

FLINT ARTEFACT MANUFACTURE TECHNIQUES AT THE PALAEOLITHIC AND MESOLITHIC SETTLEMENTS AT AUKŠTUMALA IN LITHUANIA, AND TRACEOLOGICAL STUDIES OF THEM

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Abstract

The set of Palaeolithic and Mesolithic artefacts from Aukštumala consists exclusively of flint manufactured items. This paper presents exhaustive data on studies of the flint artefacts, and on the reconstruction of their manufacture technique, based on observable characteristics of their manufacture. The functions of the artefacts found in the settlements were established at the Archaeological Material Research Laboratory at Klaipėda University, by means of an Olympus SZX16 microscope, and simultaneously their typology and the chronology of individual items were revised.

Key words: Aukštumala, flint technique, flint tools, functional analysis, micro-trace analysis, Palaeolithic, Mesolithic, Lithuania.

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Introduction

During the archaeological survey of the Aukštumala upland bog in the Šilutė district of Lithuania in 2004, two unique Stone Age settlements were discovered and identified (Dakanis 2006, p.11ff), and attributed to the Late Palaeolithic and Middle Mesolithic periods (for this, see Grigaliūnas' article in this volume). Topographically, they could have been Palaeolithic and Middle Mesolithic settlements situated on the shores of the former Baltic Ice Lake and a lake of the Ancylus transgression period (Šečkus 2009; Damušytė 2011; Gelumbauskaitė 2010, pp.109-116). The settlements were in the eastern part of the Aukštumala bog (Weber 1902), west of the village of Lapaliai. A settlement called Pilekalvė or Pilskalns existed on a sandy islet in the bog. The islet rose just 0.5 metres out of the bog, stretched in a north-south direction, and was 40 by 20 metres in size. It was damaged by trenches and farming activity. The Palaeolithic and Mesolithic settlements were discovered on this islet.

The system used for numbering finds in this article coincides with the list of finds made during the archaeological survey at Aukštumala. This should facilitate the use of material in the Šilutė Museum for other researchers. The finds in the settlements consist of exclusively flint artefacts. Those attributed to the Palaeolithic period were of white flint, and covered with a white patina, while those of the Mesolithic period were dark grey flint with a clear glossy patina. Altogether, 48 items of flint artefacts were discovered in the settlements (Table 1). Thirty-one were attributed to the Palaeolithic, and

17 to the Mesolithic period. The manufactured items from the Late Palaeolithic and Middle Mesolithic periods are discussed below.

Flint artefacts from the Aukštumala settlements

The typology of finds at Aukštumala was established, and their functions were studied by means of traceological techniques. The manufacture technique of each item was reconstructed on the basis of observable traces of the manufacture of the item. According to the flint raw material and the percussion technique, all the artefacts were made of five cores. One Late Palaeolithic techno-complex was identified, to which the following artefacts can be attributed: three burins, a gouge, one borer, one tang of an arrowhead, two knives, and one microlith. The following manufacture similarities were identified: raw material of white flint (untypical of Lithuanian flint); hard or semi-hard-hammer flint percussion technique; items were made from blades and flakes, and corrected by perpendicular retouch. A burin (see the article by Grigaliūnas in the present volume Fig. 29), a burin-scraper (see the article by Grigaliūnas in the present volume Fig. 26), a burin (see the article by Grigaliūnas in the present volume Fig. 25), and a knife-broken blade (see the article by Grigaliūnas in the present volume Fig. 28) not only showed similar flint texture and manufacture technique, but were also found in the same place. According to the flint raw material, the technique of the manufacture, and the typology of the items, all the finds from the Aukštumala

Table 1. Flint finds at Aukštumala

Artefacts		Blades		Flakes		Cores	
With white patina	15	With white patina	3	With white patina	12	With white patina	2
With clear glossy patina	5	With clear glossy patina	2	With clear glossy patina	9	With clear glossy patina	1

settlement can be classified according to two periods: Late Palaeolithic and Middle Mesolithic. Only three microliths could be attributed to the Mesolithic period: pieces of two scrapers and one arrowhead.

Artefacts from the Palaeolithic period

Specimen Nos 2 and 10 were parts of one item (see the article by Grigaliūnas in the present volume Fig. 4). These were two parts of the upper blade broken off a piece of white flint, and later covered with a light patina. The texture was cracked, due to significant and abrupt changes in temperature. Typologically, they can be considered pieces of an arrowhead. One edge exhibited a fine perpendicular retouch seen on both pieces. On the front of the blade, one negative was formed contrary to the direction of the blade fracture, which proved that the blade was broken off a double-ended core. Judging by the reverse of the bladelet and its thickness, a hard or semi-hard-hammer percussion technique was applied. This technique was widespread in the Late Palaeolithic period. One edge of the artefact was formed by a fine perpendicular retouch. The retouch could have been made by a bone or a horn punch, by taking the blank in such a way as to have the front pressed to the palm, and the back held by the fingers. The side was retouched by tilting the blank at an angle of 80° to 90°. The same effect could be

achieved by placing the blank on a stone or any other smooth and hard base, without changing the angle of retouching (Fig. 1). On the other edge, four traces of a semi-perpendicular retouch could be seen, which must have been formed by accidentally hitting a hard object, or the trace could have formed on a previously manufactured item. According to the identified traceological attributes on the unretouched edge, the artefact can be typologically assigned to knives.

Specimen No 19 was the lower part of a blade, the tang of a point (see the article by Grigaliūnas in the present volume Fig. 5). The item was made of greyish-white flint, covered with a light patina. The texture of the flint was cracked, due to sharp changes of temperature. One edge was perpendicularly retouched, and the other semi-perpendicularly retouched from the reverse side (Fig. 2). On the reverse side, the negative of a flat retouch could also be seen. The negatives on the front showed that the bladelet was broken off a single-ended core. However, one negative indicated that the blade might have been broken off by hard or semi-hard-hammer percussion. The tang of the point was typical of the Late Palaeolithic period and the manufacture technique of arrowheads typical of Arensburgian culture (Štavičius 2005, p.68; Zagorska 2012, p.161). Specimen No 4 was a flake-microlith (see the article by Grigaliūnas in the present volume Fig. 6) made of white flint, and later covered with a light patina. The

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Fig. 1. On the working edge traces of semi-perpendicular retouch. 16x (photograph by G. Slah).



Fig. 2. Side edge retouched by perpendicular retouch. 16x (photograph by G. Slah).

artefact was cracked, due to sharp changes of temperature. The microlith was formed from a flake with one edge perpendicularly retouched, and the remaining edges left natural (Fig. 3). Judging by the negatives on the front, the flake was broken off a single-ended core by hard or semi-hard-hammer percussion technique. The segmental microlith belonged to the Late Palaeolithic or Early Mesolithic period, and may have come from a manufacturing techno-complex of Late Arensburgian culture (Šatavičius 2005, p.68). Specimen No 39 was a burin (see the article by Grigaliūnas in the present volume Fig. 25), made from a white flint blade covered with a yellowish patina. A burin was formed on the upper part of the blade, and traces of microlithisation could be seen on the blade. On the corner edge of the burin, one stroke of a flat retouch could be seen. Judging by the curvature of the bladelet and its bulb, as well as the negatives on the opposite side, it was broken off by a hard-hammer percussion technique. It is difficult to say whether the item was broken

off a double-ended core, as the negatives formed at the top of the blade were rather small, and might have appeared in the manufacturing process. It was possible to identify the manufacturing process of the artefact. For this, it was necessary to break off a blade. The upper part had to be perpendicularly or semi-perpendicularly retouched, and pressed in a wooden clamp, so that the upper part of the blade would stay outside. Then a horn pressure tool was set against the retouched base. By pressing at an angle of about 40° from the centre of the retouched base outwards, part of the flint scale was torn away. Thus, the working surface of the burin was formed, and it could be corrected by a flat retouch. Use-wear was seen on the artefact, which could have been formed in an attempt to have a convenient angle of percussion, while the retouching could have been performed with a stone or a horn by smoothing the edge of the bladelet.

Specimen No 36 was a burin-scraper (see the article by Grigaliūnas in the present volume Fig. 26), made of white flint with a light yellow patina. The tool was made from the upper part of the blade. Use-wear retouch was seen on the upper part of the artefact (Fig. 4), and negatives on the front. It is difficult to say whether the item was broken off a double-ended core. Several different negative directions could be detected; however, they were rather fine, and could have appeared during the preparation of the core.



Fig. 3. One rip of retouch on the working edge. 16x (photograph by G. Slah).

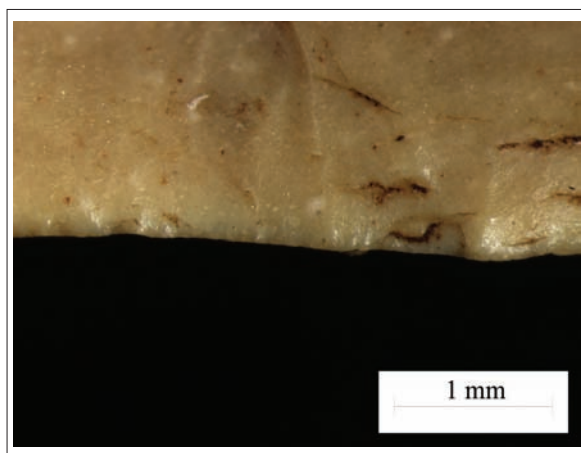


Fig. 4. Use-wear micro retouch. 16x (photograph by G. Slah).



Fig. 5. Rips of retouch. 16x (photograph by G. Slah.).

A burin was formed on the lower part of the bladelet. The lower part of the blade, with a bulb of percussion, was truncated, and thus a plane formed from which, by bone or horn pressure tools, it was possible to break off part of the edge, which was then corrected by three burin strokes (Fig. 5). On the other edge, signs of use-wear could be seen remaining after the blade had been broken off. The artefact was manufactured according to the following techniques: the signs of use-wear left on the upper part of the blade could have been formed from short-term hide processing. Tiny and regular crumbling could be observed, as well as rare isolated and deeper splays, while on the very edge, the surface had some smooth patches (Fig. 6). How could the artefact have been used as a scraper? This use was shown by an angle of the bend typical only of scrapers. It is difficult to say whether the tool had a dual function, or merely one primary function, and was later remade into another tool. The question is difficult to answer. However, the use-wear traces on its edges suggest that the artefact was used both as a burin and as a scraper.

Specimen No 16 was a borer (see the article by Grigaliūnas in the present volume Fig. 10), made of a triangular small white flint flake covered with a light yellowish patina. A piece of the cortex or a calcareous insert remained on part of the flake. The very texture of the flint was cracked, due to abrupt temperature changes. One side was retouched by a flat retouch, another by a fine semi-perpendicular retouch. The third edge was not retouched. Only by magnifying it 25 times with a microscope could use-wear traces be observed (Fig. 7, Fig. 8, Fig. 9). Judging by the direction of the micro-retouch, we can state that the borer was used as a uni-directional tool, by a principle of counter-clockwise rotation. The traces observed suggest that the artefact was not used for long.

The artefact was broken off a core by hard hammer-percussion, and later corrected by retouching. The

edges were retouched in a rotation direction, to remove a rounded or a too fragile side, while the extreme point of the borer was purposely retouched at an angle of approximately 45° , otherwise the sharp point could have crumbled from pressure and friction, and, when

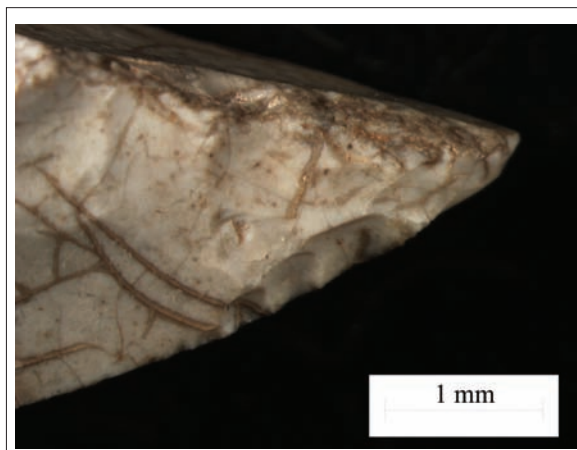


Fig. 7. Use-wear signs on the edge. 25x (photograph by G. Slah)



Fig. 8. Use-wear signs on the edge. 25x (photograph by G. Slah).



Fig. 6. Working surface with use-wear retouch. 16x (photograph by G. Slah).



Fig. 9. Use-wear signs on the edge. 25x (photograph by G. Slah).

rounded, could have stopped boring. According to the flint processing technique and the function, the artefact can be attributed to the Late Palaeolithic period.

Specimen No 42 was a gouge (see the article by Grigaliūnas in the present volume Fig. 27), made of a dark grey flint flake which later became covered with a dark yellow-brown, and in some places a white, patina. On the concave side, parts of a chipped blade could be observed, covered with a light patina. The angles of the artefact were fractured, and a grey flint structure was seen. The chipped blade was a typical result of the processing of hard material: dry wood (Fig. 10).

In order to produce the tool, a flake was needed (judging by the different-coloured patina, the blade must have been older than the gouge by a millennium), and a hammerstone (stone or horn). Then the small flake was struck on the edge by a hammerstone. On striking a deep enough part of the edge, it immediately featured a sharp edge and a convex surface.

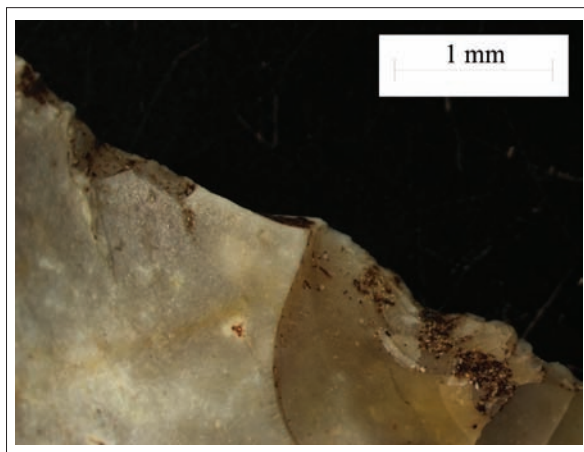


Fig. 10. Ripped off gouge bladelet edge. 16x (photograph by G. Slah).

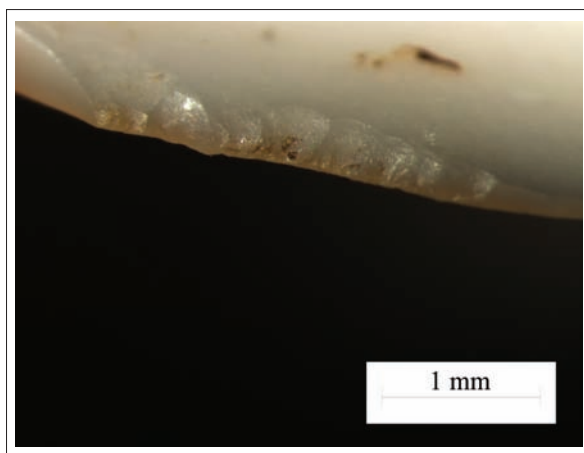


Fig. 11. Micro retouch traces. 16x (photograph by G. Slah).

According the manufacture technique, the form of the artefact and its patina, the tool was attributed to the Late Palaeolithic period.

Specimens Nos 40 and 41 (see the article by Grigaliūnas in the present volume Fig. 28) were a broken blade made of light grey dull flint, later covered with a light, semi-clear patina. The blade was broken in half. It had been broken off the lower part of the core, as is shown by four large blade negatives that formed on one edge of the front face. Traces of use-wear could be seen in several places on the bladelets. The greatest accumulation of micro-retouch traces was found on the upper part of the blade (Fig. 11): they were small isolated chipped spots by the lower part of the blade. More distinct crumbings on the reverse suggest that the tool was used in one direction, and only in rare cases in two directions (Fig. 12). The site of the break was not retouched; therefore, we suggest that the destruction of the artefact was accidental. The blade can be attributed to knives, due to the distinct use-wear traces, and the size of the artefact typologically complied with its function.

Judging by the thickness of the bulb of percussion of the blade and the negative traces on its lower part, the blade was broken off by a semi-soft-hammer percussion technique. In rare cases, these blades can be broken off by a hard-hammer percussion technique. A semi-soft-hammer percussion technique for breaking off blades was quite frequent in Arensburgian techno-complexes.

Specimen No 35 was a burin (see the article by Grigaliūnas in the present volume Fig. 29), made of a massive white flint blade, later covered with a light blue-grey patina. The blade was broken off a double-ended core. On the upper part of the blade, a burin was formed, with signs of micro-retouch observable on its edges. On the lower part of the blade, use-wear traces

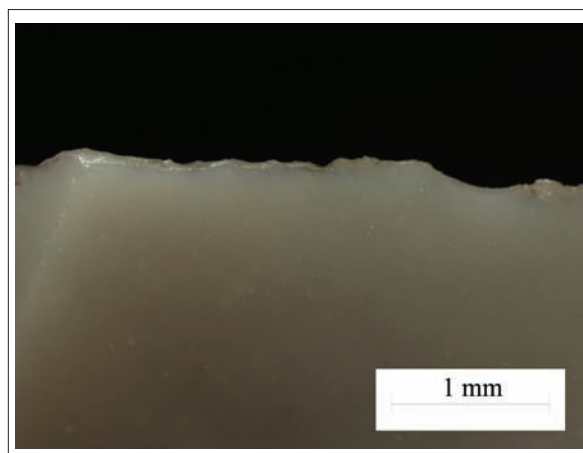


Fig. 12. Use-wear traces of unidirectional work process. 16x (photograph by G. Slah).



Fig. 13. Use-wear retouch on the pin of burin. 16x (photograph by G. Slah).



Fig. 14. Use-wear retouch on the pin of burin. 16x (photograph by G. Slah).

were seen, as well as two chipped spots similar to traces of retouch.

By magnifying the article 16 times with a microscope, we could observe several different use-wear traces: by the point of the burin, on both sides of one edge, finely chipped spots were detected (Fig. 13, Fig. 14); and on the other edge, traces of a fine retouch could be identified (Fig. 15). The rough chipped spots were caused by contact with a hard material, such as bone or horn. The middle part of the blade was intact, only rare isolated chipped spots could be detected, which might have formed accidentally, or after the artefact was no longer used. On the lower part of the blade, bi-facial use-wear retouch (Fig. 16) could be seen, very fine and regular: just two larger retouch strokes occurred. Two parts of the burin revealed its function: one was a point used for cutting; and the other, by the bulb of percussion, was minimally formed as a tang.

The tool was formed from a massive blade broken off by hard-hammer percussion technique. The blank was tanged in such a way as to have part of the prospective point protruding by half. Then, in the upper part, by the centre, a bone or horn hammerstone or pressure tool was inserted, and tilted towards the blade at an angle of 40° to 50°. The pressure tool was struck by a stone or a horn; one part would break off, and a small platform was formed from which the remaining part of the blade could be broken off in the opposite direction. By a repeated action in the opposite direction, a cutting angle was formed. The lower part of the sharp edge of the blade was finely blunted by means of a stone or a horn, in order to form a tang, convenient to grasp, or a tang in a handle. Given the form of the artefact and its processing technique, typologically it is attributed to the burins of Arensburgian culture, with quite a few discovered in Salaspils Laukskola and Lithuanian Late Palaeolithic settlements (Zagorska 2012, p.168).

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Fig. 15. Micro retouch on the burin's edge. 16x (photograph by G. Slah).

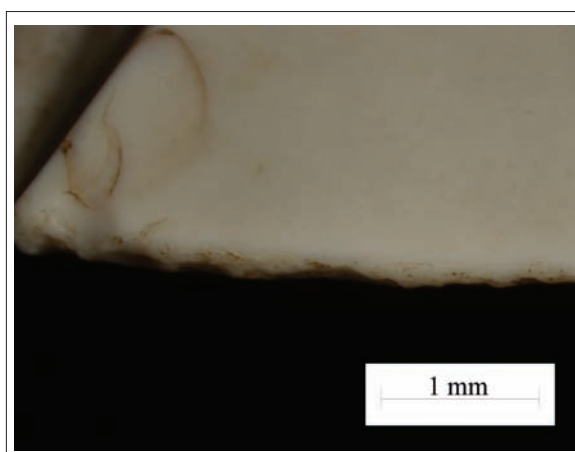


Fig. 16. Use-wear micro retouch in the lower part of artefact. 16x (photograph by G. Slah).

Artefacts from the Mesolithic period

Specimen No 11 was a bladelet-microlith (see the article by Grigaliūnas in the present volume Fig. 7). The artefact was made of dark grey flint with light inserts, with a fine use-wear retouch on the blade. Judging by the direction of the negatives, the blade was broken off a double-ended core. After breaking off the blade, the lower part was truncated; however, it could also have been removed during the secondary use of the artefact. The former artefact had a bulb of percussion and an upper part of the blade, and only later was the artefact broken and turned into a microlith.

On checking the use-wear retouch with a microscope, a double-row retouch was observed (Fig. 17). These are regular bi-facial bevelled spots repeated in different places on the bladelet. Usually, traces like this are observed on artefacts intended for processing dry wood. Given the size of the artefact, it could have been used for removing bark from arrow shafts, or correcting them.

Specimen No 33 (see the article by Grigaliūnas in the present volume Fig. 8) was a trapezoid microlith made of black flint covered with a white-grey cortex. The texture of the flint was cracked, due to abrupt changes in temperature. The microlith was manufactured from the middle part of the blade, and on the short part of the bladelet one trace of a retouch could be seen. On the longer part of the blade, several chipped spots were observed, resembling use-wear (Fig. 18). On magnifying the edge with a microscope, small chipped spots of rather recent origin could be observed, as the structure of the flint was cracked due to changes in temperature. Some remnants of pitch/tar were discovered on the bladelet. The organic compound remained on the whole edge of the bladelet, with a larger concentration on sites of the old use-wear retouch (Fig. 19). Traces

like this very seldom survive on bladelets, as organic matter disappears over the course of time. Since the specimen was found in a layer of peat, the observed pitch must have been conserved and thus survived.

The technique of microlith production. The blade was broken off a single-ended core by a hard or semi-soft-hammer technique, and then held in a wooden vice and broken into several parts. The fact that they were broken is shown by the surviving breakage sites on the artefact. Usually, two parts would be removed from the blank: the upper and the lower, since they were rounded or had a bulb of percussion which was difficult to tang. In our case, the trapezoid microlith was also made of a middle part. The next stage of its production included correction by retouch (whenever necessary). Then the article had to be embedded, as most microliths were composite parts of a blade. Tar or pitch was necessary for embedding. The two types of 'epoxy' were produced in different ways. Tar was made from melted pine resin and powdered charcoal, with some animal fat added. Pitch was made from birch bark or pine roots. For making pitch, two containers were necessary: the bottom of one of them had to have pre-punched holes (as in a colander or sieve), and the other had to be slightly larger and have a flat bottom. The larger container was put in a dug-out hole, and the other container was placed on top of it, full of pine roots or birch bark, and covered with a lid. The space between the pots was also covered very tightly. The fire was loaded with wood and lit. While it was burning, steam condensed inside the container, and the available matter and condensation dripped into the lower container. After the fire went out, liquified black matter, called pitch, remained in the lower container. When it was freshly made, it might have been too liquid for using; however, it would become more solid after being kept over the fire, and could be used

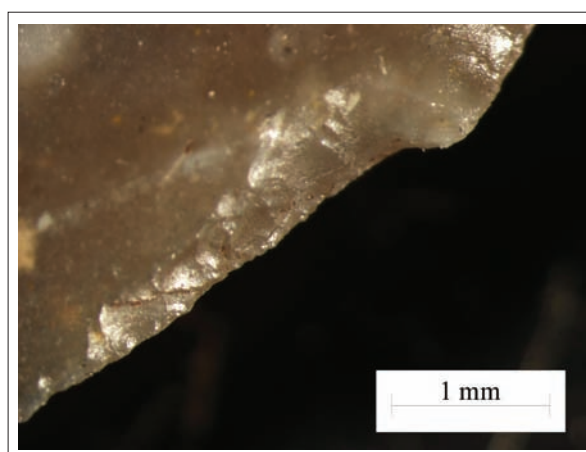


Fig. 17. Use-wear retouch enlarged by 16x (photograph by G. Slah).



Fig. 18. One retouch trace. 16x (photograph by G. Slah)



Fig. 19. Resin/pitch remains on the bladelet edges. 16x (photograph by G. Slah).

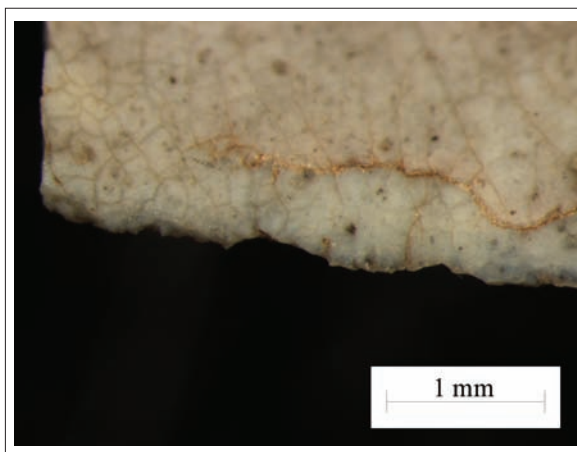


Fig. 20. Use-wear retouch. 16x (photograph by G. Slah).

as glue. Judging by the production technique and the microlith's form, the artefact was characteristic of the Middle Mesolithic period.

Specimen No 27 was a bladelet (see the article by Grigaliūnas in the present volume Fig.9), made from the middle part of a grey-white flint blade which was later covered with a light yellowish patina. The texture of the flint was cracked due to significant changes in temperature. Use-wear traces with chipped spots, caused by its physical state (Fig. 20), could be seen on one edge of the bladelet. From the remaining part,

where the micro-retouch could be seen, it was difficult to identify its function precisely.

The production of a bladelet, as with most microliths, was related to the blade truncating, and parts were selected that could be tanged and used as a blade. Specimen No 18 was an arrowhead (see the article by Grigaliūnas in the present volume Fig. 11), made of dark grey flint with a truncated upper part. The tang part was perpendicularly finely retouched. The blade was broken off a single-ended core. The finer retouch could only be seen after being magnified 16 times with a microscope (Fig. 21). Micro-traces of use-wear were observed by the point's break site, and in two places by the middle part of the blade. A single stroke of perpendicular retouching was detected by the tang part (Fig. 22).

The tang of the broken-off blade was formed with a bone or horn pressure tool, by pressing perpendicularly from the side of the bulb of percussion, at an angle of approximately 80° to 90°. However, the place of the



Fig. 21. Minor retouch. 16x (photograph by G. Slah).

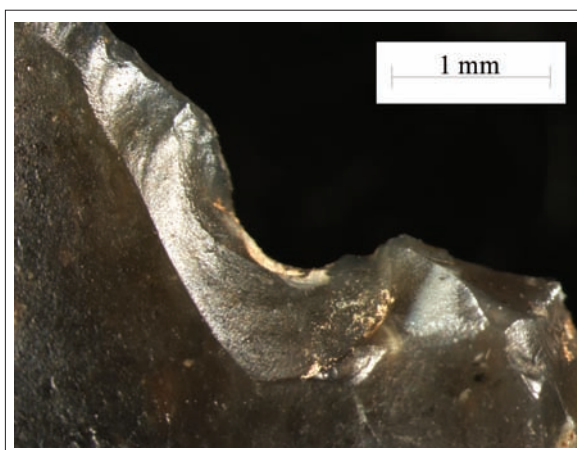


Fig. 22. Retouch part of the tang. 16x (photograph by G. Slah).

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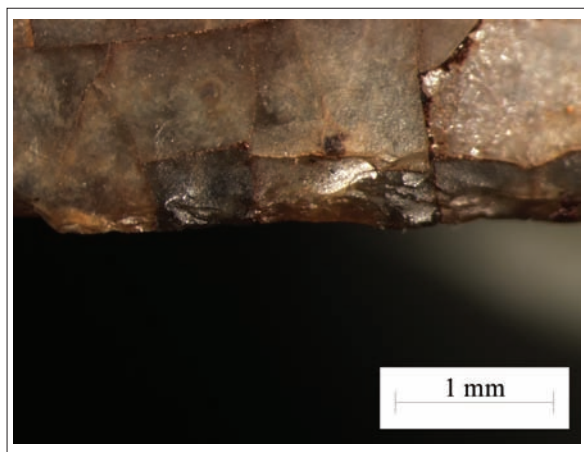


Fig. 23. Use-wear micro retouch. 16x (photograph by G. Slah).



Fig. 24. Two spots of the resin/pitch remains. 25x (photograph by G. Slah).

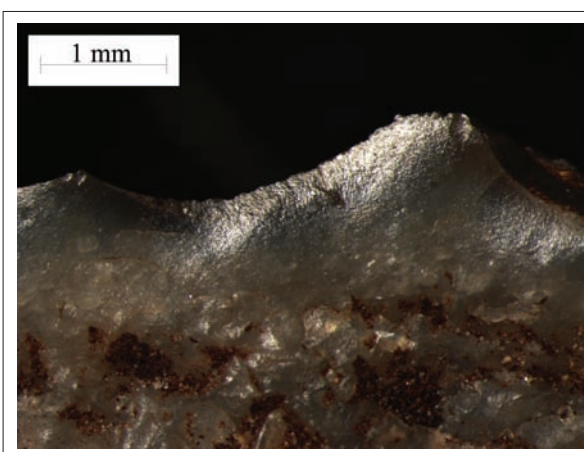


Fig. 25. Use-wear grooves visible in the place of retouch. 25x (photograph by G. Slah).

break and the use-wear traces are difficult to explain. According to the percussion technique, the artefact was similar to the Early Mesolithic period.

Specimen No 34 (see the article by Grigaliūnas in the present volume Fig. 12) was a small flake with an un-

identified function; it was of grey flint, and only the lower part survived. On the formed negatives, part of the white chalk cortex survived. The flint texture was cracked, due to changes in high temperatures. The surface was covered with a clear light patina. The flake was broken off a single-ended core, and on the negative, the correction of the core edge could be seen. Moreover, on one part, a use-wear micro-retouch was observed. According to the angle of its bend, the find might be a piece of a scraper (Fig. 23). According to its patina and the percussion technique, the artefact is attributed to the Mesolithic period. Judging by the chipped spots, the find was discovered in a layer of peat.

Specimen No 29 (see the article by Grigaliūnas in the present volume Fig. 13) was a microlith with an unidentified function, a small grey flint flake broken off a single-ended core. On one of the negatives, part of the white chalk cortex survived. On one side of the bladelet, two retouch strokes could be seen, extending from the bulb of percussion towards the negatives (Fig. 24). After magnifying the specimen 25 times with a microscope, four tiny surviving drops of tar/pitch could be observed on the negatives. The artefact was broken off the same core as specimen No 26. On magnifying the retouched places 25 times, grooves, gloss and use-wear micro-retouch could be detected on the reverse. Signs like this are characteristic of traces left by hide processing (Fig. 25). Since the surviving edges were sharply pointed, the hide was processed by stretching it on a non-hard base.

Conclusions

The flint finds discovered at Aukštumala can be attributed to two techno-complexes. One was very close to communities of Arensburgian culture. The community that settled at Aukštumala used white flint brought from elsewhere. They would usually break off the blades and flakes from double-ended cores. Although no whole arrowheads survive, according to the formation of its tang, the latter artefact could only be assigned to a complex of Arensburgian culture. Other artefacts typical of Arensburgian culture were bi-directional or uni-directional burins, or scrapers-burins which were also discovered in the settlement. The second flint techno-complex discovered at the Aukštumala settlement was made of grey flint, which can also be found in Lithuania, although rarely. That kind of flint raw material is usually found in eastern Poland. Artefacts of the latter were more frequently made from blades or parts of blades broken off single-ended, and less frequently from double-ended cores. The bladelets were often made from the middle parts of blades by a method of truncating which was widespread in the Middle and Late Mesolithic Nemunas culture period.

Remnants of organic matter, tar or pitch on embedded bladelets are very rare in Lithuanian archaeology. In the future, the examination of this organic matter may contribute to the specification of the chronology of the Mesolithic Aukštumala settlement and the use of embedded bladelets.

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AUKŠTUMALOS PALEOLITO IR MEZOLITO GYVENVIEČIŲ TITNAGINIŲ DIRBINIŲ TECHNOLOGIJA IR TRASOLOGINIAI TYRIMAI

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Santrauka

Apie Auštumalos (Lapalių) teritorijoje esantį piliakalnį pirmą kartą buvo sužinota XIX a. pabaigoje. Tačiau tik

po 2004 m. žvalgomųjų tyrinėjimų, nustačius, kad prie buvusio piliakalnio yra akmens amžiaus gyvenviečių, atsirado puiki galimybė susipažinti su šio archeologinio paminklo radiniais. Kaip ir pirmųjų tyrinėjimų metu, dabartiniai tyrinėjimai patvirtino, kad daugelis šių senovės gyvenviečių radinių datuoti akmens amžiumi. Tai išskirtinis dėl chronologijos, gamtinės topografijos ir materialinės kultūros bruožų akmens amžiaus archeologinis objektas Nemuno deltoje. Straipsnyje nagrinėjami ne tik titnaginių dirbinių tipai, jų gamybos technologija, bet ir trasologiniu metodu nustatyta galima jų funkcinė priklausomybė.

Didžiąją dalį šių gyvenviečių inventoriaus – kaip ir daugelio akmens amžiaus gyvenviečių – sudarė titnaginiai radiniai. Dirbinius būtų galima suskirstyti į kelias grupes – rėžtukai, mikrolitai, strėlės antgaliai, peiliai, grąžtelis, dvigubos paskirties įrankis, skobtelis. Pradedant tyrimą pirmiausia buvo susipažinta su pirmine dirbinių tipologija. Paskui buvo ištirta dirbinių gamybos technologija ir trasologiniu metodu nustatyta jų funkcinė priklausomybė, mikroskopu padidinus dirbinių vaizdą iki 25 x, detalizuoti jų paviršiuje darbo metu susiformavę pėdsakai. Patikrinus galimas darbinės įrankių briaunas ir be prietaisų matomus utilizacijos požymius, buvo patikslinta ir pakoreguota pradinė titnaginių dirbinių tipologija. Taip pat buvo nustatyti labai retai išliekančių organinių medžiagų pėdsakai – deguto ar dervos, kuri naudota mezolito laikotarpiu trapeciniam mikrolitui įtvirti. Ši aptikta medžiaga ateityje gali padėti tiksliau datuoti šį dirbinį ir ištirti šių gamtinių klijų gamybos technologiją, sužinojus jos cheminę sudėtį.

Pagal titnago spalvą, patiną ir dirbinių tipus galime išskirti dviejų archeologinių laikotarpių – vėlyvojo paleolito ir vidurinio mezolito – dirbinių kompleksus. Didžioji dalis ištirtų radinių buvo pagaminta iš skelčių ar nuoskalų, kurios buvo atskeltos iš dvigalio skaldytinio. Daugelis dirbinių iš Lapalių (Auštumalos) senovės gyvenvietės yra skaldyti kieta ar pusiau kieta skaldymo technika, o įrankiams formuoti ar taisyti naudotas statmenas retušas. Pagal skaldymo techniką ir dirbinių tipus juos būtų galima priskirti paleolitinės Arensburgo kultūros vėlyvajam etapui, o mezolitinis dirbinius – ankstyvajai mezolitinei Nemuno kultūrai.

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