

Raw materials in the prehistory and protohistory of the Czech Republic region: a review of ancient mining sites

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Abstract. Review of prehistoric and protohistoric mining sites in the Czech Republic area based on 18 mining sites were identified in the archaeological literature. Four main localities were visited and are characterised: Krumlovský les in the South Moravian region, which is the oldest proven prehistoric knapping raw material area; Jistebsko and Maršovice are in the North Bohemian region, which is the oldest proven prehistoric mining area for raw material for producing ground stone tools; Písečný vrch (Sand hill) in the Northwest Bohemian region, is the largest proven prehistoric knapping raw material mining area, and Tušimice in the Northwest Bohemian region is an intact subsurface prehistoric mining area. The Celts and mining are also briefly discussed, while territorial protection of these prehistoric and protohistoric mining sites is summarised in table form.

Key words: raw materials, mining, prehistory, protohistory, Czech Republic.

INTRODUCTION

This paper covers prehistoric and protohistoric mining sites in the Czech Republic area, a topic usually studied cooperatively between archaeologists and geologists. The results are published mainly in archaeological journals, with the result that:

1. Geologists, with some exceptions, are insufficiently informed about the most important archaeological studies of these prehistoric and protohistoric mining areas.
2. Archaeologists are informed about mining sites related to specific periods and regions they focused on, and not about the prehistoric and protohistoric mining sites as a whole.

Syntheses of the kind represented in this paper are important for general scientific and societal understanding. Such general knowledge may help better understanding of the national and international importance of unique prehistoric and protohistoric mining sites and improve the protection of these sites. This synthesis also serves as a basis to encourage continuous study of the most important sites.

Approximately 300 prehistoric mining sites have been discovered in Europe, most for flint (Weisgerber et al., 1981, 1999; Lech, 1995; Gayck, 2000). Surface and subsurface mining has been a common human activity in Europe since the Neolithic Age. The broad spectrum of data available on raw materials in the prehistory in the Czech Republic (CR) area results from three contributory reasons: the excellent state of the archaeological and geological research; the long period of using this territory by humans and their predecessors, and the broad geodiversity of the Czech Republic. 18 identified or presumed prehistoric and protohistoric mining sites are located in this territory (Fig. 1).

GEODIVERSITY

The broad geodiversity of the Czech Republic is well documented by geological mapping at all scales (Fig. 2; Sine, a) and by borehole surveys (more than 700,000 boreholes in the Czech Geological Survey database). There are 2,100 identified rock types on the 78,871 km² of the CR. The main rock types are: sedimentary rocks, metamorphic rocks at all grades of metamorphism, and magmatic rocks. Many of these rock types were suitable for use by humans in prehistory.

BRIEF SUMMARY OF PREHISTORY AND PROTOHISTORY: RAW MATERIALS AND LOCALITIES

Not only stone (for tools), but also clay (Venus of Dolní Věstonice, ceramic statuette, 29,000–25,000 BCE) and hematite (Venus of Petřkovice, statuette, 23,000 BCE) were used in the mammoth hunters culture (Gravettian Industry) of Moravia. The Venus of Dolní Věstonice is one of the oldest known ceramic artefacts in the world.

More than 200 prehistoric stone raw materials of the eastern part of central Europe were identified by Přichystal (2009, 2013).

Middle Paleolithic quartzite mining was carried out in the area of Písečný hill near Bečov in the NW part of the CR. White fine grained quartzite was mined and used for stone tools (chipped stone industry; Fišer, 2021b).

Fine-grained chert surface and subsurface mining from the Mesolithic to the Hallstatt Age and stone tool production (chipped stone industry) took place in the Krumlovský les area near Brno, in the South Moravian region (Oliva, 2022).

Stone axes were made from Maršovský hill metabasite near Jistebsko in the Jizerské hory Mts. (northern part of the CR) in the Neolithic (7,150–6,920 BCE). Maršovský hill surface mining reached 0.2 km² in extent (Šída and Proštrředník, 2011).

The first stone buildings constructed in the Czech Republic territory were Bronze Age (2,000–0,8 BCE) hill forts and tumuli.

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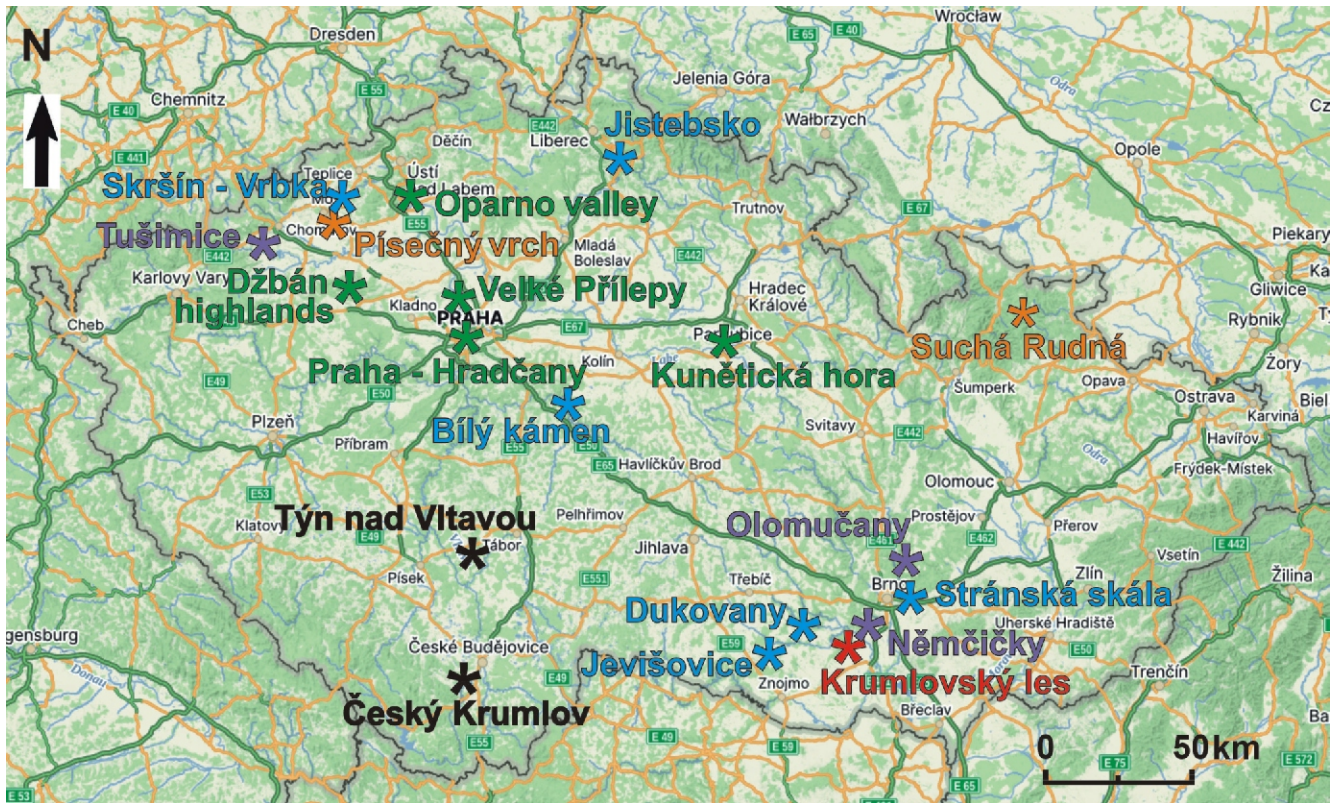


Fig. 1. Prehistoric and protohistoric mining sites in the CR

Dated age of mining: red – Mesolithic, blue – Neolithic, violet – Chalcolithic, orange – Bronze Age, black – Iron Age, green – La Tène Culture

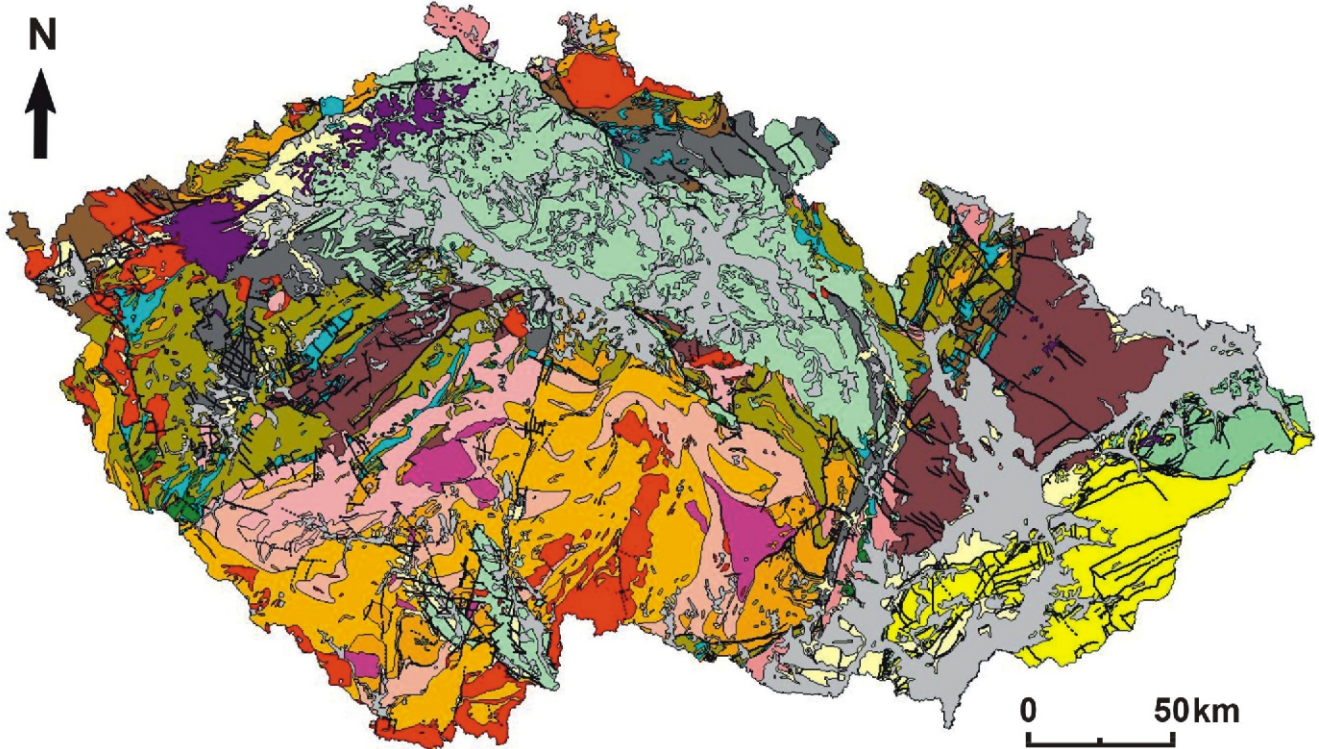


Fig. 2. Geological map of the CR (Sine, a)

Explanation to the rock types: https://mapy.geology.cz/geological_map500/?locale=en

Table 1

Prehistoric and protohistoric mining in the CR: list of main raw materials and localities, including main publications

Raw materials type	Locality
Raw materials for stone tools made by knapping	Krumlovský les (Oliva, 1998, 2022), Písečný vrch (Fridrich, 1972; Fišer, 2019, 2021a, b), Skršín-Vrbka (Malkovský and Vencel, 1995; Fišer, 2021b), Tušimice (Neustupný, 1963; Fišer, 2019, 2021a, b; Kuna et al., 2019), Olomučany (Přichystal and Přichystal, 2004, 2005), Stránská skála (Bartík et al., 2019), Němčičky (Oliva, 1998), Jevišovice (Oliva, 1998), Dukovany (Bartík et al., 2019)
Raw material for ground stone tools	Jistebsko (Šída and Prostředník, 2011; Šída et al., 2011)
Rocks for mill stone production	Oparno valley: Oparno (Waldhauser, 1981), Malé Žernoseky and Velké Žernoseky (Zápotočky, 1969), Lhotka nad Labem (Sine, b); Kunětická hora (Waldhauser, 1981), Velké Přílepy (Waldhauser, 1981)
Graphite	South Bohemian Region (Český Krumlov, Týn nad Vltavou; Waldhauser, 1992)
Sapropelite (black claystone rich on organic matter) locally called švartna	Džbán highlands and its surrounding area (Mangel and Danielisová, 2014)
Marble	Bílý Kámen near Sázava (Burgert et al., 2020)
Gold	Suchá Rudná (Aichler et al., 1985, 1986)
Iron ore	Praha-Hradčany (Zavřel, 2001)

The Celts (Iron Age inhabitants of the CR territory, 0,8–0,1 BCE) mined gold by panning in many places in the southern and central part of Bohemia. Their oppidas (hill forts) were mainly built near gold placer-mining sites. They also produced iron from iron ores in many places. Surface-mined graphite was used for their ceramic vessel production, mainly in the southern part of the CR territory (South Bohemia, Třísov oppidum and many other places). The graphite content of ceramic was up to 24% by wt. (Procházka et al., 2011). Bracelets, beads and some black jewellery made from sedimentary rock called „švartna“ were often used by Celts. Švartna was supposedly mined by them from exposures of Carboniferous strata near Kounov in Central Bohemia (Mangel and Danielisová, 2014).

A regression of civilisation took place in Middle Europe between the Celts and the historical period (0–600 AD). The Germans and Slavs moved to the CR territory in this Migration Period. During this time, they used clay for vessel production, for example.

KRUMLOVSKÝ LES IN THE SOUTH MORAVIAN REGION: THE OLDEST PROVEN PREHISTORIC KNAPPING RAW MATERIAL MINING AREA

Krumlovský les prehistoric mining area (Oliva, 1998, 2022; Figs. 3–6) is 1 km² in area. This locality is one of the largest intact prehistoric mining areas in Europe. Here, chert was the raw material for stone tools made by knapping, and was used for knapping since the Paleolithic. Shallow open pits and shafts to 8 m depth and horizontal drifts were proved by archaeological studies. The mining activity lasted here for 9,000 years with interruptions, from the Mesolithic Age to its culmination in the Bronze Age, ending around 550 BC. Prehistoric artefacts are very abundant at the soil surface. One of the main reasons for the mining activity is presumed to have been ritual.



Fig. 3. The Krumlovský les locality



Fig. 4. The Krumlovský les northern part of the mining area (now in forest), from the south-east, 350 MSL (photo 2023)



Fig. 6. The Krumlovský les prehistoric mining area surface is rich on stone artefacts (photo 2023)



Fig. 5A, B – the Krumlovský les prehistoric mining area landscape (photo 2023)



Fig. 7. Jistebsko nad Maršovice locality position

JISTEBSKO AND MARŠOVICE IN THE NORTH BOHEMIAN REGION: THE OLDEST PROVEN PREHISTORIC MINING AREA FOR RAW MATERIAL FOR GROUND STONE TOOLS PRODUCTION

Jistebsko and Maršovice and its surrounding prehistoric mining area (Šída and Prostředník, 2011; Šída et al., 2011; Figs. 7–9) covers 1.5 km². There are hundreds of shallow open pits. The Neolithic mining activity took place in the 7,500–6,900

BP time interval. The raw material for ground stone tools found here was metabasite/hornfels. Shallow open pits up to 3 m in depth were identified by archaeologists. Semi-products for ground stone tools were prepared here by knapping and distributed all over Europe. The production was estimated to exceed hundreds of thousands of pieces of stone axes and other stone tool semi-products. Prehistoric artefacts (spalls) are possible to find on the soil surface.



Fig. 8. The Jistebsko I prehistoric mining area landscape, 625 MSL (photo 2023)



Fig. 9A, B – the Jistebsko I prehistoric mining area surface (photo 2023)

PÍSEČNÝ VRCH (SAND HILL) IN THE NORTH-WEST BOHEMIAN REGION: THE LARGEST PROVEN PREHISTORIC KNAPPING RAW MATERIAL MINING AREA

The Písečný vrch prehistoric mining area (Fridrich, 1972; Fišer, 2019, 2021a, b; Figs. 10–13) covers 2 km². The raw material used for stone tools made by knapping was found here as white quartzite. There are shallow open pits, some established as used for mining in the Bronze Age. The using of this raw material started probably in the Paleolithic and commonly continued in the Neolithic and Chalcolithic ages. Shallow open pits of 2 to 3 m depth were proved archaeologically. Prehistoric artefacts (spalls) are abundant on the soil surface, which was unfortunately partly damaged by quartzite and sand mining in the 20th century.

TUŠIMICE IN THE NORTHWEST BOHEMIAN REGION: AN INTACT SUBSURFACE PREHISTORIC MINING AREA

The Tušimice prehistoric mining area (Neustupný, 1963; Fišer, 2019, 2021a, b; Kuna et al., 2019; Figs. 14 and 15; Table 2) covers 0.2 ha. This was the most perfectly intact locality in the Czech Republic, with cavities in the underground space with intact surfaces. The locality was discovered by power plant development in 1960. The raw material for stone tools made by knapping was here quartzite nodules in sandstone. There were

19 shallow open pits and shafts up to 3.2 m deep, and 3 drifts up to 5.3 m long and up to 3 m wide. The locality was mined in the Chalcolithic, the raw material also being used in the Mesolithic and Neolithic. The locality is partly undiscovered and partly conserved.

THE CELTS

The Celts were excellent in crafts, including mining. They mined gold by panning in South Bohemia for jewellery and coin production. They used clay for ceramic production, using potter's wheels. They probably mined graphite for specialized pottery, mainly in South Bohemia. There are 10 oppidas in the CR. The stone used for building oppida walls was sourced from the immediate surroundings. Millstone production is presumed at least in 4 localities in the CR. They used various raw material for sculpting (Fig. 16).

CELTIC POTTERY WITH GRAPHITE

Production of pottery with graphite was common in the area of South Bohemia during the Celtic period. The graphite content in Celtic pottery was up to 24 wt.%. The graphite coatings of vessels are supposed to have imitated metallic look (Kreiter et al., 2014; Fig. 17), though the reason for graphite use in a ceramic raw material mixture remains unknown. The main graphite Celtic mining in the CR area was located in South Bohemia (Český Krumlov and Týn nad Vltavou area).

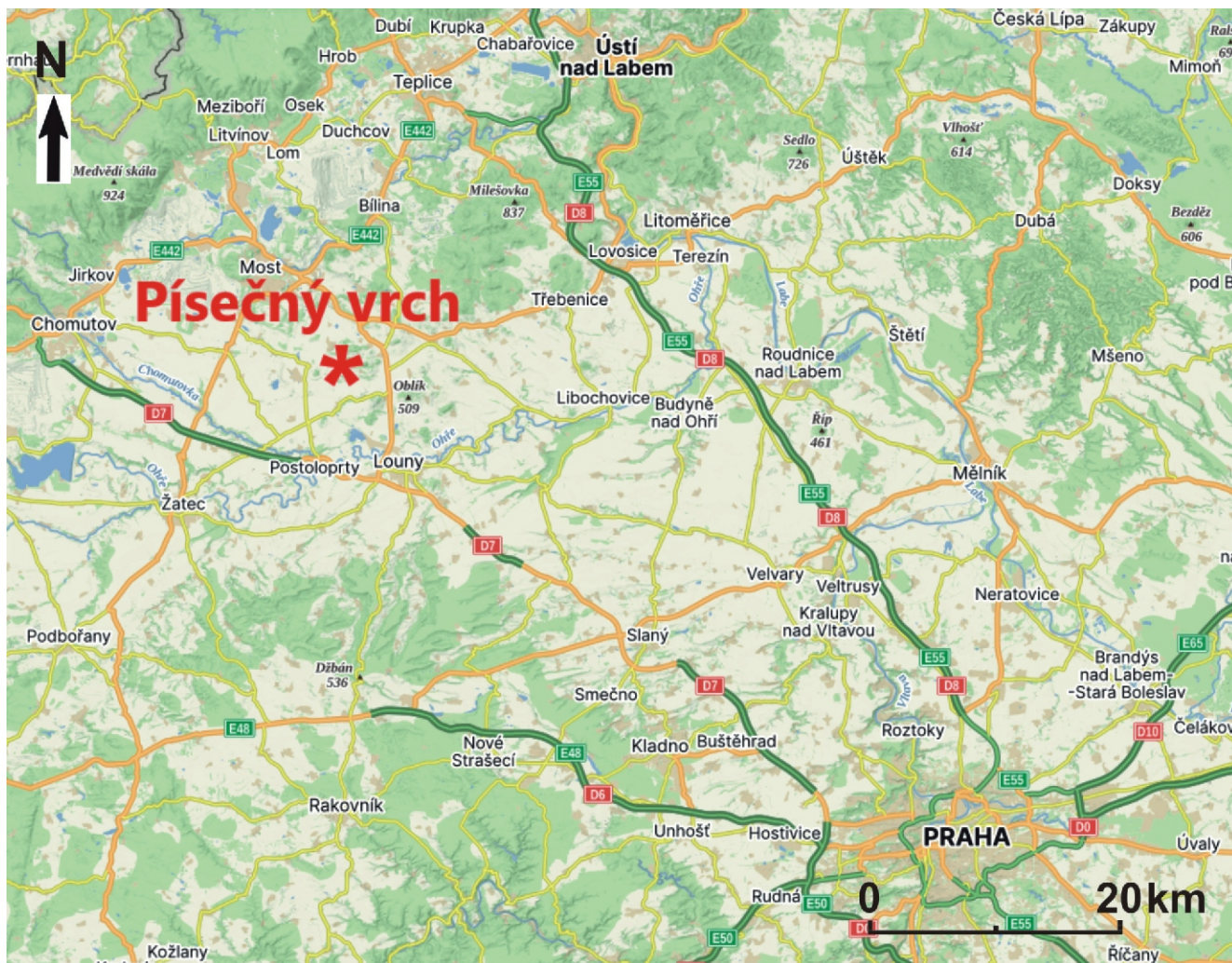


Fig. 10. The Písečný vrch locality



Fig. 11. The Písečný vrch hill from the east, 318 MSL (photo 2023)



Fig. 12. The Písečný vrch quartzite (photo 2023)



Fig. 13. The peak of the Písečný vrch hill (photo 2023)

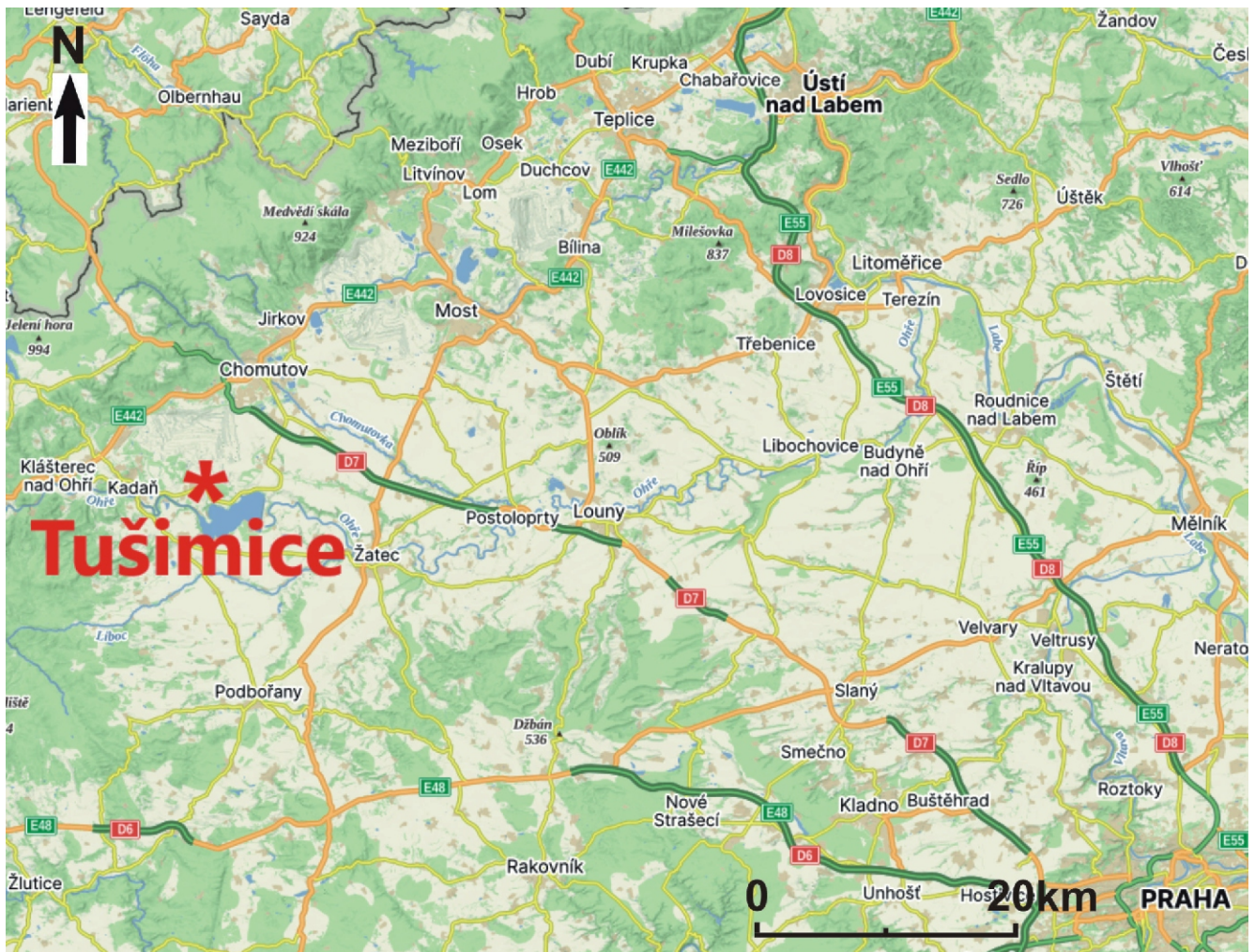


Fig. 14. Tušimice locality position

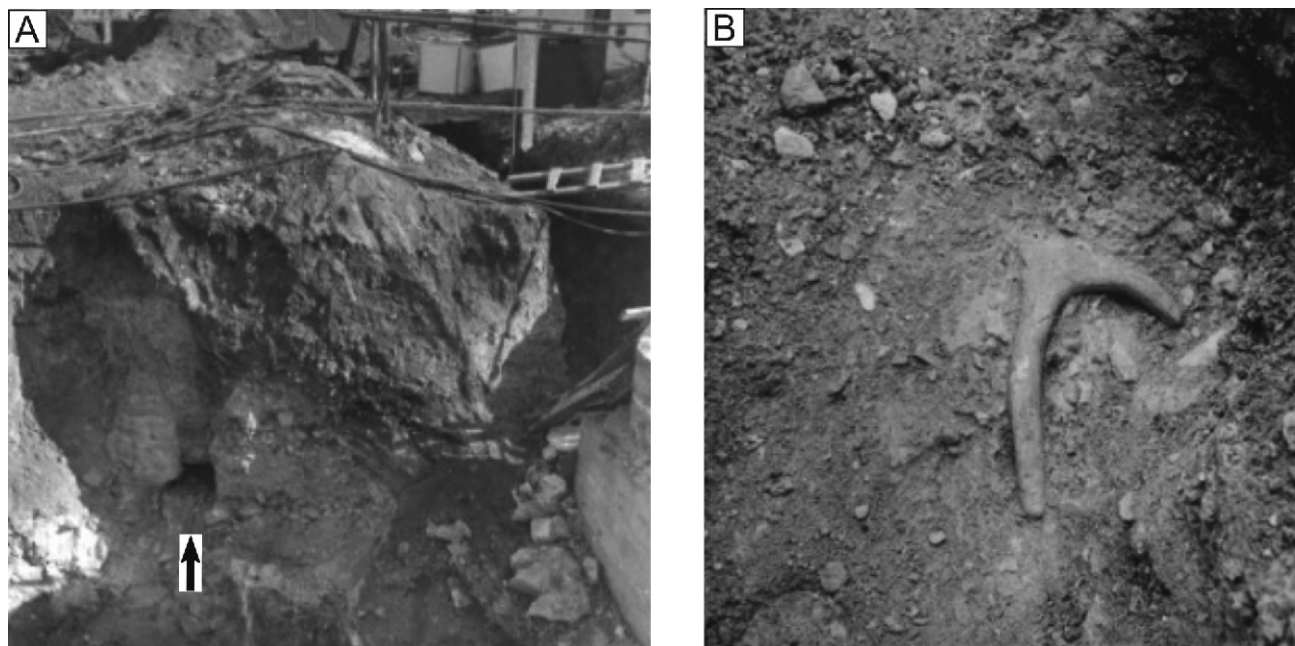


Fig. 15. Tušimice prehistory mining site

A – the mining gallery entrance see above the arrow; B – antler pick, 25 × 10 cm. Photo: E. Neustupný (1962). © Institute for Preservation of Archaeological Heritage of Northwest Bohemia

Table 2

Tabulated data for the four most important prehistoric mining sites in the Czech Republic

Mining site	Raw materials type	Dated age of mining	Depth of mining (max)	Number of open pits	Number of artefacts, spalls	Area	Duration of mining
Krumlovský les	Raw material for stone tools made by knapping: chert	Mesolithic (used since Paleolithic)	8 m (shallow open pits and shafts and horizontal drifts)	hundreds		1 km ²	9,000 years
Jistebsko and Maršovice	Raw material for ground stone tools: metabasite/hornfels	Neolithic	3 m (shallow open pits)	hundreds	hundred of thousands of pcs.	1.5 km ²	600 years
Písečný vrch	Raw material for stone tools made by knapping: quartzite	Bronze Age (used since Paleolithic, Neolithic and Chalcolithic)	3 m (shallow open pits)			2 km ²	
Tušimice	Raw material for stone tools made by knapping: quartzite	Chalcolithic (used during the Mesolithic and Neolithic)	3.2 (shallow open pits; drifts up to 5.3 m long and up to 3 m wide)	19 shallow open pits and shafts; 3 drifts		0.0002 km ² (0.2 ha)	



Fig. 16. The Celtic Heroe head statue

Celtic statues are rare. This statue was discovered in Mšecké Žehrovice Viereckschanze area in Middle Bohemia in 1943. This sculpture is made from Cretaceous marlstone 150–50 BC (La Tène period). Height: 23 cm

BLACK CELTIC STONE JEWELLERY

Bracelets, beads and some other black stone jewellery were made from a sedimentary rock locally called “švartna”, by Celts in 4th to 2nd century BC (Mangel and Danielisová, 2014; Fig. 18). Švartna (sapropelite – a claystone rich in organic matter) was allegedly mined by Celts in exposures of Carboniferous rock near Kounov in Central Bohemia. This jewellery has been found in Celtic graves not only in Middle Europe and its surroundings but also in Great Britain. The workshop area was discovered near Mšecké Žehrovice village, with 260 kg of product and waste made during jewellery production.

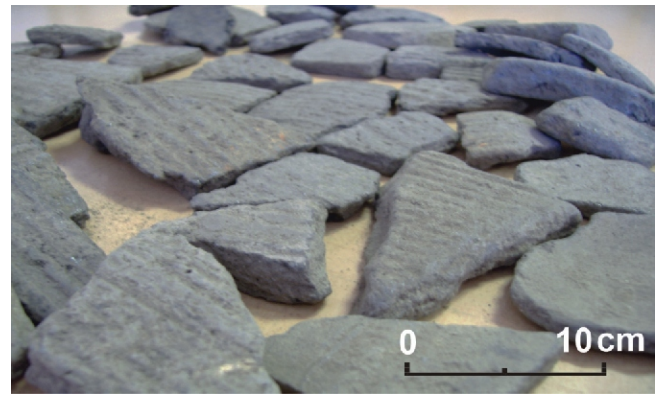


Fig. 17. Celtic pottery fragments with graphite, Třísov Oppidum, South Bohemia



Fig. 18. A copy of a švartna bracelet (a), production waste from Celtic jewellery production (b, c)

THE STATE OF TERRITORIAL PROTECTION OF THE PREHISTORIC AND PROTOHISTORIC MINING SITES IN THE CZECH REPUBLIC

A review of the state of territorial protection of the historic and protohistoric mining sites in the Czech Republic is shown in Table 3. The state of territorial protection of the prehistoric and protohistoric mining sites in the Czech Republic is perfect only partly. Main part of this areas is without appropriate protection.

Table 3

A review of the state of protection of prehistoric and protohistoric mining sites in the Czech Republic

Cultural Heritage (archaeological site protection)	Písečný vrch, Tušimice, Bílý kámen near Sázava, Lhotka nad Labem
Area with archaeological finds (ÚAN 1)	Krumlovský les (important archaeological site), Stránská skála, Oparno valley, Némčický
Natural Monument (biotope protection)	Kunětická hora
Totally damaged by mining in the 20 th century	Skršín-Vrbka
Without protection	Jistebsko, Suchá Rudná, Olomučany, Velké Přílepy, Jevišovice, Dukovany, Praha-Hradčany

CONCLUSIONS

Many archaeological studies have been carried out in the last few decades of prehistoric mining areas in the Czech Republic, often with the cooperation with geologists, as often necessary for understanding the mining circumstances. However, the level of general awareness about this topic is low not only among the public but also between specialists. This paper is intended to raise such general awareness.

The state of protection of the prehistoric mining sites in the Czech Republic varies, situation resulting from the current organisation of science (Petáková, 2009). The system focused on gaining grants leads mainly to the preparation of publications, while the scientific community is focused on analysis. The need for synthesis and wide dissemination of scientific results as a main goal of democratic science is often forgotten. This hinders reaching consensus in specialist communities on providing systematic and well-planned care of these localities, not only academically but also inform about them in public spaces and by systematic public education.

Protection of the prehistoric mining areas is very important not only for future study but also for public education and for better understanding their cultural importance. Better general knowledge of this topic may also lead to new discoveries, for example by geological mapping. More focus on improving the state of protection of prehistoric and protohistoric mining sites in the Czech Republic is recommended.

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Author of photos (Fig. 15 excluding): Zdeňka Petáková

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