

# Stone sources from the North-Carpathian province in the Stone and Early Bronze Ages

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The Polish Carpathians are known to contain few siliceous rocks with good cleavage characteristics. Only the radiolarite from the Pieniny rock belt has previously been noted. Actually the exploitation of the following local siliceous rocks during the Stone and Early Bronze Ages is documented: radiolarite, menilite and Mikuszowice hornstone, Dynów-marl. As a result of new archaeological research in the Polish West-Carpathians some indirect evidence of mining of siliceous rocks (*e.g.*, typical mining tools as an element of inventories) has been published. Because the rock-outcrops here are of different characteristics from the classic province of prehistoric flint mining (Cracow–Częstochowa Upland, Świętokrzyskie [Holy Cross] Mts.), where flint is found in the form of nodules only, and not as siliceous layers, most probably the prehistoric man in the Carpathians used another method for exploitation of this raw material from the ground.

KEY-WORDS: siliceous rock, hornstone, Flysch, Carpathians, Pieniny Mts.

## THE PROBLEM. GENERAL REMARKS

Archaeological research in the Polish Carpathians suggests an increasingly broader range of questions. One group of them relates to the prehistoric exploitation of local mineral deposits. The view accepted recently about the scarcity of raw materials influencing the shapes of stone tools found in the mountainous part of the Western Carpathians is becoming less and less universal, though it is unlikely to become completely obsolete (Rydlewski and Valde-Nowak 1979:28). These problems are, as we realize nowadays, much more complex than we previously supposed. This complexity is confirmed by the discoveries of traces of a growing number of cultures on the one hand and, on the other, by the results of the archaeological verification of the Carpathian rock formations which contain concentrations of amorphous silica, a potential source of raw materials suitable for flint tool making (Fig. 1).

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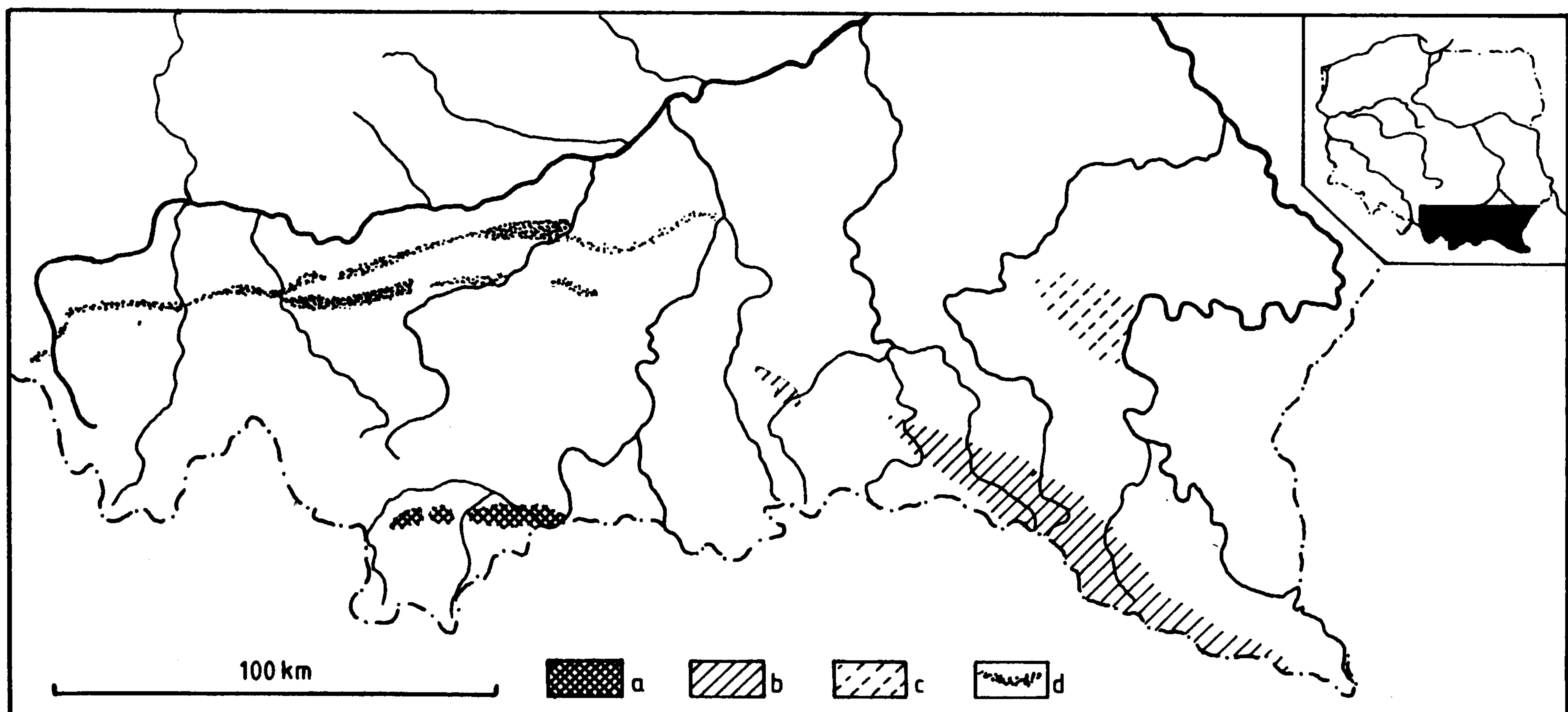


Fig. 1. The most important beds of siliceous rocks in the Polish West Carpathians: a — radiolarite, b — black menilite hornstone, c — Dynów-marl, d — Mikuszowice hornstone.

In the repeatedly published specifications of major siliceous rock outcrops in the Vistula river basin, West Carpathian deposits were hardly taken into consideration. The Polish Carpathians are known to contain few siliceous rocks with good cleavage characteristics. Only the radiolarite from the Pieniny rock belt was noted (Dagnan 1971:64; Ginter 1974:9 fig. 1; Schild 1975:330; Ginter and Kozłowski 1969:14–5, 1975:29 fig. 2, 1990:28–9; Kaczanowska 1985:23–4 map 2 inset). Studies such as the above mentioned, though recent, were produced when knowledge about North Carpathian Stone Age settlements was still scant.

## THE RADIOLARITE

Owing to numerous archaeological discoveries in the Pieniny-Podhale part of the Dunajec river basin, the Polish radiolarite was recognized as a rock with properties which allowed effective processing by prehistoric flint tool makers. The occurrence of such an abundant and easily accessible raw material between the Gorce and Tatra mountains was regarded as a factor of great importance, shaping the pattern of pre-Neolithic settlement there (Rydlewski and Valde-Nowak 1983). Not surprisingly, both the archaeological and petrographic characteristics of the Polish radiolarite were, in due course, defined (Kozłowski *et al.* 1981; Rydlewski 1989a).

The term “Pieniny radiolarite beds” is related to Jurassic deposits with appropriate petrographic characteristics, located in the Podhale Basin and in the Pieniny mountains. The natural stratigraphic position is connected with limestone of

the Lower Malm series. The geological and physical-geographical description has been fully presented elsewhere (see Kozłowski *et al.* 1981:173–6, 179–95; Rydlewski 1989a:31–51).

Intensive survey in the Polish Carpathians has identified over 50 late Palaeolithic open-air sites. Several of them are camp sites with many traces of radiolarite working. The question of its extraction is still open. The characteristics of worked radiolarite lumps would indicate their having come directly from the primary deposit, which would indicate some form of mining. So far no sites of radiolarite extraction have been identified and it is possible that fragments were prised out from strata in rocky outcrops or picked from newly formed scree (Valde-Nowak 1991a:595).

It is documented that the Pieniny beds of radiolarite were used in all periods of the Stone Age and in the Early Bronze Age (Rydlewski 1989a:72).

As far as the methods of radiolarite exploitation in the Polish Carpathians are concerned, the most important are discoveries in the Obłazowa Cave. The basis for this opinion comes not only from the fact that all Middle- and Upper Palaeolithic assemblages include many artifacts produced of radiolarite, but also from the finds of two antler wedge-levers in the Upper Palaeolithic layer VIII (Valde-Nowak 1987, 1991a; Valde-Nowak, Nadachowski and Wolsan 1987). They are typical mining tools (Fig. 2), similar to some forms found in flint mines in different areas and different cultural contexts, *e.g.*, Grimes Graves (Armstrong 1926:110), Krzemionki Opatowskie (Boguszewski and Sałaciński 1992), Polany Kolonie (Schild *et al.* 1977:67–76).

This discovery suggests the possibility of mining activity nearby. The Obłazowa Cave is situated within the range of primary deposits of radiolarite. However, apart from this discovery the methods and existing traces of mining (*i.e.*, in the form of exploitation pits) are not yet clear. It should be noted that information about Upper Palaeolithic flint-mines is in any case very rare.

## THE MENILITE HORNSTONE

In the early 1980s some research was conducted in the Polish part of the Beskid Niski mountains. Thus far, the greatest number of sites has been in the Ropa River basin. Among the finds collected from the surface, artifacts made of black-coloured conchoidal-fractured opaque siliceous rock are particularly noticeable. These finds were the first significant indications of prehistoric exploitation of menilite hornstone.

The menilith hornstone is a rock characteristic for the Dukla unit, an integral element of Palaeogene Flysch-Sediments. Structures typical for the Dukla unit are

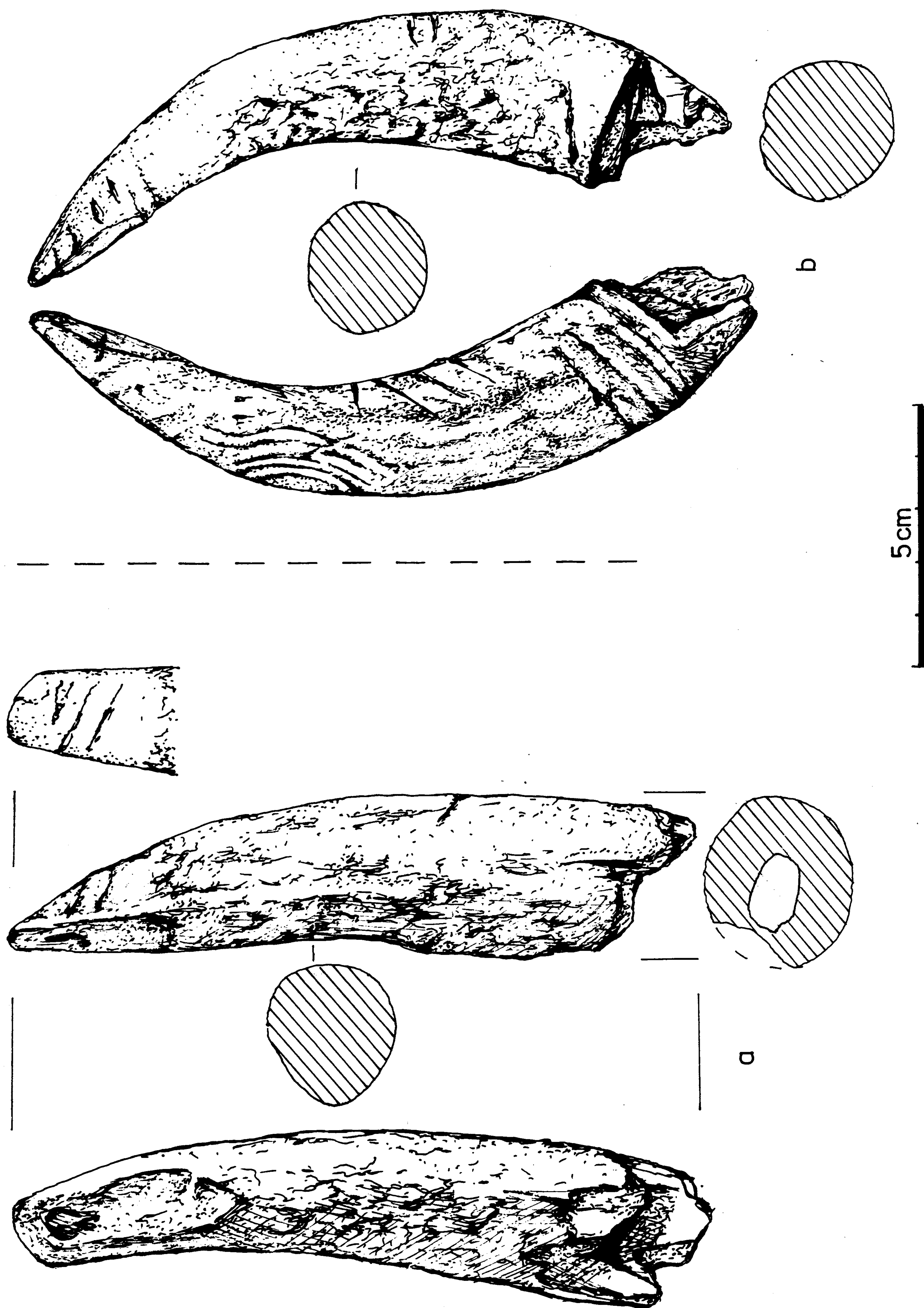


Fig. 2. Nowa Biała, Nowy Sącz Province, site 2 — Obłazowa Cave, layer VIII (Gravettian): a—b — antler levers. Drawn by M. Zender.

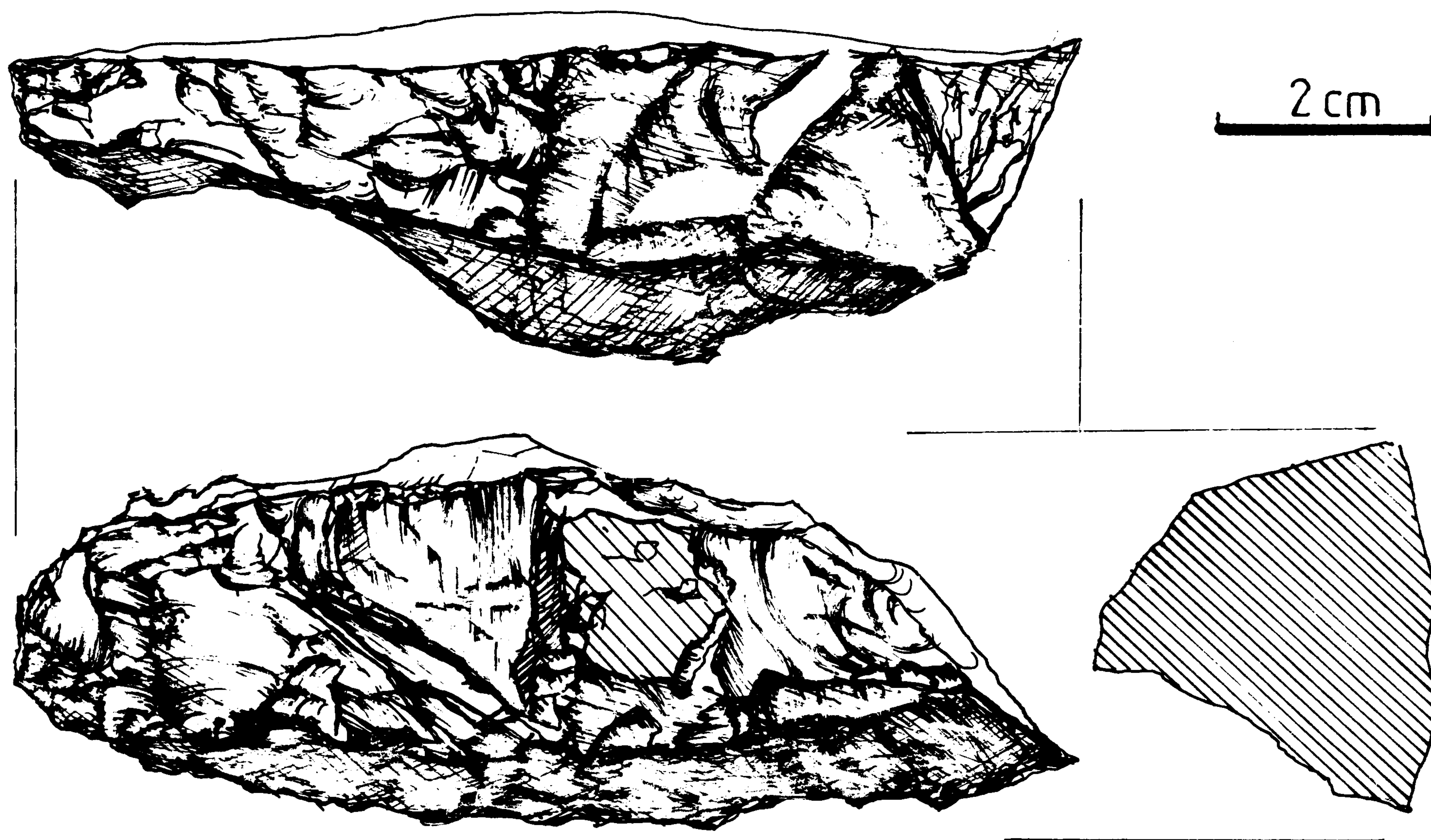


Fig. 3. Ropa, Nowy Sącz Province, site 2. Pick of black menilite hornstone. Drawn by M. Zender.

found well beyond the present-day borders of the Polish Carpathians. A number of outcrops was noted in eastern Slovakia: in the Beskid Niski mountains and on their southern foreland and similarly in the Trans-Carpathian Ukraine. More precisely, menilith strata could be dated to the Upper Eocene.

In spring 1988, during archaeological investigations, a place of prehistoric exploitation of local hornstone was discovered in the southern part of the Ropa village, Province of Nowy Sącz. Some tool forms, like a pick (Fig. 3), exactly correspond to the definition of so-called mining tools, which are linked with flint mining (compare Lech 1981:84–8). This fact, and the mass occurrence of natural pieces of menilite hornstone on the surface of the site and in its vicinity allow us to assume that a menilite hornstone mine existed in this place (Valde-Nowak 1991b:64–80). Such a reasoning is supported by the presence of processed blocks, which proves that they were taken directly from a primary deposit. The potential striking platforms of the majority of cores are fragments of the interface between the silica-rich layer with the rock without silica component. This could be an important detail for the reconstruction of the mining process and subsequent work. Probably, the material was broken out of the layer, and the miners rejected digging in the slope diluvium, which contained numerous but crumbled hornstone chips. So far, Upper Palaeolithic, Neolithic and Early Bronze Age sites of Polish and Slovakian sites confirm the prehistoric exploitation of this rock.

## DYNÓW-SILICEOUS MARL

This was the first siliceous rock in the Flysch which drew the attention of archaeologists. Its outcrops were localized in the Baryczka river basin in the Dynów Highland (Dagnan-Ginter and Parczewski 1976; Parczewski 1986:24–5). Petrographic identification, the location of its deposits and, what is interesting, the correctness of the name of siliceous marl from the vicinity of Dynów, are still posing some difficulties. Primary deposits of this rock are best known from stream-valley bottoms. Mostly the artifacts are produced from a material which comes from fluvial series. Other ways of exploitation are unknown. In the light of what has been determined so far, its deposits provided raw material for rectangular, usually completely polished axes (Jarnot-Kozłowska 1988 see further literature there). Neither in the Neolithic nor in the Early Bronze Age were artifacts made of this rock distributed more than locally. The Early Bronze Age inventories confirm the local popularity of this rock, as a material for percussion production of tools (Valde-Nowak 1995).

## MIKUSZOWICE HORNSTONE

It is worth mentioning that local Stone Age communities showed interest in other Flysch rocks from the Polish West Carpathians. One of these is the Mikuszowice hornstone, an element of the Śląsk-unit, dated to Lower Alb (Rydlewski 1989b:175).

The Late Palaeolithic (The Ahrensburg Culture) inventory from Lipnica Wielka 2 in the Orawa-Nowy Targ Basin produced a core and some flakes of this rock (Rydlewski and Valde-Nowak 1984; Rydlewski 1989b:177–8 fig. 2). Neolithic artifacts of this same rock material are known from Dobczyce in the Raba basin (Rydlewski 1989b:177–8). So far no information about exploitation of this rock is known.

## FLYSCH SANDSTONE

Some finds indicate that Flysch sandstone was sometimes processed by means of the percussion technique in the Stone Age. It should also be remembered that Flysch sandstone hammerstones, supports and retouchers are an integral part of any large Palaeolithic inventory from the Polish Carpathians (Valde-Nowak 1987:26 fig. 18). It was also the rock of which tools were sporadically made by means of the polishing technique. This is clearly indicated by the finds of asymmetrical hoes and axes of the Corded Ware Culture, Funnel Beaker Culture (TRB) or the Lengyel-Polgar cycle (Valde-Nowak 1988:129–30, 133–8). So far, only the form of river pebble-stones is known as a raw material in the case of Flysch-Sandstone.

## CONCLUSION

As a result of new archaeological research in the Polish West-Carpathians some indirect premises of mining of siliceous rocks during the Stone and Bronze Ages are well documented. In the light of this and as a result of the progress of archaeological work a new, North-Carpathians zone of beds of siliceous raw material is recognized. Because the rock-outcrops here have different characteristics from the classic province of prehistoric flint mining (Cracow–Częstochowa Upland, Świętokrzyskie Mts.), where flint is found in the form of nodules only, and not as siliceous layers, most probably, prehistoric man used another method of exploitation of these materials from the ground.

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