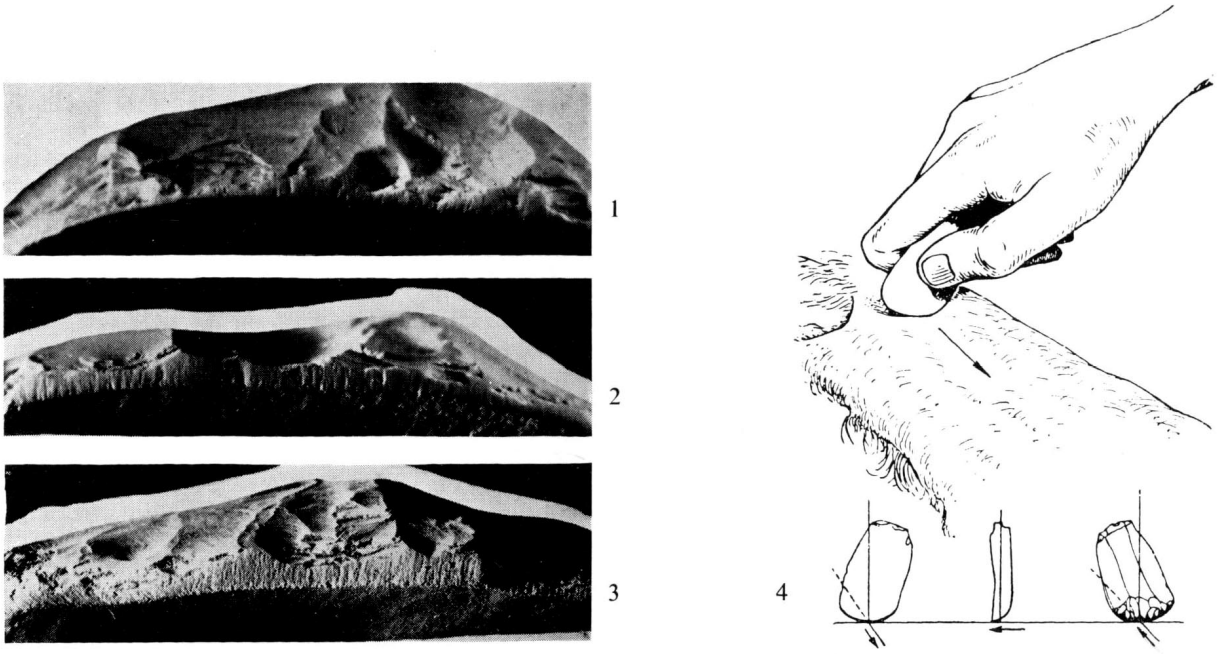
Fixing in a handle was necessary probably only for very small examples made on short blades. Such short end-scrapers are commonly met, and without a handle their use would have been difficult, although still possible. Broken examples found at some sites suggest the use of handles. In all probability changeable bone handles would have been used, in which the flint was easily mounted and removed when no longer serviceable. The existence of detachable bone and antler handles for burins and knives in upper palaeolithic times can be regarded as a strong probability.[1]

End-scrapers consitute a well-defined category of tools; confusion about their purpose is to be attributed to a too formalistic approach to the problem.

Analytical study of traces of use on end-scrapers has shown that they bear evidence of their employment in dressing skin. Especially significant are the peculiarities of shape of the working edge as revealed under the microscope. In the first place the working edge (the sharp part) is never straight; as a rule it is semi-circular or curved on an angle. This roundness and convexity was necessary in working on the under (flesh) side of the skin, which would yield under the pressure of a comparatively narrow implement like a scraper. Had it not been round but rectilinear it would have lacerated or even cut through the pelt at the angle. Secondly wear is confined to the edge of the flint which is blunted more or less uniformly by friction, because it was held with its axis at an angle of 75°–80° to the skin surface. Sometimes it was less, sometimes as much as 90°, depending on the thickness of the blade and the kind of retouch on its working edge. Thirdly the striations occur as minute grooves intersecting the blade-edge transversely. Careful study of the grooves shows that they are slightly broader on the ventral side and grow narrower towards the top retouched part of the tool. This again indicates that the tool was moved frontally with the ventral side forward (fig. 31.1–3). It can be seen best of all on flint, for on obsidian scrapers which wear more quickly and have sharp striations this peculiarity of the traces reveals itself less clearly. The formation of striations on end-scrapers, in the same way as on all other tools, is due to the hard mineral particles that found their way on to the skin: sand grains, loess particles and other scratching agents.

The identification of wear traces on end-scrapers as a



31 1–3 *enlargement (10 ×) of the working edge of upper palaeolithic end-scrapers from Timonovka;* 4 *reconstruction of the method of operation of an end-scraper.*

[1] S. A. Semenov, *Short Reports of the Institute for the History of Material Culture*, 35 (1950), pp. 132–7.

special functional criterion allows us to study these tools from sites of the different periods where they occur. Moreover, using our wear traces we can find tools with this function amongst stone objects of very different shapes, to which previously a different purpose had been attributed. In their study, as with other implements, everything confirms the view that tools can be very different in shape and yet have exactly the same function, and conversely identical shapes may have had quite different functions. The decisive factor therefore in the definition of function is traces of use.

Timonovka was a site which yielded a large number of end-scrapers, but also other tools which had not the remotest resemblance to them. These were massive irregular flakes, accidental products of flint-working (fig. 32). Retouch on them indicated use, but their shape could give no clue as to their purpose. By study of the traces alone the conclusion was reached that they had been used as scrapers in working on skin and hide. The traces were on the convex parts of the edge and had all the specific traits of scrapers. Some examples recall Mousterian scrapers.

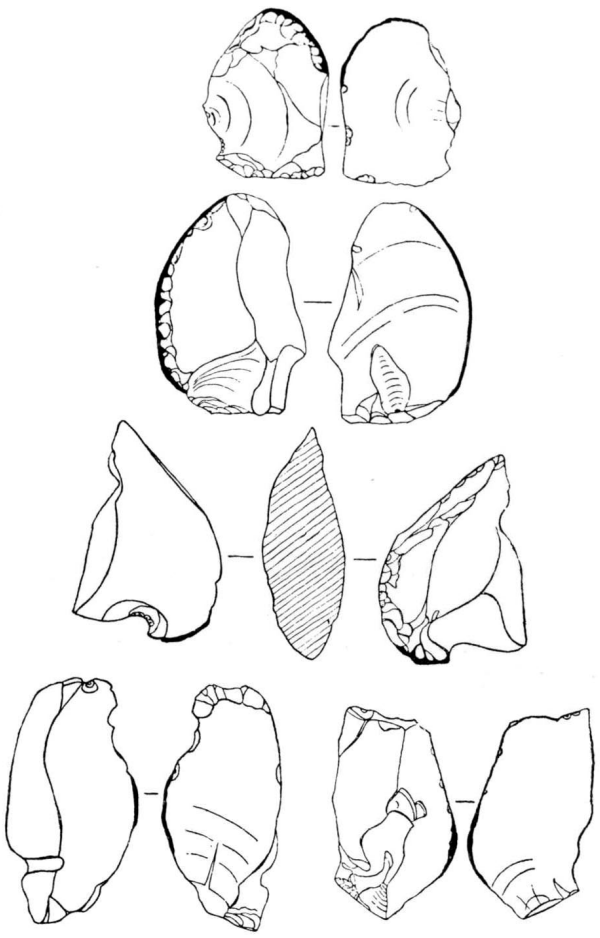
The inhabitants of the Siberian palaeolithic site of Malta also resorted to flakes and chips for dressing skins (fig. 33.3). For this they employed short flakes one side of which was retouched and the angles rounded off to make the working edge convex (fig. 33.4). It is possible that this kind of scraper was mounted in a handle.

The use of flint cores at Malta as skin scrapers is of great interest. The broad convex striking platforms were trimmed to remove sharp angles and projections which would have spoilt the work (fig. 33.1, 2).

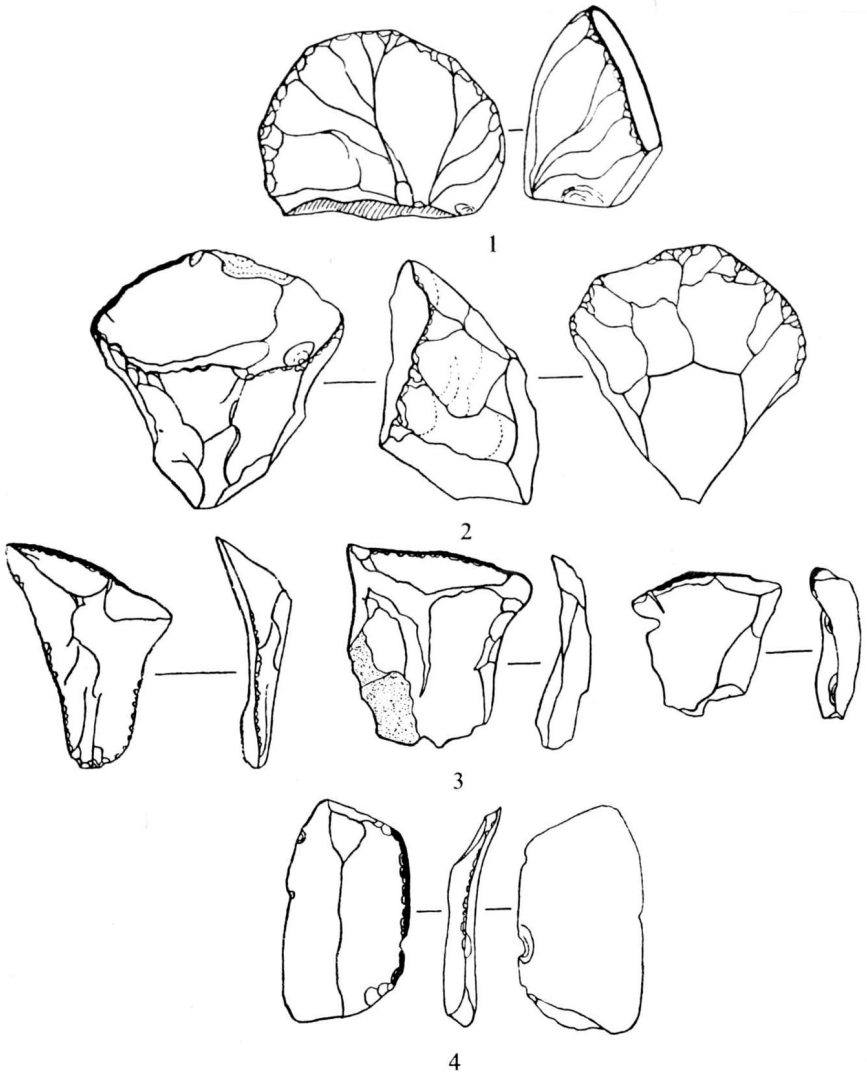
The scrapers from Afontova Mountain, which were made on flaked diorite pebbles, deserve special attention. Originally they were considered to be hand-axes (by N. K. Auerbakh) and subsequently were called disk-shaped chopping tools (by G. H. Sosnovsky) or axes (by A. P. Okladnikov). Examination of the traces of use on them has established that, in fact, what we have are scrapers for dressing skins (fig. 34.1). The kinematics they reveal are characteristic of palaeolithic and neolithic end-scrapers (fig. 34.2).

A different kind of flint for use on skins has been found in neolithic settlements. For example, in Luka-Vrublevetskaya besides ordinary end-scrapers we find tools on broad flakes recalling Mousterian examples. The working edge is not on the end but on the convex side of the blade (fig. 35.1).

There are some grounds for placing the neolithic scrapers with broad working edge in a special category. Generally the blade of such tools is less blunted and still has got its sharp edge, but linear traces are scarcely detectable on them. It is likely that they were used for primary dressing, for scraping off fat and grease, and so strictly they should not be called end-scrapers or



32 *Upper palaeolithic end-scrapers from Timonovka made on waste flakes, the wear on them being indicated by dark lines.*



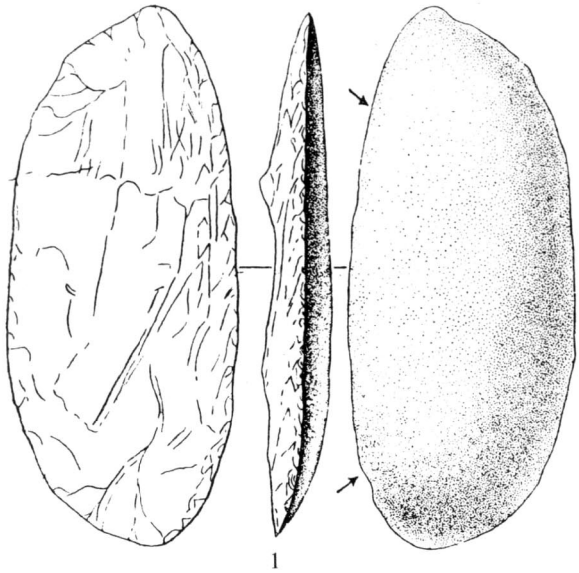
33 *Upper palaeolithic end-scrapers made on cores* (1 *and* 2), *waste flake* (3) *and blade* (4) *from Malta* (*Siberia*).

softeners. Possibly after blunting such broad scrapers were used for removing hair when the pelt was being made ready to be made up into skin articles. The removal of hair, of course, would have been done by crude soaking in lye. The Eskimos, for example, until very recently soaked skins in urine, which, as is well known, contains sodium chloride and lime.[1] But hair will not always come away easily from the skin surface and often it has to be scraped and struck off.[2] End-scrapers with narrow working edges would have been quite suitable for finishing the skin with softening by rubbing.

Cleaning and removing hair differ from softening; in the first the skin is spread over a stand, that is it is on a

[1] According to A. Middendorf (*Journey into North and East Siberia*, 1869, II, p. 641), in north Siberia for tanning reindeer liver, chewed and mixed with spit, reindeer brain and other organic material were employed.

[2] Neolithic scrapers are sometimes very large, as, for example, in the settlement at Yuryuzan (Bashkiria), dug in 1955 by Krizhevsky. These scrapers made of chert reach 8–20 cm in width, so they must have needed both hands in use. Tools of this type were previously regarded as knives.



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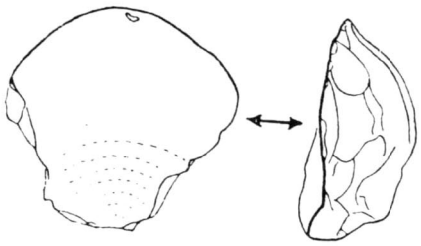

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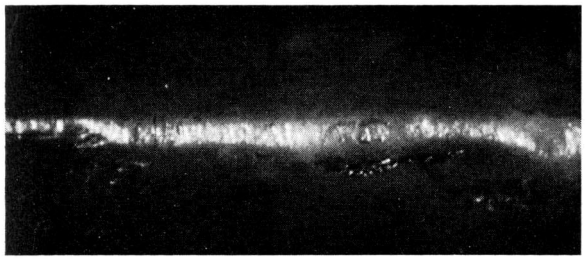

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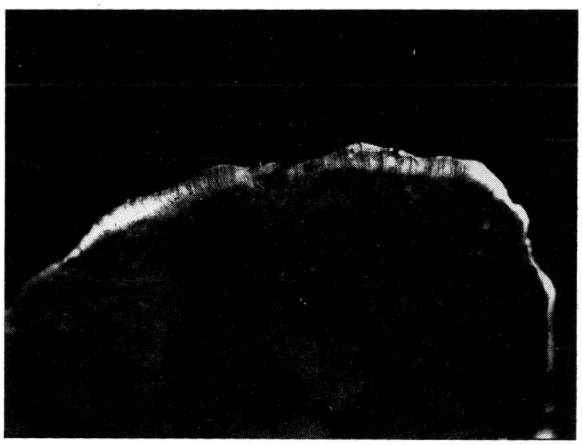


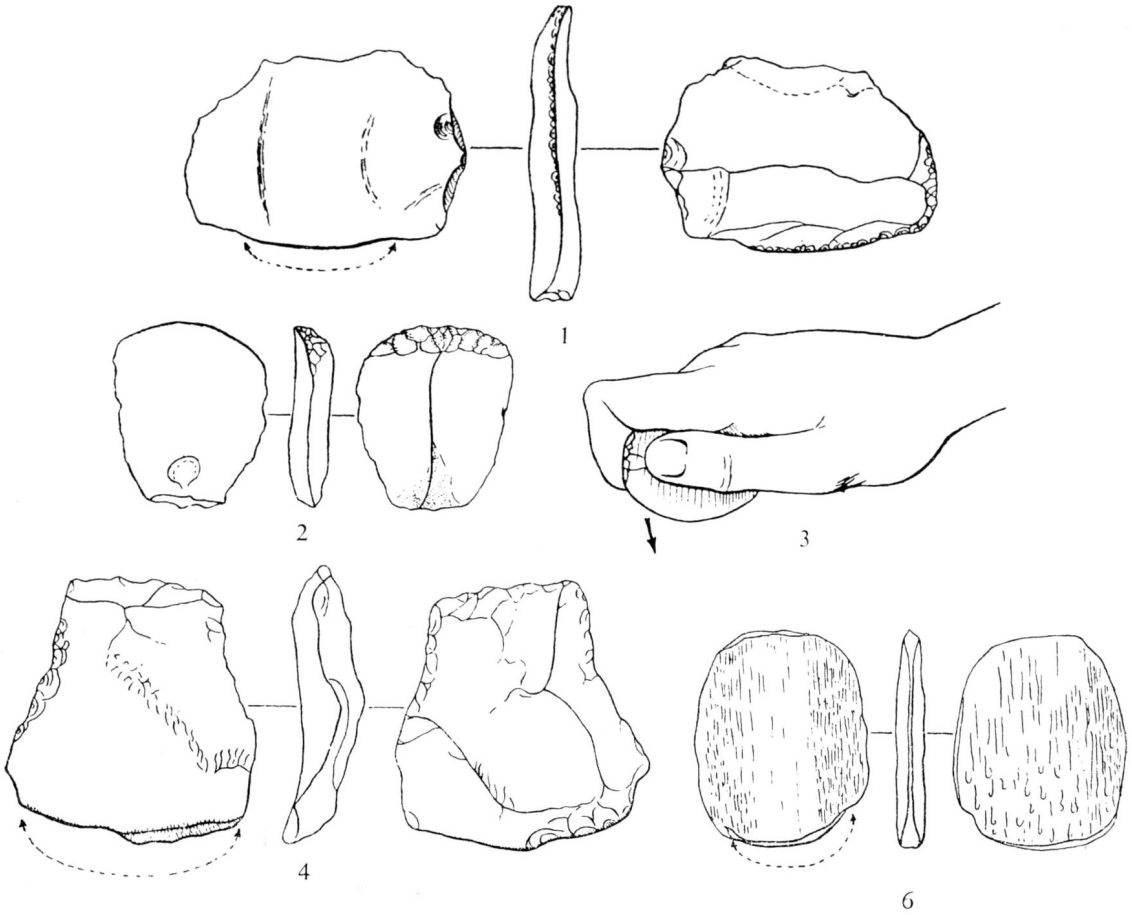
4

34 1 *Upper palaeolithic side-scraper on a flake off a diorite pebble from Afontova Mountain (arrows indicate working part);* 2 *micro-photograph of wear traces on* 1*;* 3 *end-scraper from Fofanov;* 4 *micro-photograph of working edge of* 3.

more or less hard support, while in softening it is stretched out, fur downwards, and worked unsupported.

It is not unworthy of notice that in contemporary skin clothing manufacture they still use a tool for softening which has a slight resemblance to a stone scraper, at all events in the shape of its working edge. This is a steel circle with a broad aperture in it for the hand of the operator, its edge lined with wood or skin to make it more comfortable to hold. The skin or leather being treated is held over special trestles, while the operator, supporting the edge of the skin with his left hand, holds the circle in his right hand and gradually pulls it over the whole skin. The tight bunches of fibres in the skin are softened and freed so that the pelt and whole hide becomes soft without breaking. A contemporary chamois leather is produced by working on both sides, while kid, calf and other skins are treated only on the underside.

The flint end-scraper that appeared in upper palaeolithic times continued to be made of stone in later periods. The Eskimos and Tierra del Fuegans besides stone often used shell for scrapers. Stone end-scrapers only went out of use finally with the adoption of the use of metals in everyday life. Anthropologists have observed the use of bone scrapers among some American Indians, but in archaeological collections bone scrapers



35 1–3 *Late neolithic end-scrapers from Luka-Vrublevetskaya* (1, *on waste flake;* 2 *thumb-nail scraper;* 3 *reconstruction of way* 1 *was held*). 4 *and* 5 *short end-scraper from ancient Eskimo settlement at Chukotka* (*after Rudenko*) *in general view* (4) *and micro-photograph of working part* (5)*;* 6 *and* 7 *antler end-scraper of the Hellenistic period from Olbia seen in general view* (6) *and micro-photograph of working edge* (7).

are very rare. We may notice one curious example of a scraper of deer antler from Olbia (Scythian period) found in 1947 by S. I. Kaposhina. It will be noticed that it is shaped like an end-scraper (fig. 35.6, 7). The semi-circular working edge is also worn on one side and the striation traces of wear are analogous to those on an Eskimo scraper found in the Chukotsk Expedition of S. I. Rudenko (fig. 35.4, 5).

From neolithic times stone scrapers were used not only without handles or with one-handed grips but also with two-handed handles, like those we meet among northern peoples today. In such handles scrapers 5–7 cm broad on an average were mounted, where the increased force required to use them is considerable.

Finally it should be observed that examination of traces characteristic of different kinds of scrapers allows us to appreciate the purposes of a most varied range of stone tools. These traces can be discovered, for example, on old disused adzes and axes. Traces of such re-use are frequently found on the archaeological material from Siberia and Kamchatka.

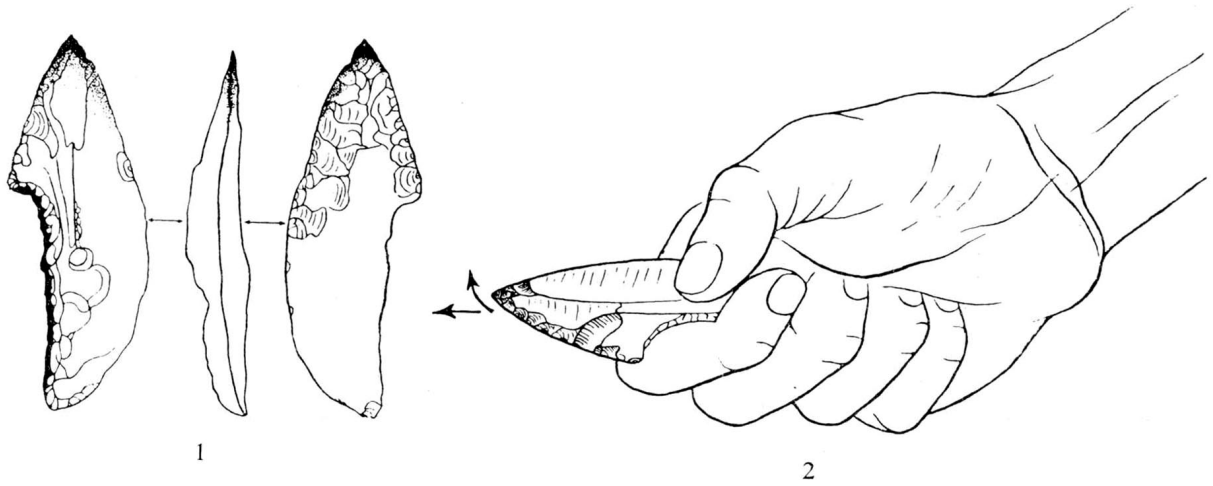
As an ethnographic parallel for a similar use of adzes we may mention Wisler's description of life among North American Indians.[1] The facts mentioned by him leave no doubt that tools were used for dressing skin that consisted of slightly modified 'stone adzes'. This tool, a sort of adze, was mounted in a bent handle for dressing skin.

c. Shouldered points and their purpose

The lack of accord between the definition of a tool's function by the traces of use it bears on the one hand, and its apparent form on the other, has been most strikingly revealed by research on the shouldered points from Kostenki I. These objects were first identified as javelin heads, and the tang at their base was regarded as a device for mounting them in a shaft (fig. 36.1). These upper palaeolithic weapons would have been connected with reindeer hunting.

Shouldered points (*pointes à cran*) discovered at Willendorf (Austria) in an upper Aurignacian layer allowed Breuil[2] to identify them as characteristic of this period. They were known also from the caves at Grimaldi near Monaco,[3] at Sergeac[4] and at other sites. At home in the U.S.S.R., besides Kostenki I, they have been found at Avdeevo and in the site at Berdyga studied by Zamyatnin.[5]

Study of the shouldered points from Kostenki I has



1 2

36 1 *An upper palaeolithic shouldered point from Kostenki I showing wear in the form of polishing on its tip and tang;* 2 *its method of use reconstructed.*

[1] C. Wisler, *American Museum of Natural History*, Handbook, Series 1 (New York, 1920), p. 57.
[2] H. Breuil, *L'Anthrolopogie*, 34 (1924), pp. 526–7.
[3] H. Breuil, *Comptes Rendus du Congrès International d'Anthropologie et d'Archéologie Préhistorique* (1913), p. 169.
[4] F. Delage, *L'Anthropologie*, 45 (1935), p. 235.
[5] S. N. Zamyatnin, *Reports of the Archaeological Commission of the Academy of Sciences of the B.S.S.R.*, (1930), p. 486.

introduced necessary corrections to the established view about their purpose. On the tips of the points polishing was in many cases observed, clear evidence of prolonged use, which extended over both faces. It encroaches over an appreciable part of the point; on the forward part of the blade at the opposite end to the tang it is more severe than on the tang itself. Moreover, it is a characteristic of this polishing that it occurs not only on the projections of the retouched surface, the scar arrises, but also in the hollows. An especially curious fact is the presence of polishing within the notch itself, where it is much less intensive but covers practically all the retouched surface.

The traces that have been studied reveal a new function for the tool, for it is impossible to believe that this kind of wear could have arisen merely by its use as a spearhead. A head would be polished by wear against the soft body of an animal only if it had transfixed the bodies of hundreds of animals. Such a contingency can be entirely excluded. A point often broke against an animal's bone, as the stumps of many points from Kostenki I show. Flint heads of ivy-leaf shape from Telmansk on the River Don well illustrate this, where both complete and broken specimens were found. There was a whole series of tangs which would appear to have been brought back to the hut on the end of the haft after the front part of the head had been lost in the hunt.

Very often these points would have been used as knives for dismembering game. Such a pointed tool would have been particularly suitable for disembowelling mammoths, whose skin would be quite impenetrable with a blunt-ended knife.

Grasped with the tang in the palm of the hand and pressed forward and up a point would make an excellent knife for ripping open a carcass (fig. 36.2). This would explain the polishing mentioned on the notch as due to pressure by the hand.

The functions of a point as a javelin or knife-dagger are in reality extraordinarily similar. Consequently the methods of manufacture of the two were similar, a circumstance which is even more clear in neolithic industries. We may cite as an example the material collected by T. Wilson.[1]

Wilson assembled under the title of stone knives (*couteaux en pierre*) a group of tools which from their method of manufacture appeared to be asymmetrical points for arrows or javelins. Functionally they were undoubtedly knives, although prepared in just the same way as points. The majority of these knife-points were mounted in a short handle for which there were two notches on either side of the base. Like a knife, the points were inserted into a split haft and lashed with sinews. 'Many tools which are regarded confidently by archaeologists as arrow- or javelin-heads in reality were used as knives', Wilson remarked.[2]

Thus a one-sided notch or shoulder on a point must be considered not only as a hafting device but also as one method of blunting a sharp edge so that it can be grasped by the hand without injury. A degree of polishing that hunting projectiles would not have experienced is not the only argument against an interpretation of these objects as just javelin-heads; another is their variable size. Besides specimens 85–90 mm long, small or even minature examples commonly occur not more than 40 mm long and 10 mm broad, which would be small even for arrow-heads, and it is very interesting that they bear traces of use as awls.

d. Palaeolithic burins

'In Aurignacian times there appeared a hitherto unknown implement, the burin. Excellently fitted to a new kind of work, cutting up bone, antler and ivory, which had then come into use, it was so remarkably suitable for this type of work that its origin would seem inexplicable. However, one need only examine large collections of Aurignacian cores in order to make an easy guess about this, for on them a sharp edge formed by two facets will often be found. This fact shows us the origin of the burin.'[3]

Such was the view of L. Capitan about burins. Without entering into polemics on this hypothesis about their origin we may observe that, in spite of their similarity to contemporary steel burins, their function had for long not been understood, and they had been given the conventional name of 'screwdrivers' (*tarauds*). However, by then the experiments of Leguay had demonstrated that this tool was used for working bone, and that it was done on the same kinematic principle as with a contemporary steel burin.

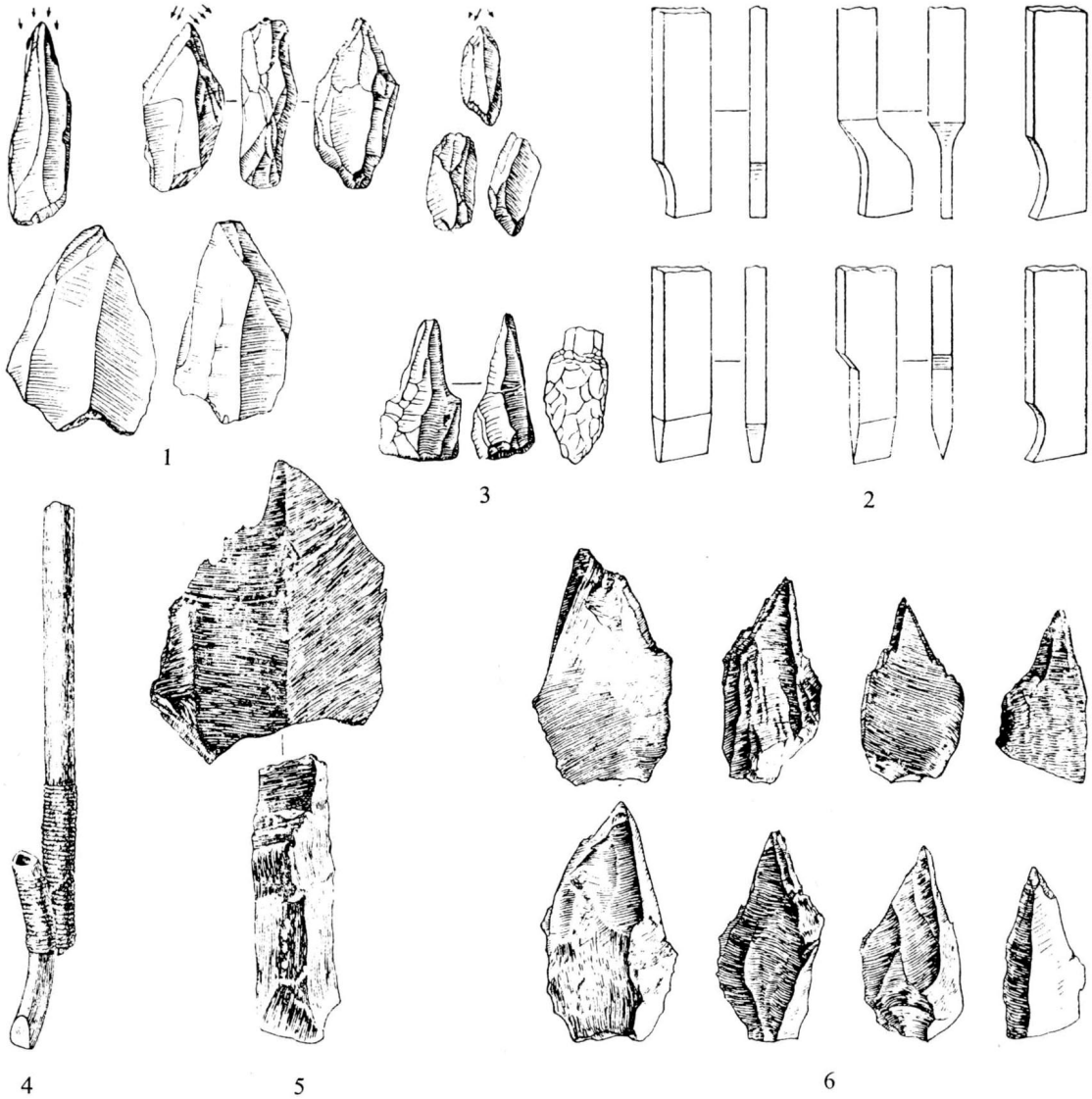
Thus the problem of the real use of the burin was settled, although the possibilities of further experimental work were not exhausted. It had come to be recognized that the basic morphological sign of a stone burin was the so-called burin facet. Using this, Bourlon worked out a classification of burins,[4] believing it would prove useful for assessing the characteristics of sites and dating them.

According to the position of the facet on the tool, Bourlon classified it as this or that type of burin: side, medial, angle, transverse and so on. If the burin scar was

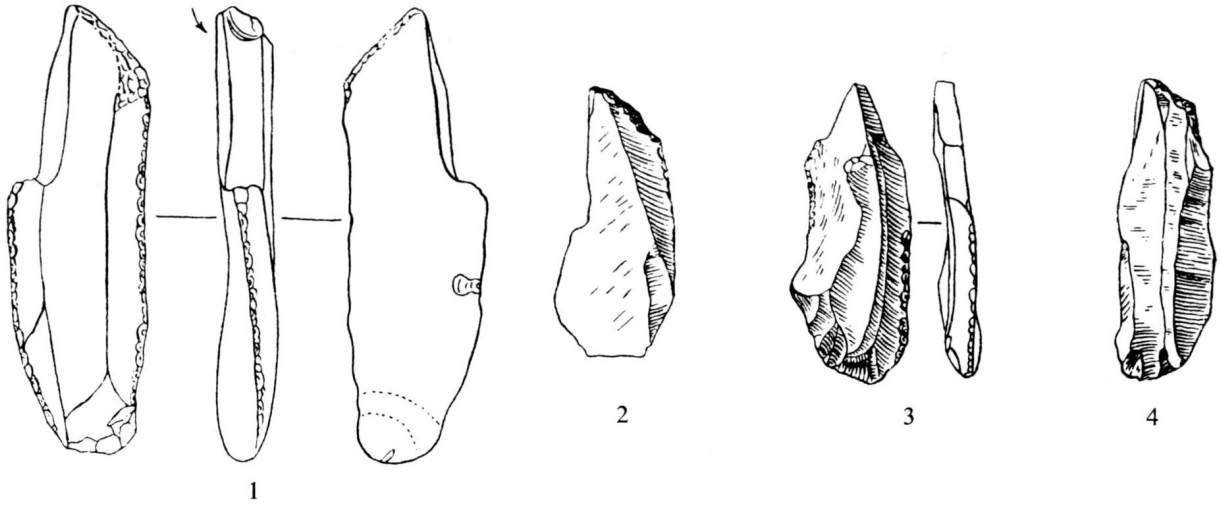
[1] T. Wilson, *Comptes Rendus du Congrès International d'Anthropologie et d'Archéologie Préhistorique* (1902), pp. 298–324.
[2] ibid., p. 322.
[3] L. Capitan, *Comptes Rendus du Congrès International d'Anthropologie et d'Archéologie Préhistorique* (1913), p. 432.
[4] R. Bourlon, *Revue Anthropologique* (1911), pp. 267–78.

on a large flint it would be called core-shaped, multi-faceted or polyhedric. As the form of a burin arising by flaking and retouch is variable, the nomenclature grew apace, each student creating a new term as he wanted it. In order to put an end to this Gorodtsov proposed his own classification based on the material from Timonovka and Suponevo. He divided the types of burins found into thirteen groups, and these he further subdivided into seventy-five types.

Today Gorodtsov's classification of burins is not regarded as of much value. It only goes to show how far a student of systematics may stray from the basic duties



37 1 *'Multi-facetted' and 'polyhedric' burins from upper palaeolithic sites of eastern Europe;* 2 *modern steel burins;* 3 *neolithic burins from Khakhsyk (E. Siberia);* 4 *bone burin from Bororo tribe (S. America);* 5 *upper palaeolithic burin from Mezin (3 ×);* 6 *neolithic burins from L. Baikal area.*



38 (AND OPPOSITE) 1 *burin from Mezin;* 2–4 *burins from Malta (Siberia);* 5 *method of use of a burin reconstructed;* 6–8 *enlargement of wear traces on burins from Timonovka, the arrows indicating the direction of movement. All upper palaeolithic.*

of science when he sets himself the task of only describing shapes and not seeking an explanation of their origin.[1]

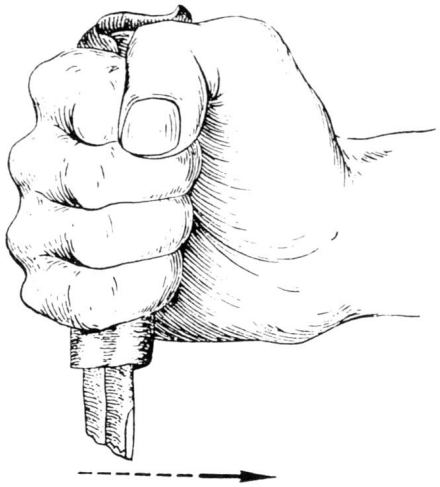
The one-sided approach to the study of burins has been further extended by Terrade,[2] Peyrony, Garrod, Bouyssonie, Neuville,[3] Pradel and others.[4] Relying exclusively on the criterion of burin facets, or more exactly on the presence of a small flat edge produced by vertical flaking of a blade, they have begun to see burins even in Mousterian and Acheulian industries. However, there is no kind of evidence to support the real existence of the Mousterian burins that the authors have claimed. Such evidence would be provided by bone objects of the period bearing traces of work from burins, but, as is well known, such material proof is quite absent from Mousterian sites.

What are the so-called core-shaped or multi-faceted 'burins' with two, three and more burin scars (fig. 37.1)? Capitan considered them as the initial form of Aurignacian burins. Are we, in fact, dealing with burins at all? Could one conceivably cut bone or even wood with such a tool whose working part has several facets? It is well known that the most important structural trait of any burin, starting with undoubted ethnographic specimens (for example, Eskimo ones), whether stone or metal, and finishing with modern steel ones, is the presence of only one facet or side on the working edge. A good specimen of a flint burin, for example from Mezin (fig. 37.5), is very close in shape to the simplest form of contemporary burin (fig. 37.2). It has one cutting face and one cutting angle only. This rule holds good for all burins.

We may add that the bone burins of the Bororo tribes made of an animal tooth (incisor) similarly have one working facet (fig. 37.4). It is very probable that some neolithic tools from Siberia, recalling small cores by their shape, were actually burins. Their side surfaces are multi-faceted (fig. 37.6), but on these the conical side lies almost at right-angles to the facet, which makes them more suitable for cutting. The traces of use on these burins, a few of which have just reached our laboratory from the Irkutsk Museum, have not yet been studied. Nevertheless they are quite different structually from the flint objects from Siberia known as 'neolithic burins' (fig. 37.3).

Traces of use have been identified on single-faceted burins; they consisted of groups of fine parallel lines on the side faces. On a burin from Mezin these striations

[1] V. A. Gorodtsov, *Proceedings of the Archaeological Section of the Russian Association of Scientific Institutes of Social Sciences*, 5 (Moscow, 1930).
[2] A. Terrade, *Memoires de la Société Préhistorique Francaise* (1912), pp. 185–95.
[3] R. Neuville, *L'Anthropologie*, 41 (1931), pp. 13–51, 249–53.
[4] L. Pradel, *L'Anthropologie*, 52 (1948), pp. 220–8.



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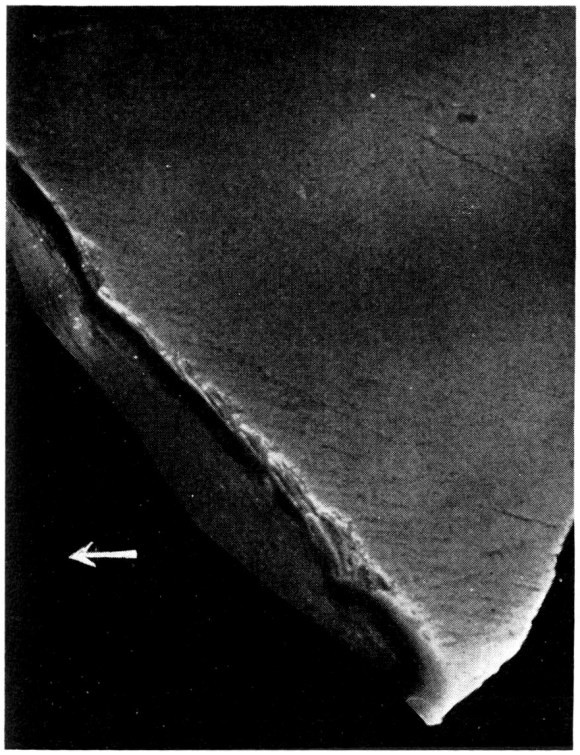

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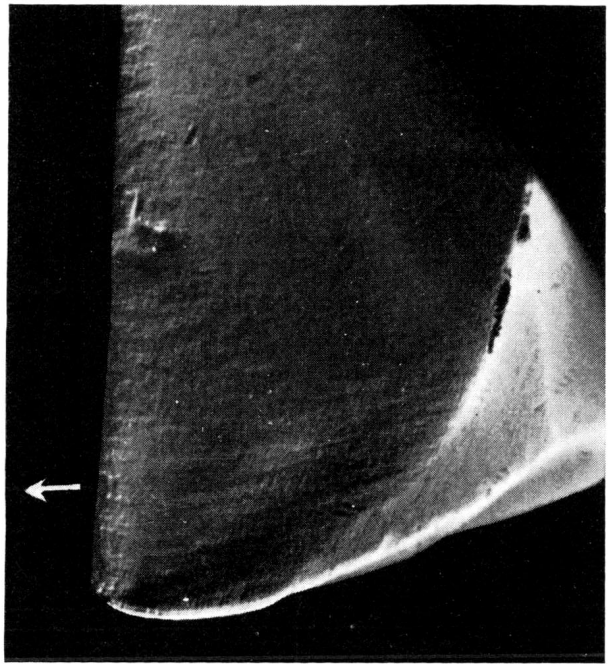

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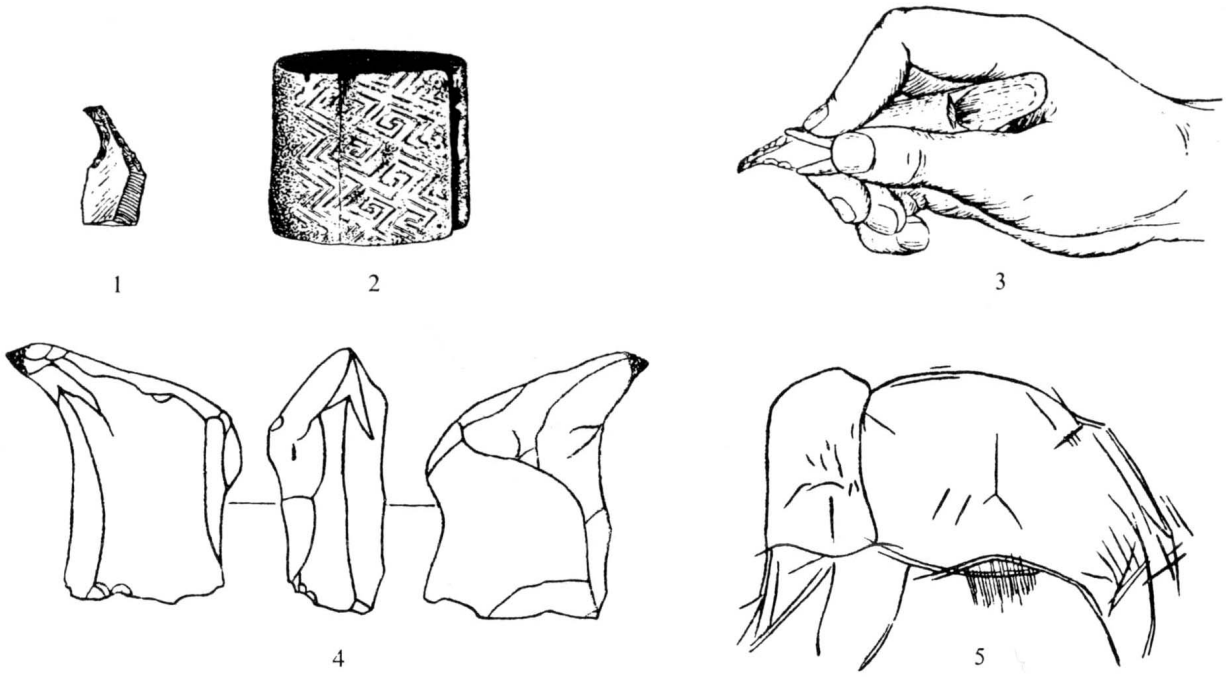


39 (AND OPPOSITE) 1 *Flint beak-shaped burin from Mezin;* 2 *upper palaeolithic engraved bracelet of mammoth ivory from Mezin;* 3 *reconstruction of beak-shaped burin in its handle in use;* 4 *beak-shaped burin from Malta (Siberia);* 5 *drawing of a mammoth on bone from Malta;* 6 *ancient Eskimo flint burin from Chukotka;* 7 *neolithic burin from Khakhsyk (E. Siberia) of tabular flint;* 8 *ancient Eskimo burin of obsidian from Chukotka;* 9 *micro-photograph of working part of obsidian burin, arrows on the right edge indicating the traces.*

lay not on the front but on the back, for the burin was wider here and so suffered the initial wear. The lines are at right-angles to the axis of the burin and parallel to the surface being cut. During work a burin evidently was fitted into a handle and held in a vertical position (fig. 38.5).

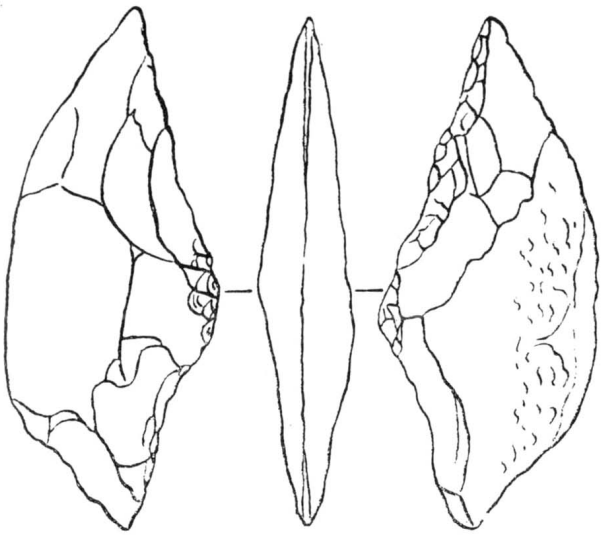
Observations by V. T. Ivanova in 1954 on burins from Timonovka made with a binocular lens are of considerable interest. These revealed severe wear on the burins whose traces showed that they had been used in a quite unusual way. The working edge on one (a medial burin) was not the burin angle produced by the facets but the ventral surface of the blade. So during use the under-face (flake surface) was in a frontal not a sagittal plane. The side facets were worn by use and so had lost their lustre and become mat. The linear marks of movement were very distinct (fig. 38.6).

Another burin (of normal type) with working edge produced by a burin blow had traces demonstrating its use not only as a burin but also as a chisel. This secondary function could be produced by altering the position of the hand so that the axis of the tool changed from a vertical to a horizontal position.

The presence of a burin facet, which is regarded as the morphological trait of burins, is not a criterion of function in all cases.

Kostenki IV has yielded material illustrating this point. It produced typical medial burins on long retouched blades; two opposed burin facets on one end should, it would be assumed, leave no doubt that these were burins. Archaeologists to whom these tools were shown unanimously agreed that this was so, and yet micro-analysis of the surface proved it to be otherwise. The use traces were found not on the burin facets but on the back of the blade. They took the form of striations running half-way across the back from one edge, and on this basis the tools were identified as whittling knives, or one-handed planes for use on bone and wood, with functional analogues in other sites (Kostenki I), where, however, they were made in a different way.

The burin facets at Kostenki IV must be regarded merely as a device to form a part either to be grasped in the hand or mounted in a handle. The use of the burin technique in the manufacture of other tools cannot be a matter for reasonable doubt. By striking off a single flake vertically with one blow the sharp blade-edge was



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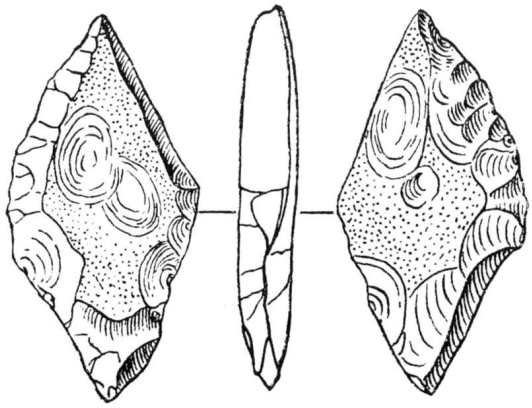

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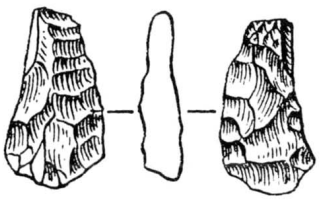

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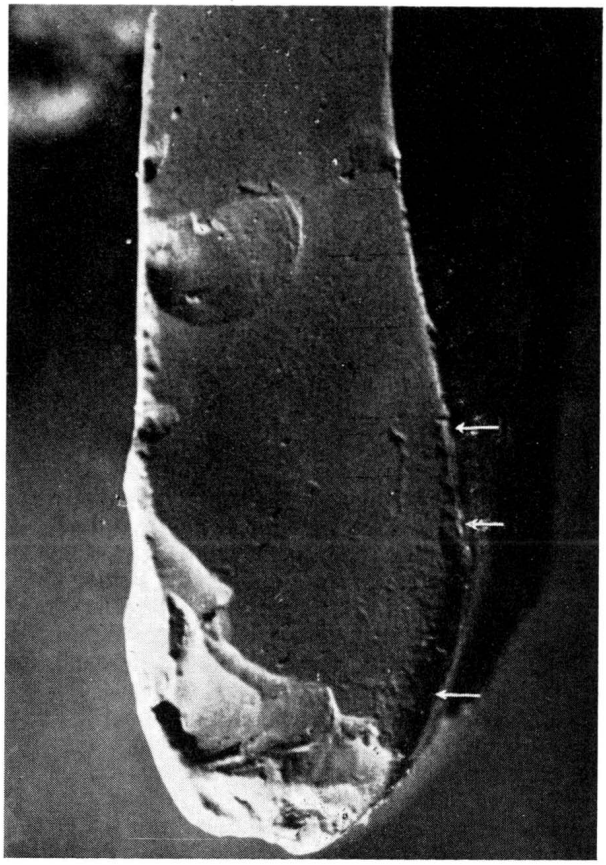

removed instead of resorting to more laborious blunting by pressure retouch.

In the material from Kostenki I and other sites there were tools with traces of use for cutting meat, and, as already mentioned, the traces take the form of a fairly wide area of polishing on both faces of the blade. The opposite angle of the blade has been taken off by a burin blow in order to provide a rest for the index finger.

The use of a burin blow to blunt a blade-edge, in the parts where its sharpness would have impeded its use when held between the fingers, can be observed on many tools used without handles. Sakajia cave yielded specimens of concave scrapers for use on wood and bone, made on massive flint flakes. The sharp edges of the flake had been removed on both sides by burin blows which would have allowed it to be held between the index finger and thumb.

It is very instructive to consider the use of the burin blow in the manufacture of flint drills in some neolithic sites. Such evidence has just been found in material from a site discovered by Okladnikov at Khakhsyk in Yakutia. Small tools made by flat pressure retouch from this site had pointed ends re-sharpened by taking off

burin spalls from one or both sides.[1] Originally the tools were awls, but micro-analysis revealed clear traces of their re-use as drills, in the form of transverse striations across the burin facets. The facet arrises had acted as the cutting edges during boring.

New evidence that a burin scar is not an undoubted indication of use of the tool as a burin is provided by certain burins prepared without such blows. At Mezin, Eliseevich, Malta and other upper palaeolithic sites a series of small flint tools of beak-shaped form have been found. Research has shown that they were used as a special kind of burin. In some examples, as at Mezin, these burins were made by retouching irregular flint blades selected from the mass of waste flint (fig. 39.1, 4).

For what purposes were such tools used? The beak-shaped form with drooping conical point and the character of the lustre indicate that only slight physical force was needed. They were not therefore suitable for cutting bone transversely or longitudinally, for this requires great physical force and a solid cutting angle which is not present in beak-shaped burins. The sum of indications suggests that they were engraving instruments, tools for artistic sculpture of bone, especially for engravings of animals and ornament (fig. 39.2, 5).

In Mezin, Malta, Eliseevich, and Kostenki I, where the burins just mentioned have been found, engravings on bone are well known. In Mezin, moreover, a bone handle was found specially prepared for engraving on bone. It is probable that the burins from the Grotte d'Ammonites (France), known under the name of 'beak with notch' (*bec à encoche*), and regarded as engraving instruments, had an analogous purpose.

In conclusion it is necessary to turn our attention to one or two types of burin found in the neolithic site of Khakhsyk in Yakutia, and amongst the ancient Eskimo material found by S. I. Rudenko in the Chukotsk area. These extremely individual types are still not very numerous. For the Bering Sea Eskimos, who were already familiar with iron and iron burins, stone burins were an exceptional survival. They were made of coloured flint, chert and obsidian, and were either semi-circular or rhomboidal in shape. They were made not on blades but on either flakes or tabular flint (as at Khakhsyk) and retouched. These burins were commonly two-sided and intended to be mounted in a handle (fig. 39.6, 7). The cutting edge in some cases had been made by a burin blow and in others by fine trimming. Micro-analysis revealed the striations characteristic of all burins on their lateral faces. On the obsidian burins the striations were weak; the traces of wear took the form of rough patches without lustre along the side of the cutting edge (fig. 39.8, 9).

Thus the study of burins by traces of use has brought real revisions to the previous typological view of these tools.

e. Flint awls of upper palaeolithic times

The discovery of bone needles with eyes, and awls, in upper palaeolithic sites has caused the investigator to raise the question as to the existence of sewn skin clothing in this period. Although the majority of students at the present time do not doubt that hunters of the upper palaeolithic period protected themselves from the cold with skin clothing and knew how to sew, there are still some who continue to contest this view. They contend that the existence of needles and awls in such a remote period does not constitute sufficient proof of the existance of sewn clothing. In support of this they cite the Australians, who had no sewn clothing, but who used bone needles in sewing small skin articles.

Without dwelling on the fact that the tropical or sub-tropical climate of the areas where the Australians live is irrelevant to the conditions of Ice-Age Europe and Asia, we will confine ourselves to those tools which are closely connected with the working of skin and fur. Firstly there are the characteristic upper palaeolithic end-scrapers used for cleaning and softening the underside of the fur. Secondly in the same period there were bone burnishers used on the outer face of the skin. Thirdly there existed bone needles and awls. Fourthly at this period mineral colouring was widely employed, as revealed by the presence of stone and bone mortars, pestles and ochre of various shades on the sites. It is difficult to concede that all these were used for small skin objects (like bags, screens and so on) of secondary importance in the life of prehistoric man. The remaining category of tools, closely connected with the sewing of clothing, were a variety of flint awls. The existence of these tools has been established on many sites, sometimes in great numbers. There are some grounds for supposing that only thin skins, taken off small animals, could be pierced with a bone needle, and even in this case it would have been necessary to broaden the hole with a bone awl, so that the needle could pass freely through with a thread of sinew. Thus the skin would be pierced preparatorily, then the hole widened with a bone point, so that finally the needle and thread themselves could go through.

Flint awls would have been preferable for initial piercing. Using a flint awl it would have been possible to sew together skins and make composite articles without a needle by passing a pliable sinew directly through the pierced hole. On many palaeolithic sites needles have not been found and it is quite possible that in a number

[1] S. A. Semenov, *Materials and Researches on the Archaeology of the U.S.S.R.*, 39 (1955), pp. 455–8.