  
Obr. 17. Monoxyly z Uherského Hradiště.  
Obr. 18. Neúplný monoxyly Mikulčice 1 (podle POLÁČEK – MAREK – SKOPAL 2000).  
Obr. 19. Monoxyly Mikulčice 2 až 4 (podle POLÁČEK – MAREK – SKOPAL 2000).  
Obr. 20. Místa nálezů zachovaných monoxylyů na území Čech a Moravy: 1 – Jaroměř; 2 – Labětín; 3 – Kolín 1 a 2; 4 – Oseček; 5 – Poděbrady 1 až 3; 6 – Přerov nad Labem; 7 – Skorkov; 8 – Čelákovice; 9 – Otradovice, Toušeň a Brandýs nad Labem; 10 – Mohelnice; 11 – Příkazy-Hynkov; 12 – Spytihněv; 13 – Uherské Hradiště; 14 – Mikulčice 1 až 4.  
Tab. 1. Datování některých monoxylyů z Čech a Moravy.  
Tab. 2. Sumarizace základních údajů k existujícím monoxylyům z Čech a Moravy.

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