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(review) J. Kopacz (ed.). *The end of the Stone Age on the Stránská skála Hill in Brno – lithic production or “optimalisation”?* (= *Collectio Archaeologica Ressoviensis* 41). Rzeszów 2019: Wydawnictwo Uniwersytetu Rzeszowskiego, 257 pages.

The experienced team of Jerzy Kopacz, Antonin Přichystal, and Lubomir Šebela have collaborated with Jaroslav Bartík, a younger progressive colleague, to produce a modern monographic evaluation of the Stránská skála hill occupation by Bell Beaker people. A wide spectrum of external experts was involved in specialised analyses. Stránská skála hill is one of the most famous south-Moravian archaeological sites, which joined the benefits of a raised location with a good overview of the Brno basin's surrounding landscape and a source of local cherts; although its homogeneity and knapping quality varied from very fine to very coarse. The site was occupied as early as the Cromer interglacial period; nevertheless, the focus of the presented book is a brief span of its occupation, at the turn of the Stone and Bronze Age, represented by the Bell Beaker archaeological culture at Site IV.

The text is divided into three main parts. *The Preliminaries* involves common introduction chapters related to the site, its geology and geomorphology, a description and sorting of the Stránská skála cherts, and an overview of the previous archaeological research. The second part of the book, entitled *Stránská skála 2016*, is dedicated to a detailed analysis of Site IV field situation, artefacts and samples. The last part presents concluding chapters.

The main research questions, formulated in the first chapter, are related to stone processing strategy, the preferred source of the chert, and the position of the site in the operational chain of the produced lithics. The traditional stone management of the local population of the Jevišovice culture (which preceded the Bell Beaker people) could be adopted when the local sources of the raw material were utilised, or the typical patterns of Bell Beaker knapping and re-

touching could be retained, although the raw material sources changed. The representative collection of 3,143 pieces of lithics found in the outcrop vicinity raise questions about their affiliation to an atelier, workshop or the settlement/functional zone character. The origin of the chert – from limestone outcrops, debris depositions on the hill slope, surface or even recollection of an older occupation layer – illustrates a certain plasticity in terms of production costs and strategies. The position of the site in some production and distribution networks was questionable because only four other sites are known in which lithic collections of the Stránská skála chert are present. All of them are quite close to the outcrop.

The second chapter elucidates in detail the complex geological situation of the site on the border of two geological units, the Bohemian Massif and the Western Carpathians. Stránská skála hill is formed by the largely preserved relic of the originally continuous sedimentary cover of the Jurassic limestone in the Brno basin. Three other relics exist in this region, although they are smaller or have even largely disappeared as a result of human activities. A layer of Devonian limestone forms the base of the hill, whereas a crinoidal layer and upper limestone layer create the upper part. Both limestone layers are rich in cherts. The upper limestones are preserved only on the Stránská skála hill, representing a unique source of well knappable banded cherts in the Moravia. Other relics only give cherts in the lower limestones. The third source of such cherts was formed by long-term geological processes, which eroded original Jurassic limestone cover and accumulated the nodules, blocks and gravel on river terraces. They were distinguished as Moravian Jurassic cherts. Intensive limestone quarry-

ing transformed the site's geomorphology, especially on the northern and western slopes.

The detailed description of the cherts continues in the third chapter, which is dedicated to the petrographic characteristics of individual variants. Although the author has published similar texts several times before, it has an indispensable place in the book dedicated to the eponymy site. The text completes the knowledge of this chert type in its geological and petrographic context, which is essential for an understanding of its accessibility, ability to be worked by knapping, and the preferences in the core exploitation strategies. The macroscopic features, microfossil description by water immersion method and thin-section microscopy in PPL and XPL is given. Tables of chemical composition using major oxides and rare earth element methods complete the chapter.

After a short chapter of the history of research on the site, including a helpful table ordering the individual archaeological activities and their references, a framing overview of the Stránská skála chert use in the prehistoric period is given. The Palaeolithic part is concise, whereas the primary attention is dedicated to Eneolithic and Early Bronze Age cultures. The sub-chapters of the Lengyel and Funnel Beaker cultures are mainly based on research by J. Bartík. The chapters provide the requisite information on technique, exploitation concept, produced debitage and its distribution pattern. Such information is perceptibly missing in the sub-chapters devoted to the Jevišovice and Únětice cultures, which are too brief and general, mentioning only sites and size of the collections, unfortunately.

The main chapter of the book (chapter VI) describes the excavation processes and results, including standard analysis of the findings – lithics, ceramics, bone tools and macroliths. The collection of lithics is particularly well analysed, including small items identified by floating. It is essential because a similar completeness of collections is certainly not the standard in Moravian research on the Bell Beaker culture. The preference of the coarse and hard variety of the Stránská skála chert coincides well with the Early Bronze Age strategies, when the most wear-resistant raw materials were preferred. Analysis of debitage butts, the low number of crested flakes or blades, and a wide variability in exploitation patterns showed the low application of sophisticated core preparation. It means the knapping was mostly opportunistic, although we do not need to agree with the author's meaning of the low technological standard of the core. The ability to knap even difficult and coarse raw material needs skills and routine. The splinters formed 42% of the collection (if we count the items, not the weight), and

the category of the production waste reaches 77%. Flakes dominate target production, representing less than 10% of the collection. The authors supposed the final purpose of such production were endscrapers, arrowheads, or so-called segments because finalised retouched tools are almost entirely absent in the collection. Unfortunately, the complete list of retouched tools is not presented in some of the tables but only mentioned in the text. For example, endscrapers are mentioned as the possible purpose of the flakes, but none is noted in the collection or referred to in drawings or photographs. All these features of the lithics collection are typical for workshop activities. All other findings are testament to everyday settlement activities, including the use and perhaps production of ceramics, the use of bone awls and needles, stone polishers, mills, and spindle whorls. Daub fragments have shown construction imprints.

The chapter devoted to expertise analyses (chapter VII) increases the amount of archaeological information considerably.

The use-wear analysis by Damian Wolski was applied to app. 2% of the collection due to the low percentage of non-waste items and lower legibility of the raw material under the microscope. It is mentioned several times that a certain part of the collection was thermally transformed and it is a pity that such information is not available in the tables in the previous chapter. Particularly surprising is the fact that use-wear was only positively identified on the surface of six artefacts, and it was weak and unspecific. Because other use-wear analyses of lithics knapped from Stránská skála chert were published (Šajnerová 2003a; 2003b; Kaňáková and Parma 2015), it cannot be caused only by poor legibility and preservation, i.e. it is potentially crucial for collection interpretation. An inspiring aspect is the fact that the author introduced the use-wear of technological features of the lithics, especially cores, to the analysis of Moravian collections. Such analysis is well known in Western Europe but it has not yet been applied in the Moravian context. The identified changes in chert colouration and other features of thermal alteration are interpreted as heat treatment aimed at improving the knapping quality of the rock. It should be reflected some older publications (McCutcheon and Kuehner 1997) dedicated to differences of heat treatment results in flint and chert, because physically it does not work well in case of heterogeneous structure of the chert material. Perhaps some small testing experiment on the Stránská skála chert might elucidate this question better.

Petrographic analysis of ceramics using thin-section microscopy by Anna Rauba-Bukowska presents

a precise and visually rich analytical chapter dedicated to ceramics. It significantly enriches existing knowledge of Bell Beaker ceramic petrography and technology in south Moravia. Despite some archaeological indications, the analysed samples of ceramics were not manufactured on the site.

Both the archaeobotany by Maria Lityńska-Zajac, and the archaeozoology by Miriam Nývltová Fišáková support the settlement character of the site. Although the samples were not numerous (in the case of charcoals of firewood) or well preserved (in the case of osteology), the results frame the site as a standard, small, non-specialised settlement.

In the third and concluding part of the book, the authors endeavour to insert the obtained local data into a broader European context of late industries and Bell Beaker diffusion. Although the introduction to the diffusion seems too long for such a purpose, and the mentioned compared sites seem to be widely dispersed, the final considerations are consistent and well-argued. A more theoretical chapter by D. Wolski contemplates the dichotomy concept of late industries as a reflection of social processes and changes in the studied period. It should be noted that the opportunistic *ad hoc* tools with unspecific short-time use-wear are common even in Neolithic collections, i.e. it is not something unique for late industries, but perhaps not so prominent as it is hidden behind steady typological tools, organised cores and blade production of Neolithic collections. A final consideration of the site's status clearly distinguishes the Stránská skála IV site from the mining region in Krumlovský les Upland. Whereas the Krumlovský les mining district was connected with a symbolic motivation regarding knapping activities, Stránská skála chert processing was directly practical and related to daily life.

The complete database of the lithics could be highly beneficial for many readers and, as is common in modern science, the raw data are open and presented in clearer form for individual items.

The repeatedly mentioned hypothesis of the composed dagger (from an arrowhead at the tip and seg-

ments on sides) needs more robust verification to be presented as a fact. The well documented bright spots on segment backs, no sickle or saw use-wear on their functional edge, no binding hafting wear on arrowhead, should all be presented in micro-photos at least. Use-wear analyses of segments and arrowheads of the Bell Beaker culture realised recently oppose this idea.

Although some genre photos can be refreshing in an academic text, they should not be mixed with those which are more documentary in scope. Figures V.3-8 and IX.6 were not well processed and need more care. They should be re-drawn in higher resolution. Deeper final editing could be beneficial because mistyped characters are more frequent than usual, and some might be confusing.

Despite these details, the new Stránská skála book is a beneficial contribution to the research of Bell Beaker stone processing in the Central European context. The comprehensive introductory chapters and expert analyses make the book interesting even for archaeologists who do not specialise in lithics.

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