

Elżbieta Trela-Kieferling (ed.), *Nakopalniane pracownie krzemieniarskie z okresu neolitu w Bęble, stan. 4, woj. małopolskie* [*Neolithic Flint Workshops at the Mine in Bęble, Site 4, Małopolska*]. Kraków 2021, Muzeum Archeologiczne w Krakowie. Biblioteka Muzeum Archeologicznego w Krakowie vol. X, pp. 204, 68 illustrations (57 colour, 11 black-white), 72 plates and 37 tables

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This monograph on the Neolithic flint workshops of the Bęble mining complex (Cracow district, Lesser Poland Voivodeship) appeared in 2021, published by the Archaeological Museum in Kraków with financial aid from the Ministry of Cultural and National Heritage, National Heritage Board of Poland and the Marshal's Office of the Małopolska Region. The editor of the publication is Elżbieta Trela-Kieferling. The book appeared in the series „Biblioteka Muzeum Archeologicznego w Krakowie” [The Library of the Archaeological Museum in Kraków], edited by Dr hab. Jacek Górski. It is the tenth volume in the series, which has appeared since 2006, and is a commemorative volume, dedicated to the initiator of the series, Dr. Jacek Rydzewski.

The work consists of eight chapters, preceded by an introduction written by the editor of the series, J. Górski, Director of the Archaeological Museum in Kraków. The entire study is published in Polish and English. The English version is at the end of each chapter, after the list of references, the captions for the figures and tables are also in two language versions.

The first chapter, “Site 4 in Bęble, Kraków district: its location and history, and the present state of research” [in Polish: Lokalizacja, historia i stan badań stanowiska 4 w Bęble, pow. Kraków], is written by the editor of the volume, E. Trela-Kieferling (curator at the Department of Archaeological Education and Exhibitions at the Museum). Within, the reader is introduced to the history of research on the site and its geographical location. The material presented in the following chapters come from the research of Albin Jura (1873–1958), the discoverer and the first researcher of the site, in 1935–1936, and the research by Stanisław Kowalski and Janusz Krzysztof Kozłowski from 1954. The site was later excavated by Jacek Lech in 1973, and was verified by this researcher in the years 1976–1980, as well as in 1990 as part of the “Polish Archaeological Record” survey [in Polish: Archeologiczne Zdjęcie Polski]. During the preparation of this study, no new excavations were undertaken, but non-invasive magnetic and electroresistivity surveys (chapter 2) and analysis of airborne laser scanning data of the site (chapter 3).

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The results of the aforementioned non-invasive studies are presented in chapter 2: “Magnetic survey and electrical resistivity tomography at the flint mine in Bębło, site 4, Kraków district” [in Polish: *Badania magnetyczne i elektrooporowe na terenie kopalni krzemienia w Bębłe, stan. 4, pow. krakowski*]. The authors of the chapter are Marcin M. Przybyła, Michał Podsiadło and Piotr Gruba. They begin from presenting the methodology and the history of this type of research carried out so far in the sites related to flint mining. The geophysical investigations conducted at Bębło confirmed the prevailing opinion about exploitation of the site by simple open pits. Unfortunately, the applied methods are of limited usefulness for examining a mining site with remains of shallow exploitation. This is due to the fact that the fills of mining pits and their surroundings are very similar in structure, which does not favour obtaining a contrast between them. During these studies, a detailed surface prospection of the site was also carried out. It consisted of plotting, using a GPS locator, the distribution of flint items and workshop waste exposed on the surface. The material itself was not collected but the material was left in situ. As a result of this survey, it was found that the workshop waste was absent from the area revealed by the electroresistivity survey (as a zone of homogeneous reduced resistance) that is inferred was related to the presence of features related to intensive mining activities. However, this interpretation requires verification using excavation methods.

In the next chapter, by Michał Kasiński – “Site 4 in Bębło, Kraków district: analysis of data from airborne laser scanning (ALS)” [in Polish: *Stanowisko 4 w Bębłe, pow. krakowski, w świetle analizy danych lotniczego skanowania laserowego (ALS)*], the results of the attempt to apply the ALS technique on the site are presented, together with a discussion of the factors influencing the effectiveness of this analysis in research on prehistoric mining on the site. Unfortunately, in the case of Site 4 at Bębło, this method did not allow for the presence of traces of the activity of prehistoric miners to be found. The reason for this can be sought in the fact that the area of the site is currently used for agriculture. Nevertheless, there is an interesting presentation in this chapter introducing the reader to the secrets of ALS analysis, outlining various methods and useful tools in this type of research. The great advantage of this part of the book is the presentation of the results of the ALS analysis in the area of the southern zone of the Olkusz Upland around the site at Bębło. The author presents potential places the surface relief of which may represent traces of mining activities of past prehistoric communities. Unfortunately, these sites have not yet been verified in the field.

Chapter 4, “Technological classification of flint artefacts from Site 4 in Bębło, Kraków district” [in Polish: *Klasyfikacja technologiczna wyrobów krzemiennych ze stanowiska 4 w Bębłe, pow. krakowski*] by Trela-Kieferling is the most extensive portion of the volume. The author analysed the collection of 8,800 flint products

stored at the Museum, including all the flakes, cores, technical waste, tools and blades. On the other hand, she decided against giving a detailed description of all 6,672 flakes and splinters, and only analyzed 1015 specimens selected at random from the latter group of material. When working on this assemblage, Trela-Kierferling used the *chaîne opératoire* inference method. She also presented a detailed description of the raw material obtained by prehistoric communities in Bębło, at the same time denying the sense of introducing petrographic divisions based solely on macroscopic features.

In the chapter, the reader is introduced to the details of the methodology adopted for the study and the results obtained from its application. The author analyzed the collection divided into three technological groups in order to recreate the production chain: the first consisted of items related to core preparation and repair, the second group consisted of the products of core exploitation, and the third group comprised tools.

As a result of the analysis, it was shown that the purpose of the activity of the prehistoric communities in Bębło was twofold: the production of flakes (micro- and mediolithic) and cores, mainly for blades. The description of the cores was carried out taking into account the operating phases (initial operation, advanced operation, rudimentary cores and transformations of cores).

The collection also includes five core forms related to the acquisition of semi-raw material for the production of gunflints. The modern activity in the area of the flint mine in Bębło has not been discussed in detail in the study.

The blades (729 items) were analyzed in detail in terms of the condition, dimensions, presence of cortex, the nature of the striking platform (size, shape, number of flake scars), the characteristics of the bulb of percussion, the features of the negative side and the tip, and the raw material from which they were made. On the other hand, the described flakes (1015 specimens, see above) were characterised taking into account the following features: dimensions, outer surface, striking platform, bulb of percussion, profile of the sides in relation to the longitudinal axis, bends or twists, and the shape of the tip.

The last technological group discussed are the tools (389 specimens). They were dominated by scrapers, piercers and drills, moreover there were also some truncations, burins, combination tools, notched and toothed and other retouched tools as well as retouched tools. The seven backed knives that were also recognised deserve attention, they may indicate that the Bębło mine was also used by later communities of the Early Bronze Age. In addition, 37 mining tools were identified, they were picks, forms with straight or incurved sides and retouched edges (resembling two-horned types, the cordiform type or waisted hammers). There were also mauls (19 examples).

Additionally, the collection includes specimens with a much later chronology (e.g., tetrahedral smooth forms). As in the case of gunflint production cores, these specimens were not included in the study.

The text of this chapter is complemented by detailed tables, charts and very high-quality drawings of these forms.

The next chapter presented by Trela-Kieferling refers directly to the analysis of the flint products. These are the results of microwear analysis carried out by Katarzyna Pyżewicz (chapter 5, “Site 4 in Bębło, Kraków district: microwear analysis of the flint material” [in Polish: Bębło, stan. 5, pow. krakowski. Badania traseologiczne materiałów krzemionych]). Traseological studies of flint materials from flint mines are complex and difficult. This is due to the fact that they are particularly exposed to postdepositional processes (as a result of both human and natural activities; cf. Małecka-Kukawka 2011; Małecka-Kukawka and Werra 2011). As a result of the research, it was found that most of the microscopically examined formal tools did not have traces related to their use. There were traces of use only on a few individual flint specimens, for example as a fire-striker, for intensive processing of other stone materials (grinders? hammers?), others showed traces of contact with antlers / bone. Single flakes showed traces resulting from plant and leather processing. Additionally, Pyżewicz noticed traces related to the flint processing techniques used (visible on the striking platforms and on the flake scars of the retouch). The recorded traces indicate the use of a direct blow with a hard hammerstone. The obtained results are in line with the current knowledge on the traseological analyzes of flint finds from flint mines, which in recent years have shown that these materials have a very high research potential. The negligible results obtained for Bębło could largely be the result of the selection of forms intended for analysis.

Chapter 6, “Bębło, Site 4, Kraków district: the refitting of the material excavated by Stanisław Kowalski and Janusz Krzysztof Kozłowski” [in Polish: Bębło, stan. 4, pow. krakowski. Materiały z badań Stanisława Kowalskiego i Janusza Krzysztofa Kozłowskiego – składanki] written by Justyna Zakrzewska presents the results of the results of an attempt to refit the flints. The author presents the methodology of work and the stages of the analysis. Disappointingly, as a result of the work undertaken, only three two-piece compilations were obtained. The reasons for this result are due to a number of factors above all the very intense flint-making activity on the site which produced a high volume of material, then its subsequent mixing and scattering due to the very intensive agricultural exploitation of the site. This was compounded by the material being studied having been derived from a surface survey and undertaking the analysis of only a part of the collection.

In the penultimate chapter, the editor of the monograph undertakes a description the flint-working strategy of prehistoric communities and the dating of the mining

workshops in Bębło (chapter 7, “Strategies in flint knapping and the dating of workshops at the flint mine in Bębło, site 4, Kraków district” [in Polish: *Strategie krzemieniarskie i datowanie pracowni nakopalnianych na stanowisku 4 w Bębłe, pow. krakowski*]). Through the analysis of the flint material, the technological sequence was reconstructed. On the basis of the results of a comparative analysis, it is stated that these materials are similar to those known from the flint mine in Sączów, Cracow area. Therefore, despite the lack of radiocarbon dates, in the light of typological and comparative results, the author links the functioning of the mine with the activities of the so-called “early metric change” communities of the Lengyel culture group. Thus, she discusses the change in dating of the Sączów mine, which is currently associated with the middle phase of the Lengyel-Polish cycle (Lech 2011). The author points to the possibility of linking the beginning of technological change (the production of medio- and macrolithic products from concretions obtained by mining methods) with the environment of the Wyciąże-Złotniki group, and therefore she also postulates such chronology of both mines and workshops. It seems, however, that this hypothesis has not yet been sufficiently argued through.

The monograph is closed by chapter 8 (“Conclusions”), also by the editor. This short summary, where we find the most important conclusions presented in the monograph, is complemented by very elegant and interesting visualizations of the mine and the studio in Bębło by M. Podsiadło.

The issue of prehistoric flint mining stands out clearly in the context of European archaeology. The first traces of systematic extraction of this raw material date back to the Middle Palaeolithic, but there was increased exploitation of silicates among Late Palaeolithic communities and this was continued by Mesolithic communities, albeit in a more modest form. Nevertheless, the most advanced examples of flint exploitation date back to the Neolithic and Eneolithic times and are related to the activities of agricultural communities. In the mining fields, apart from spectacular forms of prehistoric underground mining, there are examples of parallel exploitation with simpler forms of mining. In a number of cases, a variety of mining forms is observed within one mining field (e.g., Spiennes, Grimes Graves; see Lech 2012).

After many years when it was permanently present in the literature of the subject, the prehistoric flint mine in Bębło, which is an example of a mine with simple forms of mining, has at last become the subject of a monographic study (see also Brzeziński 2020). The editor of the study undertook not only the difficult task of researching the remains of the activities of prehistoric flint miners in the field, but also the analysis of archival collections, that is the study of material from the Museum’s resources. Unfortunately, no new excavations were carried out as part of the work, and no results from the research by Jacek Lech from 1973 were included in the study (Lech 1981). As a result,

some of the issues raised remain open. This is especially true in the case of the chronology. Unfortunately, no material that could have been used to resolve that issue has survived in the Museum's resources. When preparing the work, no new research was carried out that could provide new artefactual material for study, or to use for closer dating of activities on the site. The study also lacks wider information about the mining facilities of prehistoric communities, the description of which can be found in the study by J. Lech (cf. 1981: 64–67). There is also a certain lack of satisfaction after reading the chapter on airborne laser scanning (ALS) data. Unfortunately, the results shown that detected traces of potential mining fields in the vicinity of the site have not been verified in the field. As a result, this prevented the author of the chapter, as well as the editor of the monograph, from drawing broader conclusions about prehistoric mining in the southern zone of the Olkusz Upland and the site in Bębło against the wider background of flint mining in Neolithic communities in the region.

However, these comments do not affect the overall positive assessment of the monograph. The analytical study was conducted at a high level of competence and was carefully prepared. The processing of the collection of several thousand flint materials from site 4 in Bębło is a valuable contribution to expanding our knowledge about the mining activities of Neolithic communities, as well as their flint processing. It is worth emphasizing that there is a significant discussion of the creation and assessment of research postulates concerning the verification of the dating of the dating of Lesser Poland region flint mines.

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