

## EXPLOITATION AND PROCESSING OF THE CHOCOLATE FLINT ON THE EXAMPLE OF OROŃSKO REGION.

### SUMMARY

The submitted doctoral thesis deals with the mining and processing chocolate flint in the north-westernmost part of the deposit. It is related to the issues of extraction methods, and organization of obtaining and processing raw materials, both in places of its exploitation - in mine workshops and specialized mine workshops. An important issue discussed here will be differences in its use within mines, workshops, and camps and places away from them. There will also be a discussion on the distribution of the raw material and the possibilities of determining its provenance based on available methods and in the context of the latest discoveries in the outcrops of this raw material.

To broaden the background of considerations on the title problem, other mining sites in Poland and remote areas associated with the exploitation of rock raw materials will be indicated. An outline of the chronological, cultural, and environmental background of the Late Paleolithic in Poland will also be included, including a list of more important sites directly related to the use and distribution of chocolate flint.

The scope of work in territory is limited primarily to the north-western, extreme part of the chocolate flint deposit, in the Orońsko region. This area is concentrated around the Oronka and Szabasówka rivers, which are tributaries of the Radomka, which is a left-bank tributary of the Vistula.

The Orońsko region was not chosen by accident. Here, in 1935, Stefan Krukowski discovered mining shafts during excavations and, in their backfills, historic flint material dating back to the Late Paleolithic period. At the beginning of the 20th century, this was a unique phenomenon on a global scale. Extensive flint mines were already known at that time, e.g. Grimes Graves (Great Britain, see e.g. Barber et al. 1999; Russell 200), but they were dated to the younger periods of the Stone Age.

The territorial scope includes the town of Orońsko and neighboring areas, but also adjacent areas within the modern area of the Orońsko commune, where, as a result of repeated surface surveys, the presence of mining fields was noted.

The chronological scope covers the Paleolithic period, but mainly its final part - Alleröd and Younger Dryas. Based on the collection of flint materials from the area in question, older sites dating back to Bölling can probably also be identified. In total, this falls on the G1a-e and GS periods according to the climate scale of Greenland ice cores (Greenland Ice Core; Rasmussen et al. 2006; 2014). It mainly covers the issue of settlement since the spread of Magdalenian culture communities on Polish lands. However, the greatest attention will be devoted to the settlement of the technocomplex community with arch backs and, above all, pinnacles, both of the older horizons (Older Tanged Points OTP / Bromme culture) and the Świder culture / Masovian cycle. All available dates were calibrated using the OxCal program and saved in the cal BP format (<https://c14.arch.ox.ac.uk/oxcal.html>).

The dissertation consists of two parts. Part I contains 9 main chapters with extensive subchapters. In Part II you will find three groups of source materials: 1 - a catalog of the sites included in the work with explanations, 2 - a map with the location of the sites included in the catalog, 3 - tables with drawings and photos of artefacts.

Chapter 1 contains basic organizational information - i.e. the scope and nature of the work as well as the principles of development and the adopted terminology. There are also chapters on the history of research and a critical look at the analyzed sources.

Chapter 2 provides a background to the issues discussed in the work. It concerns primarily the problem of obtaining and processing rocks and mineral raw materials, in particular dyes, in neighboring and more distant areas.

Chapter 3 discusses chocolate flint deposits - their location, history of research and detailed characteristics and diversity of the raw material.

Chapter 4 characterized the Orońsko region in terms of geology and geomorphology.

Chapter 5 is one of the main parts of the work dealing with the problem of mining chocolate flint. Separate chocolate flint exploitation points and the flint inventories obtained from them are discussed here.

In the following sections, the Orońsko chocolate flint mine, the best-studied Paleolithic site in the discussed area, is analyzed in detail. Detailed issues related to the geology and geomorphology of the mine surroundings and the characteristics of the raw material are discussed here. An attempt was made to analyze and reconstruct the methods of obtaining raw materials and the characteristics of flint and organic materials. An important point here is the chapter on absolute dating and an attempt to reconstruct the environment during the mine's operation.

In the next chapter other sites located in the Orońsko region are discussed, where inventories of processing workshops and camps from both surface research and regular excavations are analyzed in chronological order, according to cultural division. Chapter 7 addresses the problem of the provenance and distribution of chocolate flint in individual sections of the Paleolithic in relation to previous studies of the topic in a framework based on the results of these considerations. In Chapter 8, an attempt was made to reconstruct the systems of obtaining and processing chocolate flint in accordance with the chronological division in the Orońsko area. Chapter 9 attempts to assess the importance of Orońsko in the Paleolithic raw material economy.

This part ends with a short chapter 10 - Conclusion, bibliography and list of figures, tables.

The Orońsko area was probably exploited in the Middle Paleolithic, and certainly in the Late Paleolithic. For the Middle Paleolithic, the amount of data is too small to draw further conclusions about the nature of this settlement and its dependence on chocolate flint deposits. In the late Paleolithic period, this area was exploited by Magdalenian and Arched Backed Piece communities, but the most visible and intense traces of settlement are associated with the Tanged Point Technocomplex. There are sites that suggest that chocolate flint deposits were a factor in the concentration of settlements in this area, but there are also sites that generally indicate that the area was important for other reasons and was returned to many times. This was certainly influenced by the environmental characteristics of the area, the valleys of large rivers and the proximity of other settlement centers located in the Kamienna valley or in the northern parts of the Vistula, the Vistula and San basins, probably in the upper tributaries of the Vistula, which is a natural communication route, animal migration route, where in many people returned from places seasonally. Hence, in the area of Orońsko, a significant percentage of the sites are multicultural, and in the mine, mining shafts can be associated with the activities of groups of almost every taxonomic unit of the late Pleistocene. The exploitation of deposits probably began there during the period of the existence of Magdalenian communities (Guzów, Orońsko), however - apart from single examples of flint forms characteristic of the Magdalenian culture from the surface of mining fields and the presence of Magdalenian culture workshops in Guzów Kolonia, there are no direct traces of mining activity.

There was certainly intensive underground mining activity from the end of the Alleröd and throughout the Younger Dryas, as indicated by C14 dating and rich flint inventories. The

dating of objects associated with the arched butt technocomplex is only relative, but none the less - if the inventories discovered within the mine shaft backfills were supported by the C14 dating of the shafts where they come from, they could be even older than the above-mentioned ones, because the ABP communities functioned primarily in Alleröd, but some researchers suggest that some groups could have existed until the beginning of the Younger Dryas (Burdukiewicz 2011: 305). Certainly, the communities that came to the part of the mine marked here as Orońsko 2I4/2016-2023 were associated with the technocomplex with hardwoods from the turn of these periods.

The chocolate flint mine in Orońsko was undoubtedly one of the most important points on the map of prehistoric mining, especially in the oldest period of the Stone Age. This is a unique phenomenon on a European scale, not only because of such an early period in which direct remains of the exploitation of siliceous rocks are rare, but also because of the abundance of mining facilities, workshop sites and hunting camps located in a small area.

The scale of the abundance of historic materials and the number of sites indicates the great economic and social importance of this area and it can be suggested that the raw material must have certainly been imported on a large scale. In this context, the topic of potential mutual contacts of communities from the Orońsko area with Rydno or Całowanie seems to be very interesting - at both sites the dates are almost identical to those in Orońsko, and the technology, especially of the older groups with notes, corresponds to the inventory obtained from the shaft backfill. Bone products and antlers partially covered with dye, possibly ochre from the Kamienna River, are also common in Orońsko.

What is noteworthy is the correlation between the older complexes and the technocomplexes with the backed ones. According to S. Krukowski's original interpretation, the mining shafts he discovered refer to this technology. This is probably the same climatic period as during the operation of the Or2/I4 mine. More and more often, there are voices that the features of both Bromme and ABP technologies are intertwined. The presence of moose is also indicative of the hunting preferences of the Bromme community.

Sites of the Świder culture dominate in the vicinity of the outcrop belt in Orońsko. Within the Or2/I4 trench, no reindeer remains, typical of the hunting strategies of the communities of świderian culture, nor a mining shaft, which can undoubtedly be associated with these communities, have been recorded. Nevertheless, technological elements of the Świder culture can be observed among the inventory of shaft backfills, so the author will allow herself to suggest that flint was probably also exploited by communities of the swiderian culture, which may be confirmed by future research.