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Rude Mark
– A Maglemosian Settlement in East Jutland

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The Maglemosian settlement of Rude Mark, near Odder in eastern Jutland, was completely excavated in the spring of 1978. The excavation was undertaken because of plans to build a by-pass round the town of Saksild (1). The settlement lay in the middle of the proposed route centred on the 18 m contour, near the top of the slope down towards the now-dry Kysing Fjord. During the period of settlement, the fiord was probably filled by a fresh-water lake with its surface near the 8 m contour (S.H. Andersen 1975, p. 33). The site was not on the lake shore, but lay some 200 m from it on the nearest more or less flat piece of ground to the south. In the absence of heavy tree growth to the north, the site would have had (just as it does today) a good view of much of the SW-NE oriented boreal lake basin (fig. 1).

The settlement was found during a survey by Jan Skamby Madsen, formerly of Odder Museum. A trial excavation of about 2 m^2 revealed a high concentration of flint of Maglemosian type (2). Surface collection indicated that the settlement extended about 15 m all round the trial excavation. The locality does not seem to have been known to private collectors or ever to have been exposed to systematic collection of artifacts.

During 1978 an area of 304 m^2 was examined. 125 m^2 of plough soil was removed by machine from zones about 3 m wide along the eastern side and 3.25 m wide along the south side of the area. The rest of the plough soil was excavated by shovel and sieved through a 4 mm mesh. The cultural deposits below the plough soil were also sieved in this way.

The relatively high lying site was noteworthy for several reasons. The limited extent of what was apparently a single occupation made complete excavation possible. A number of disturbances resulting from both human and natural causes could be distinguished, and their effects allowed for. Artifactually the find shows a near total specialisation on microlith production. Triangular microliths are particularly common, while all other tool types are rare.

THE NATURE OF THE SITE

The settlement was located on morainic sand with a low lime content. On the surface of this subsoil was the remains of a scatter of granite and flint nodules of various sizes. These stones were particularly concentrated in a 3 m broad zone running SW-NE, with a smaller concentration a little SE of the centre of the site. The terrain falls only about ½ m towards the N in the settlement area.

Most of the central part of the settlement was covered by a 0.1–0.2 m thick sand layer with a little humus, or a cultural deposit yielding finds (fig. 2 level 3). The level thinned out on all sides towards the edge of the excavated area. The fact that this remnant of a cultural layer was found at all may be because the site was originally located in a slight depression in the terrain. This could also have been created by human activity during the period of settlement. Intensive activity on the probably thin humus layer on the poor sand could have caused mixing and disturbances of this sort of depth below the surface of the ground. Most of the stones on the surface of the subsoil and in the thin cultural level were randomly distributed and lay in their original positions. A degree of clearance may be indicated by an area about 4 × 5 m, which was free of stones, in the centre of the site.

The only trace of a feature linked to the settlement was an irregular diffuse area of reddish sand and humic sand in the centre of the site, just to the north of the 1977 trial excavation. It measured about 2 × 3 m, and was up to 1 m deep. A tongue of humic sand with a patch of charcoal up to 0.5 m across extended from the south into the previously mentioned feature. The southern part of the reddish feature was disturbed by the largest tree fall on the site, measuring some 4 × 5 m. The patch of charcoal and the red colour of the feature could result from a hearth or hazelnut roasting area ploughed away when a system of ridge and furrow cultivation was established during the historical period. The bottom of a furrow between two strip fields ran right over the central part of the red feature. The lack of burnt stones can be explained by the fact that the original hearths have been ploughed away. The next furrow in the medieval field system was visible in the northernmost part of the excavated area. This one had also cut at least 0.2 m down, so that all traces of the cultural level had vanished (fig. 2, level 2).

A total of 18 treefall holes were observed, all very uniform. They varied from 1.5 to 5 m in diameter, and from 0.3 to 1.2 m in depth. They were usually regularly oval in shape. They contained a characteristic tripartite deposit consisting of a 0.1–0.2 m thick, sloping or vertical humic sand level with finds. On one side of this was the remains of a layer of the bright yellow basal sand, broken up by root holes, and on the other a sandy humic layer, grey in colour and with no stones. The lastnamed rarely contained finds, and consisted mainly of leached sand which originally lay around the bole of the tree, and also of material naturally deposited on the contemporary forest floor. The cultural deposits in the treefall holes in the central part of the site had a very high frequency of finds. These holes therefore give a fairly good idea of the density of finds on the settlement at a time presumed to precede the later cultivation.

Various points on the old surface and in the treefall holes produced collections of charcoal, which can not, however, be definitely linked to the occupation. Some scattered Early Neolithic material was found in the western part of the excavated area, but none was found in the treefall holes, which suggests that the trees in question had fallen before the Neolithic period.

FINDS

Soil conditions mean that only charred organic materials survive. Flint and stone, on the other hand, probably present an almost representative picture. The flint nodules from the scatter of stones on the subsoil surface seem to be immediately usable for tool manu-

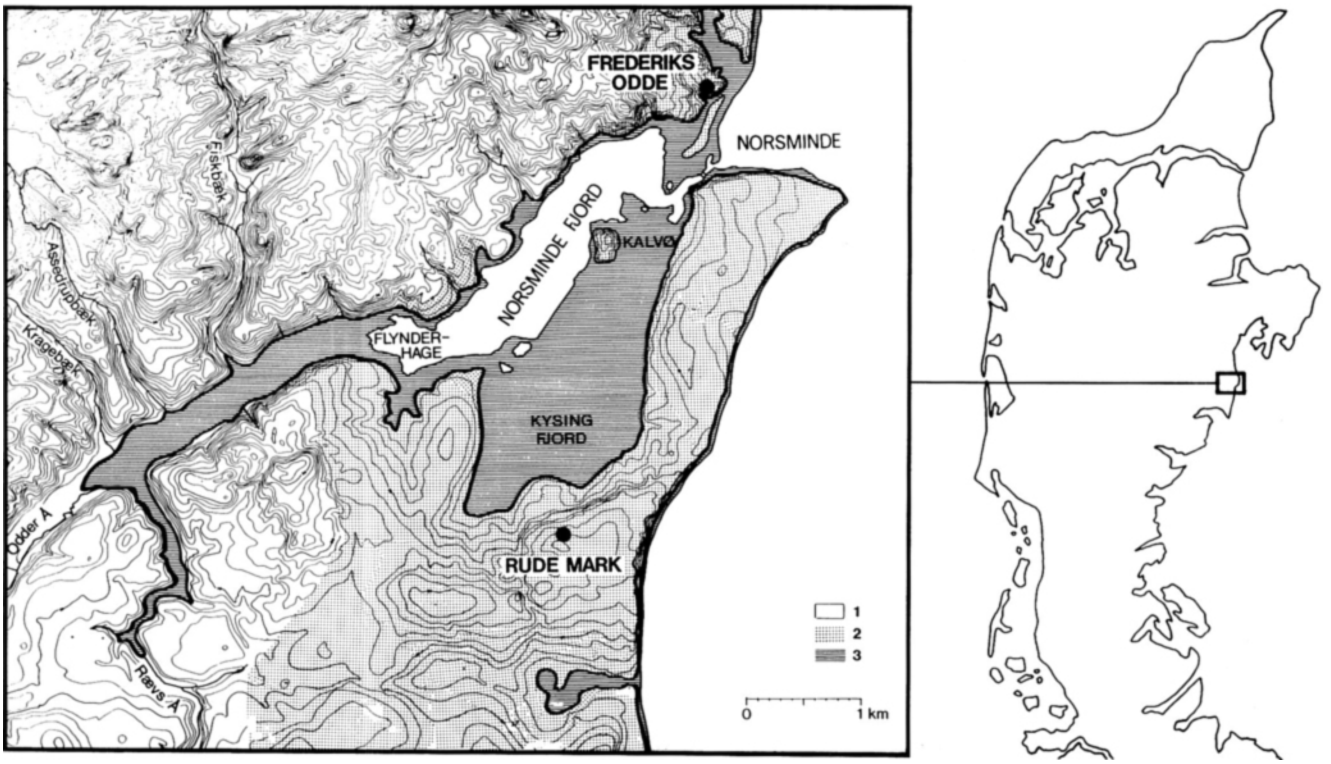


Fig. 1. The location of the Rude Mark settlement and the only other known Maglemosian site, Frederiks Odde, in the Kysing- and Norsminde Fjord region. Orohydrographic map based on 4 cm map sheet by Geodætisk Institut (reproduced with permission of the G.I. no. A.404/85. Courtesy S.H. Andersen). – 1, clay. 2, sand. 3, raised sea-floor.

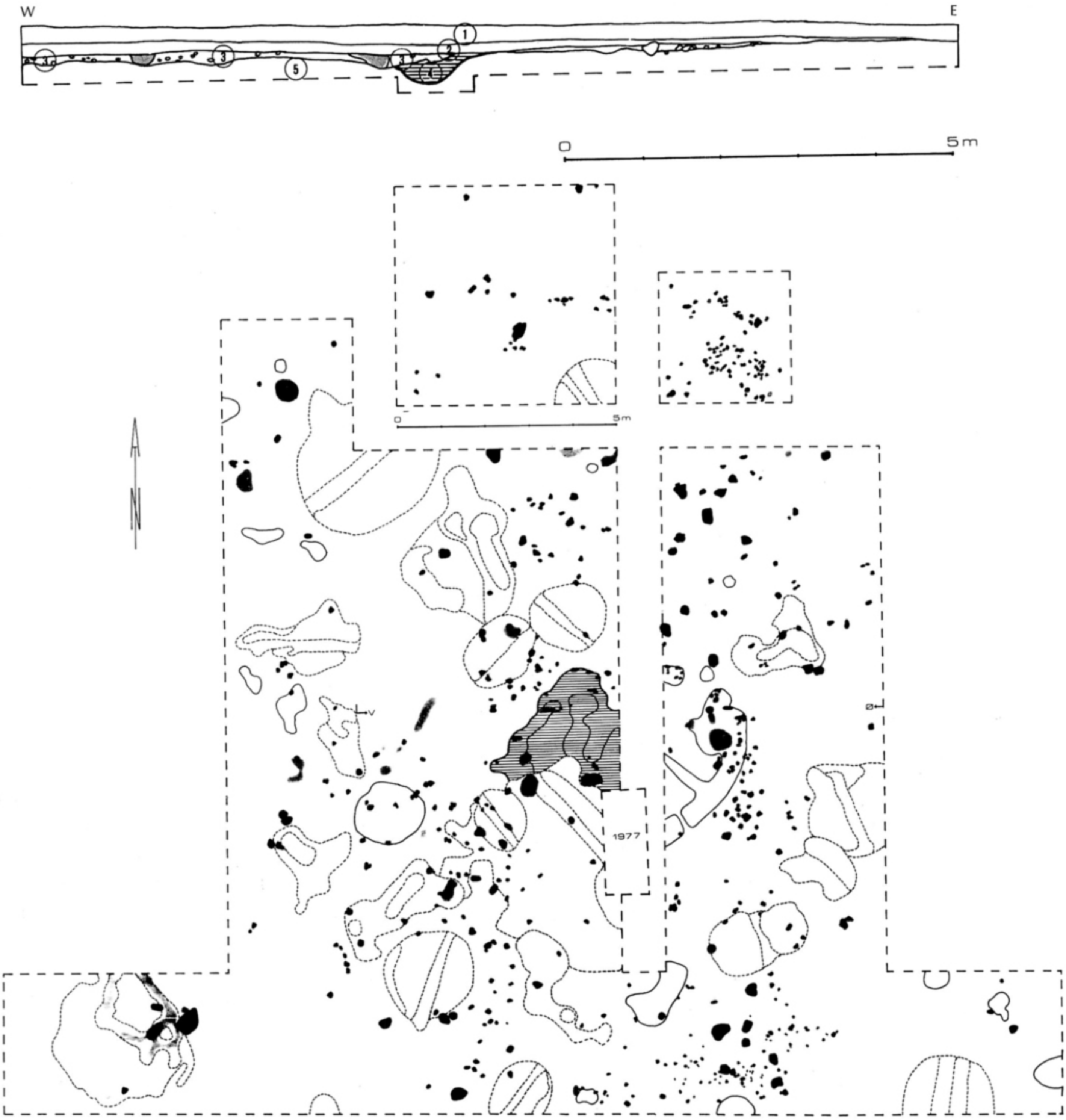


Fig. 2. W-E section and plan of the settlement.

facture. Tools were mainly produced from local morainic flint, using nodules of small size. 49% of the blade cores, for example, have some cortex remaining. Use of frost shattered surface flint is also common, as 66% of the blade cores have at least one frost shattered primary working surface.

The total flint waste and worked pieces amounts to 22,579 items. 723 (3.2%) are artifacts. Total weight of the flint material is 36,430 grams, the artifacts weighing 1,920 grams or 5.3%. Only 2% of the flint is shattered by heat. The distribution of burnt flint (fig. 3) supports the interpretation of the central reddish sand area as a hearth or roasting area, because the highest concentration of burnt flint is in this area. The low frequency in the north part of the red sand area is because this is the position of the furrow between two strip fields. Only ⅓ of the burnt pieces are burnt white with heat fracturing; the rest are less fractured, are burnt black, or have irregular, shining shatter surfaces.

The distributions of flakes, blades (fig. 11), blade cores and removals (fig. 10) form a regular, oval concentration 12 m SW-NE and 8 m SE-NW, and also a weak 4 × 4 m flake and blade concentration about 3 m N of this. It will be shown below that the distributions of microburins (fig. 13) and microliths (fig. 14) also show a roughly similar double concentration. Microliths comprise 77% of all the tools below the plough layer.

Most of the flint is light to dark bluish grey in colour. There are, however, a few pieces of white, milky, opaque flint. A couple of flaked flint nodules have traces of a surface patina which was originally reddish brown. These must have been brought to the site from an area with damper soils. Just under half the flint from the plough soil and a few pieces under it have a faint whitening of the surface, similar to that seen on sites in a marine environment. This alteration could be recent.

7,611 pieces of flint were sieved from the ploughsoil over the settlement, forming 33.7% of the total flint. In the ploughsoil there was a decrease in frequency away from the central area that was roughly proportional with that visible under the ploughsoil. As the site seems to form a single unit, and as there is no admixture of flint from any other mesolithic occupation, the flint from the ploughsoil is included in the following analysis (3). The distribution maps only include finds from below the plough soil (4). For the sake of comparison with other sites, previously established typologies are used for classifying the finds (see e.g. Brinch Petersen 1966: 77–185). A general summary is given in table I.

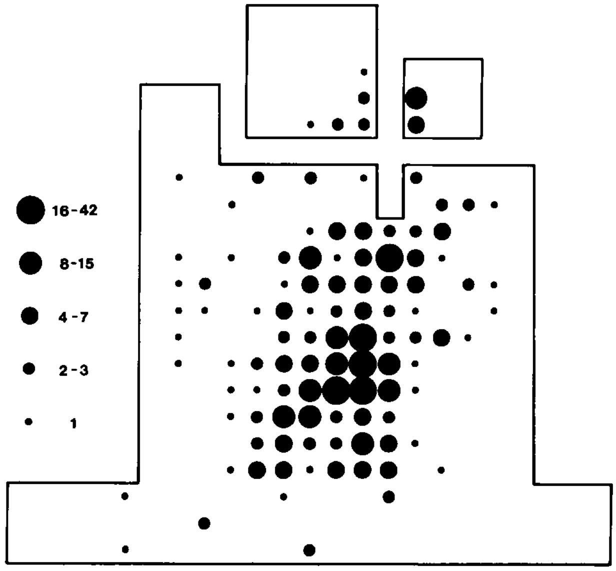


Fig. 3. The burnt flint distribution of Rude Mark.

Waste products

Cores

The microblade cores and flake cores from the site divide up as follows (cf S.H. Andersen 1973: 25):

A.	monopolar cores	72
B.	bipolar cores	59
C.	polyhedric cores	7
D.	disc cores	3
E.	fragmentary, indeterminate	12
	Total	153

None of the cores can be described as completely regular, prismatic microblade cores. A-cores are often conical and heavily flaked. 47% of the cores have only one striking surface. The cores are generally irregular, and only 10 have regular blades. Preparation by means of carinated blades did not occur. 61% have trimming or preparing of the core edge. Mean height of the A-cores is 5 cm, diameter of the striking surface 3.2 cm; of the B-cores, 4.6 cm and 3 cm respectively; and of the C-cores, 4.7 cm and 2.3 cm respectively. Three cores have strong crushing marks on their edges, resulting from subsequent use as hammer stones. 5 A-cores could be re-united with removals, all of which seem to be the results of mistakes, with the cores being struck too far from the edge and then discarded (fig. 4: 13–14). In one case attempts were made to continue blade production, however (fig. 4: 15). The D- and E-cores were mainly used for the production of short, broad flakes and have no edge trimming (fig. 4: 12). Two A-cores have faint scratchings in the remnants of cortex.

Core removals

Core removals divide up as follows (cf S.H. Andersen 1973: 25):

WASTE PRODUCTS		%
blade cores	153	0.70
core base removals	21	0.10
core side and edge removals	92	0.42
core point removals	10	0.05
blades	3643	16.64
flakes	17584	80.34
burin spalls	8	0.04
microburins	367	1.64
scalar pieces	3	0.01
flakes and blades with scratched cortex	6	0.02
total	21889	100.00
IMPLEMENTS		
flake scrapers	19	2.63
blade scrapers	5	0.69
borers	8	1.11
dihedral burins	4	0.55
angled burins	30	4.55
transverse burins	4	0.55
knives	36	4.98
denticulated flakes and blades	13	1.80
waisted flakes and blades	4	0.55
transversally retouched blades	18	2.49
notched blades	18	2.49
flakes with partial edge retouch proximally	20	2.77
flakes with partial or full retouch on side	30	4.15
A-lanceolates	126	17.43
B-lanceolates	28	3.87
C-lanceolates	9	1.24
segments	22	3.04
microliths, broken	147	20.33
triangles, isosceles	60	8.3
triangles, not isosceles (slightly scalene)	108	14.94
core axes (including fragments)	8	1.11
flake axes	1	0.14
pressure stones	3	0.41
hammer stones	2	0.28
total	723	100.00

Table I.

Core base removals, platform complete or partial	19
Central parts of cores	4
Core side removals from B-cores (pole-pole or pole-point)	47
Core side removals	30
Core point removals	10
Core edge removals	15
Thick flakes (over 1 cm), indeterminate core fragments	42
Total	167

The core base removals result from the flintworker's attempts to create a striking surface and angle enabling further blade production from the core. On the dorsal surfaces are visible traces of the trimmed core edge. 5 core base removals have the striking point placed immediately above the previous one. The core side removals are a heterogeneous group, differentiated from thick flakes by having blade scars on their dorsal surfaces. The core edge removals have a triangular cross section, with the edge of the core forming the dorsal side. 10 core removals have burin spalls or spall-like pieces detached, 10 have clear, partial use wear, 3 were used as scrapers and 1 is denticulate. 3 of the core removals could be edge removals from core axes with edge angles of 56–57° (cf Skaarup 1979: 49).

Blades

This group comprises 16% of the flint waste products. By definition their length is equal to or greater than twice the breadth. Microblades have lengths of under 5 cm, breadths of under 1.2 cm. Division into regular A-blades and less regular B-blades (cf Skaarup 1979: 45 and Blankholm et al. 1968: 69) is as follows:

A-microblades	489
A-blades	500
B-microblades	917
B-blades	1742
Total	3648

Fragmentary blades are only included when they satisfy the definitions put forward above. The striking platforms of the A-microblades are often so small that they can scarcely be seen. The striking angle is usually between 75 and 78°, which corresponds to the striking angle of the cores. There are traces of powerful trimming followed by the use of a striking point on the edge of the core. Lips or platform overhangs over the bulb of percussion are only rarely present. This indicates the use of hard hammer technique or of a soft hammer stone (Madsen 1981: 16–20). ¼ of the A-blades and ⅓ of the A-microblades have only a single dorsal ridge and are gently curved towards the distal end. Mean length of the A-blades is 4.7 cm, and about 5% have use wear. About 30% of the A-microblades are unbroken, while the corresponding total for A-blades is 56%. Proximal ends predominate among the broken fragments, suggesting that the distal ends were used as flint insets /microliths. The B-blades also have a 5% level of use wear.

The total number of A-microblades is less than that of microliths, which shows the high degree of utilisation of microblades for artifacts.

Waste flakes, flakes, and burin spalls

Flakes and waste flakes form 80% of the flint material. About 6% of the artifacts are produced on flakes. 4 flakes have scratches on the cortex, whether human or natural in origin cannot be determined with certainty. Most of the flakes are small trimming or retouching removals. This is mainly due to the fact that almost all the soil was sieved.

The small number of burin spalls corresponds to the low number of burins. 2 are secondary, i.e. they result from the resharpening of an old burin (fig. 5:22). 6 are primary spalls with triangular cross section (fig. 5: 23).

Microburins

About 90% of the 367 microburins are on microblades. When orientated with the dorsal side and retouched end upwards, they divide up as follows (cf Skaarup 1979: 51):

A. proximal end microburins	275
B. distal end microburins	42
C. microburins on medial pieces	34
D. microburins truncating microliths	11
E. crescentic microburins	5
Total	367

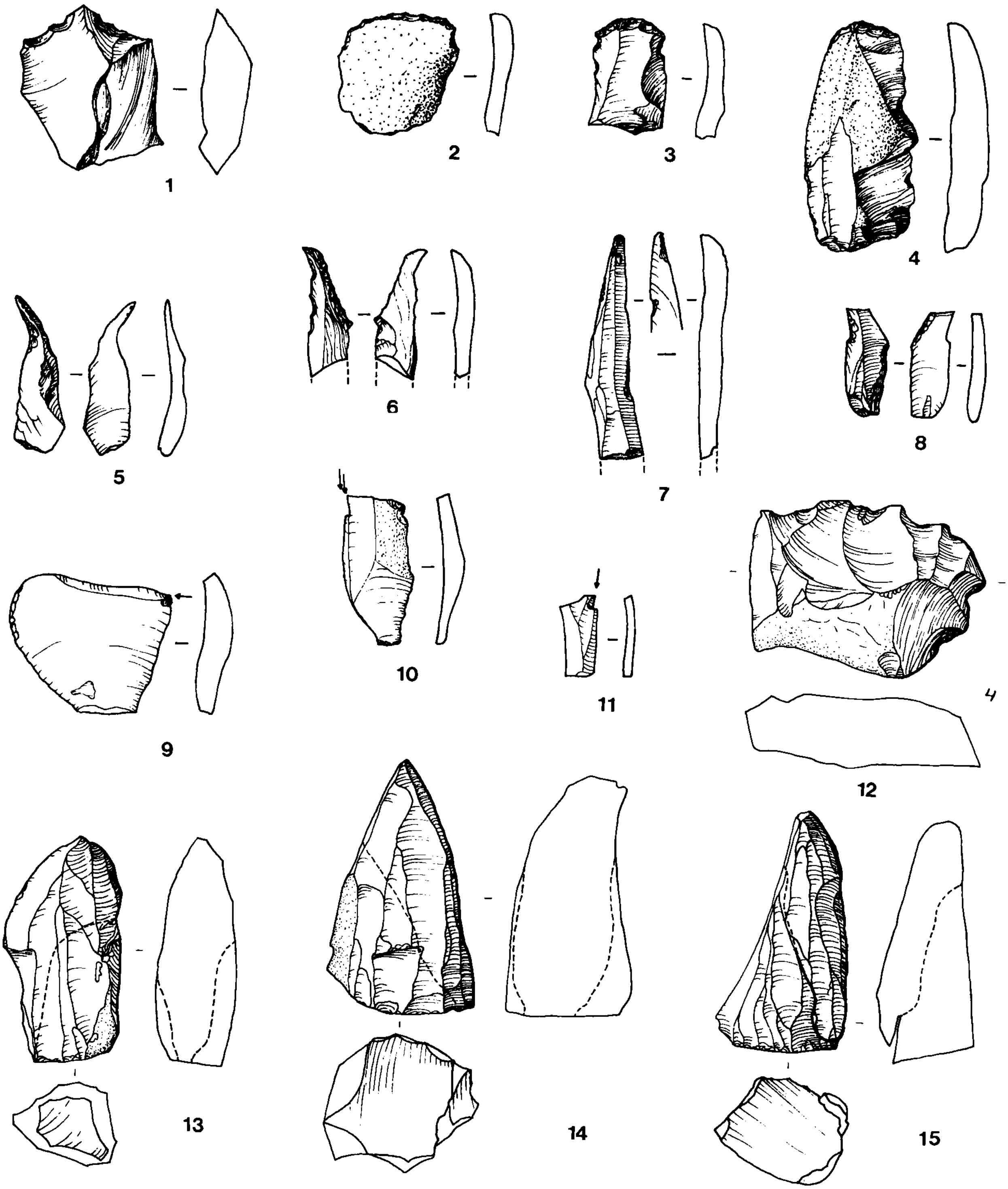


Fig. 4. Scrapers (1 – 4), borers (5 – 8), burins (9 – 11), and cores (conjoined cores and removals) (12 – 15). N.A. Boas del. 2:3.

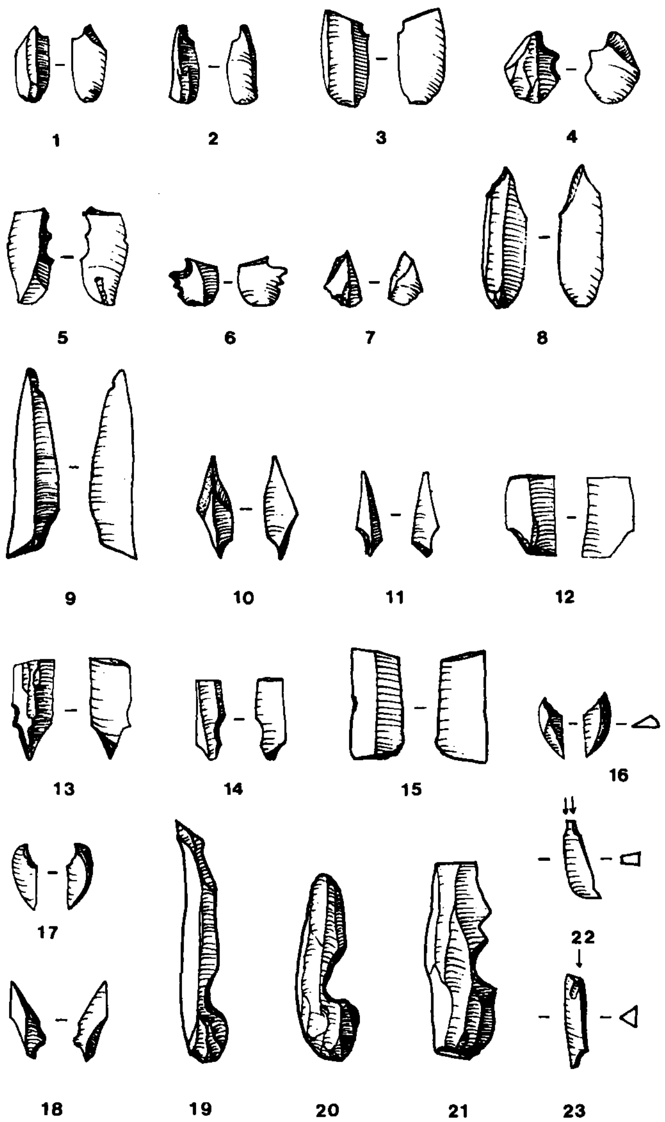


Fig. 5. Microburins (1 – 15), cresent microburins (16 – 17), truncated microburins (18), notched flakes (19 – 21) and burin spalls (22 – 23). N.A. Boas del. 2:3.

No fewer than 204 A-microburins have the notch on the right side, and 17 B-, 23 C- and 7 D-microburins do too. ¾ of the microburins are on proximal ends. Mean thickness is 0.2 cm. The distal end microburins are longest, having a mean length of 3.7 cm. This is similar to that of the lanceolate microliths, so that these microburins can be seen as unfinished or discarded lanceolates. Mean burin angle is 35°. The D-microburins are formed at notches just above and parallel with diagonal retouch on a blade or a microlith (fig. 5: 18). They show the method of producing triangular microliths, and can be regarded as waste products resulting from the shortening of the length of triangles (Larsson 1978: 80). D-microburins are only about 1.5 cm long and 0.5 cm broad. The roughly 1 cm large crescentic microburins (fig. 5: 16–17) are the result of mistakes where the fracture has progressed in an even curve back to the same side of the blade as the notch. The distribution of microburins (fig. 13) corresponds to that of blades, waste flint and microliths – particularly lanceolates! (cf fig. 11, 12 and 14).

Artifacts

Scrapers

Only 3.5% of the artifacts are scrapers. It is a very heterogeneous group. They divide up as follows (cf Skaarup 1979: 53–55):

Blade scrapers (breadth under 50%)	6
Oval scrapers (breadth 50–75%)	10
Discoid scrapers (breadth over 75%)	5
Toothed scrapers	1
Side scrapers, oval	2
Total	24

5 scrapers are doubtful, however, in that their edge retouch is under 0.2 cm in height. 3 are produced on plain cortex-covered flakes, and 7 have partial cortex on the dorsal surface (fig. 4: 2 and 4). 3 blade scrapers, 2 oval and 1 side scraper have clear use wear on the ventral surface near the edge. Mean length of the blade scrapers is 5.7 cm, of the oval scrapers 3.9 cm and of the discoid scrapers 2.9 cm. One blade scraper is on a microblade, the rest on macroblades with the scraping edge at the distal end. All have convex edges, which for the blade and oval scrapers have a maximum extent of 2.5 cm. One blade scraper has two notches in the right long edge (fig. 4: 4). Edge angle varies between 50 and 110°. One oval, one side and one blade scraper are on core trimming pieces. There are no double scrapers.

Borers

The group consists of:

Bore points	1
Blade borers	5
Flake borers	2
Total	8

The two flake borers were found in the ploughsoil and could be neolithic. The bore point and 3 of the blade borers have points turned to the left, while the rest have straight points (fig. 4: 5, 6, 8). All points are on distal ends. Mean length of the blade borers is 5.3 cm and length 1.4 cm. 3 of the borers with bent points are very similar to the Late Palaeolithic "zinken" (Holm and Rieck 1983: 8 and fig. 2, 3–8).

Burins

These are produced on blades, flakes, and core removals and may be divided as follows (cf Skaarup 1979: 57–63):

Dihedral burins	4
Simple angled burins on breaks	16
Double burins	2
Transverse burins	4
Angled burins on convex scraper edge	2
Plane burins on platform remains	10
Total	38

Towards ⅓ of the burins have an uncharacteristic appearance, and may

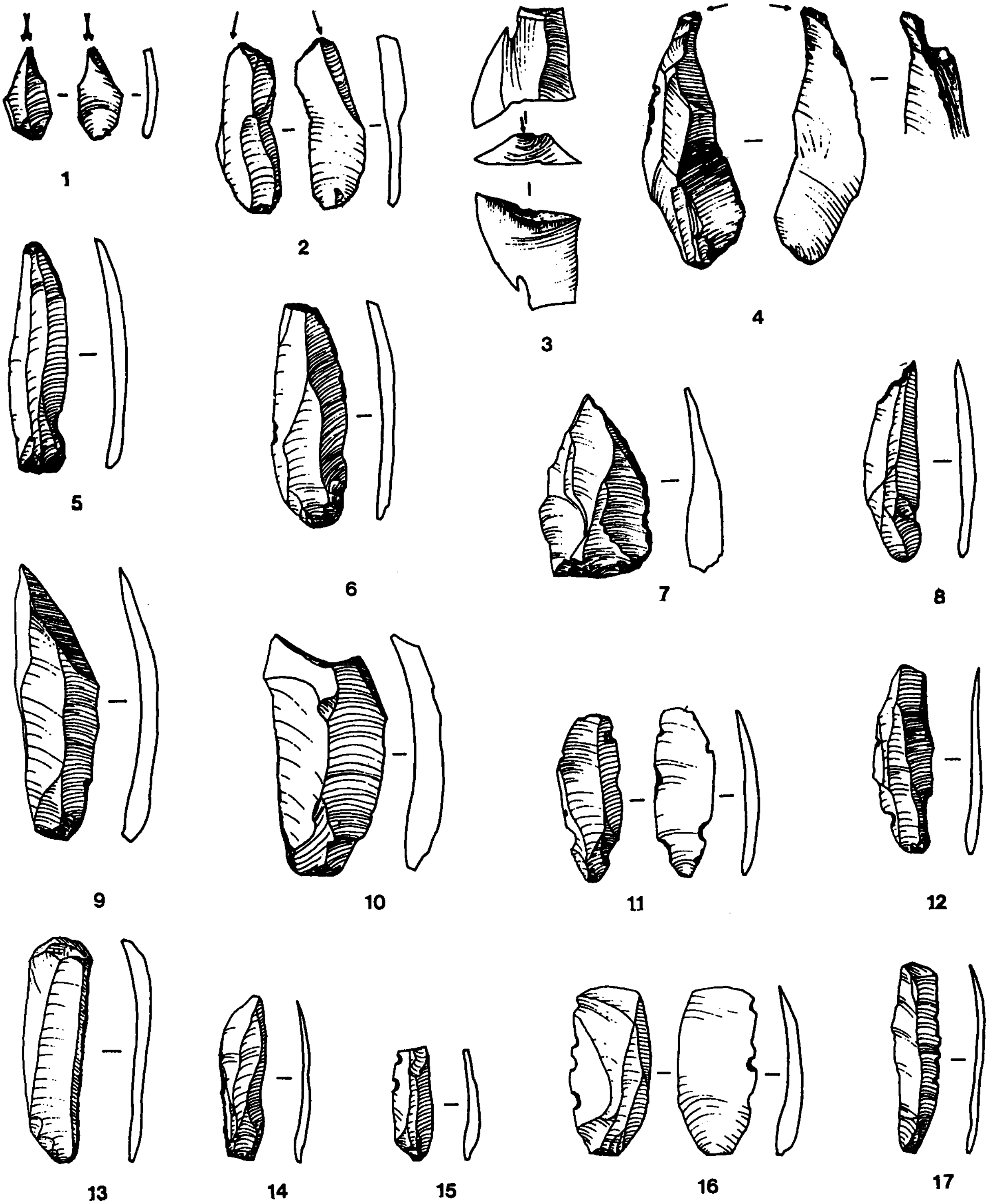


Fig. 6. Burins (1 – 4), knives (5 – 7), waisted blades (11 – 12), blades with edge retouch (9 – 10, 13 – 14) and denticulated flakes (15 – 17), N.A. Boas del. 2:3.

have been produced by chance. This is mainly the case for the plane burins, all of which are made on platform remnants of flakes. 1 transverse burin, 1 angled burin on a break and 3 plane burins are made on core removals. One transverse burin on a broken flake nearly forms a right angle on the ventral surface, in the middle of which there are powerful traces of use wear at right angles to the ventrally turned side of the edge (fig. 6: 31). 8 simple angled burins are angled to the left and 8 to the right, while 12 of the rest are angled to the left. One double burin is on a macroblade (fig. 6: 10). There are no burin blows on transverse retouch (fig. 4: 9–11 and 6: 1–4).

Knives

Flakes with edge or end retouch (Skaarup 1979: 63–67) comprise 36 items, which can be divided into the following groups:

Flakes with crescentic end retouch	13
Flakes with crescentic edge and end retouch	5
Flakes with straight or oblique end retouch	11
Flakes with concave end retouch	7
Total	36

They can be regarded as knives, as shown by the fact that more than half have clear use wear on the unretouched long edge. 12 pieces are turned to the left, the rest to the right. 2 blade knives have a notch near the proximal end's »dorsal« side (fig. 6: 5). Mean length of the flakes with crescentic end retouch is 5.8 cm, of the flakes with straight or oblique end retouch 5 cm, and of the last group 5.5 cm. Retouch is always carried out from the ventral surface except on two flakes with straight/oblique retouch. The latter group is always on blades (fig. 6: 8). One piece with diagonal concave end retouch is fully retouched along the shorter side, and has a notch opposite this. Two other knives have notches on the shorter side. They could both be roughouts for triangles with concave sides. One flake has deep concave end retouch.

Notched removals/microlith roughouts

The group with notches, sometimes finely retouched, is heterogeneous. Under half are indubitably microlith roughouts. Apart from one, all are on blades, and are subdivided as follows:

A-microblades with notch	6
A-blades with notch	5
B-microblades with notch	3
B-blades with notch	3

6 of the blades are broken 0.1–1.2 cm above the notch. 2 blades have only ½ a notch; these could be microburins on breaks. On 5 blades the relatively deep notch is assymetrically V-shaped, with the longest arm oriented towards the distal end (fig. 5: 19). 2 blades have 2 notches, the one furthest from the distal end being the deepest (fig. 5: 20). One blade has a crooked notch and is denticulate on the left side. 6 blades have notches on the left, 11 on the right. V-shaped notches are more commonly near the proximal end, while U-shaped notches are more randomly dispersed (fig. 5: 21). Length of whole blades is up to 7.2 cm, breadth 0.8–2.1 cm.

Waisted blades

This group comprises 3 blades with notches on both sides of the basal end, and 1 which is waisted in the middle. One blade has, apart from the notches, sporadic retouch on both long edges and the distal end. Another has two other small notches on the right long edge, and fine convex retouch on the distal end (fig. 6: 11–12).

Denticulated flakes

This heterogeneous group divides up as follows:

A-microblades with denticulation	5
A-blades with denticulation	4
B-microblades with denticulation	1
B-blades with denticulation	3
flakes with denticulation	2
Total	15

The denticulation occurs either as saw- or sickleblades and flakes with series of closely spaced notches under ½ mm in size (5 pieces), or as 2–3 U- or V-shaped notches over ½ mm (10 pieces). Two blades combine both (fig. 6: 17). 4 have more or less straight breaks at one end, 4 others at both ends (fig. 6: 15). 5 examples have denticulations combined with use wear on the same edge, and 3 have gloss. 3 are on the left side, 9 on the right side, of blades. The denticulation is always produced from the ventral side (fig. 6: 17).

Removals with full or partial retouch on a long edge

Apart from blades with full retouch along one side, this is a heterogeneous group comprising 30 pieces. The retouch may be of almost all types and different placements. It may be applied to either complete or fragmentary flakes and blades. One blade has fully retouched long sides. 2 have full retouch on one side, one left and one right (fig. 6: 13–14). Retouching is always carried out on the dorsal surface.

Microliths

The 500 microliths can be classified as follows (cf Brinch Petersen 1966: 93–98, Skaarup 1979: 71–80):

lanceolates with partial retouch on a long edge	126
lanceolates with full retouch on a long edge	28
lanceolates with oblique basal retouch	7
lanceolates with convex or straight basal retouch	2
segments	16
segments with chord retouch	6
fragments of indeterminate lanceolates and segments	34
triangles, isosceles	39
triangles, slightly scalene	10
triangles, isosceles, one side concave	15
triangles, isosceles, two sides concave	6
triangles, slightly scalene, one side concave	65
triangles, slightly scalene, two sides concave	33
triangle fragments, indeterminate	43
microlith fragments, unclassifiable	70

Lanceolates. Most of the lanceolates may be produced of waste products from the manufacture of segments and triangles. Triangles are usually made from the medial portions of blades using the microburin technique, but 99% of the lanceolates are distal ends. 37% of the lanceolates are broken, there being twice as many basal than point breakages. The fact that so many have similar more or less straightly broken bases indicate that blades with the distal end broken were, despite this, used for lanceolate production. This breakage often occurs during blade manufacture, and need not be the result of use or conscious preparation. 12% have 1–3 small notches or removals resulting from use, and 27 lanceolates have broken tips (cf Brinch Petersen 1984: 178). The retouch is always carried out on the dorsal side (fig. 7: 1–5 and 8:5). Point retouch

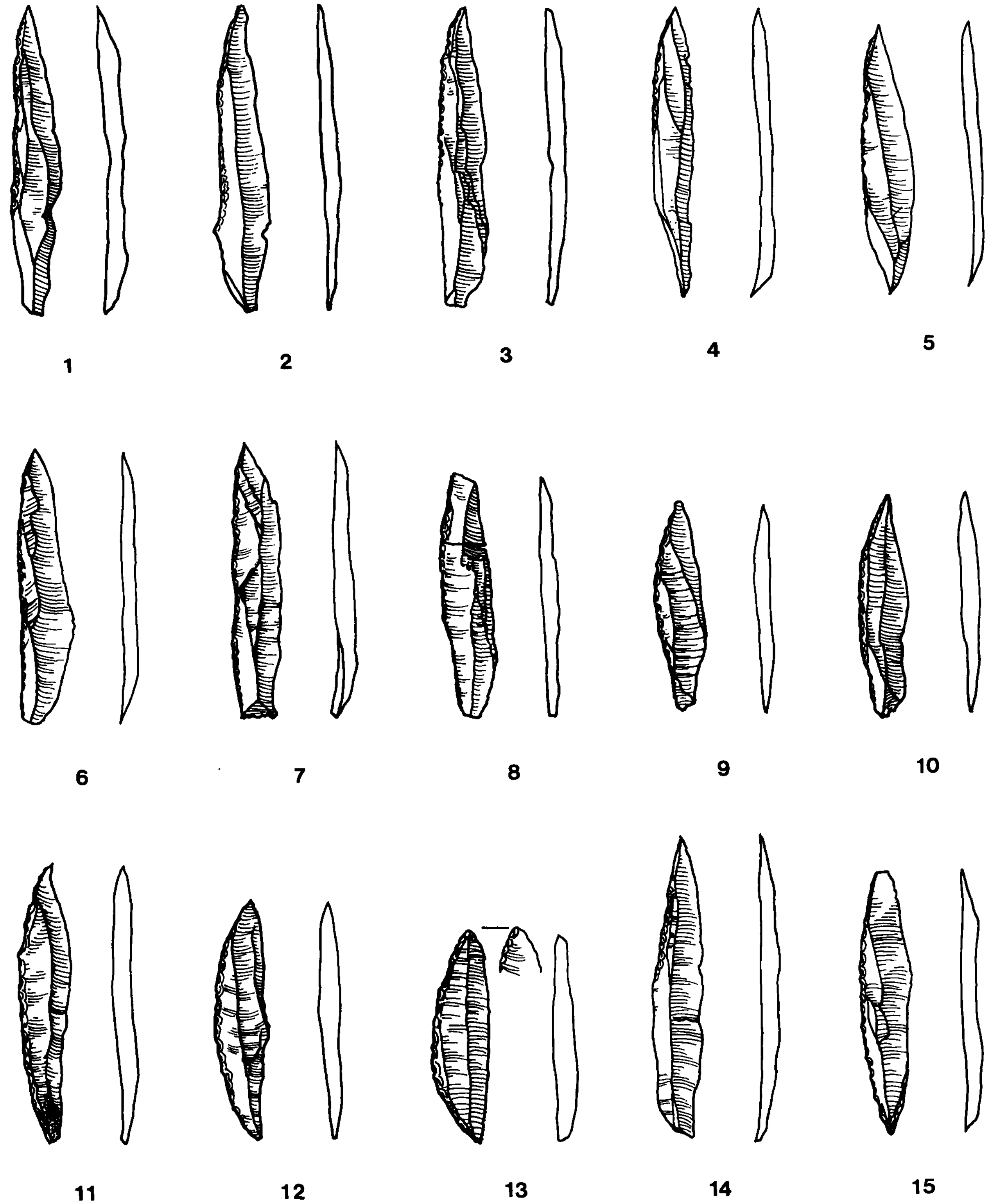


Fig. 7. Lanceolate microliths (1 – 10), segments (11 – 13 and 15) and a lanceolate with basal retouch (14). The proximal blade end of the illustrated lanceolates and segments are upwards, triangels downwards. J. Bacher del. 1:1.

is straight (40% of cases), convex (35%), concave (5%) or weakly convex-concave (7%).

Fig. 16 a shows great variation in length of lanceolates with partial retouch along a long edge. There is a tendency towards bimodality, with peaks at around 2.9 cm and 3.5 cm. Breadth is ideally around 0.8 cm. Mean length is around 3.3 cm, breadth 0.9 cm and thickness 0.2 cm (cf fig. 16 b).

Lanceolates with full edge retouch all have the retouch on the left. There are equal numbers with broken points and bases. 5 fragments have small, unretouched basal tongues, and are thus transitional between this and the previous group. Over ¼ of this group (like ⅓ of the previous one) has a facet at the point resulting from microburin removal. Mean length is 3.6 cm, breadth 0.9 cm, and thickness 0.2 cm (fig. 7: 6–10).

5 of the 7 lanceolates with oblique basal retouch have uniform basal retouch on the right. One has left handed point and basal retouch, ending on a microburin facet (fig. 7: 14). Two have full side retouch, which at one point angles in towards the middle of the piece. The last short-broad lanceolate has almost straight basal retouch (fig. 8: 4). It resembles a Horsham point (Brinch Petersen 1966: 95 fig. 47), but could also be classified as an atypical triangle.

Segments. 7 segments are damaged. All have steep, left-hand retouch, which is continuous except in one case. 4 have unretouched microburin facets, one of them at both ends. This shows a production method similar to that of the triangles, with two closely spaced, asymmetrical notches, from the bottom of which the burin scars run out towards the ends of the blade. One piece (fig. 7: 15) closely resembles a Sauveterrian point. One segment has chord retouch on the ventral surface (fig. 7: 3), 5 have it starting from the proximal end. Their mean length is 3.8 cm, breadth 0.8 cm and thickness 0.3 cm. They are thus definitely thicker than either the triangles or the lanceolates (cf. fig. 7: 11–13).

Fragments of indeterminate lanceolates and segments. This group comprises 16 proximal point ends, 4 distal point ends and 14 medial pieces. 26 have left hand, 8 right hand retouch. 4 point ends have preserved microburin facets.

Triangles. 19 of the isosceles triangles with straight sides (fig. 8: 9, 12–15) are damaged. 31 have left handed and 8 right handed retouch, when oriented with the distal end of the blade pointing away. All retouch is on the dorsal side, and is finest at the distal end. Most are medial sections of blades; only 6 have the lower short side retouched on the side of the blade's distal end, and 7 have a microburin facet preserved on one or both ends. In 5 cases the hypotenuse is damaged with 1–3 notches. The angle between the short sides varies between 105–158°. Mean length of the isosceles triangles is 2.6 cm, breadth 0.8 cm and thickness (for all the triangles) 0.2 cm.

Of the slightly scalene triangles with straight sides, 8 have the shortest side at the proximal end, 2 at the distal end (fig. 8: 1–3). 3 are left handed, 7 right handed; 6 are on distal fragments, 4 on medial fragments. 2 have unretouched facets from microburins. The angle between the two short sides varies between 122–152°. Mean length is 3.3 cm, breadth 0.7 cm.

8 isosceles triangles with one concave side are right handed (fig. 8: 20), 7 are left handed (fig. 8: 21–23). With one exception, the concave side is at the proximal end. The concavity is strongest on the last ½ cm leading up to the angle between the two short sides, so that a hook may be formed by the extension of these two sides. The concave retouched side always becomes concave-convex towards the point. One is retouched on the hypotenuse at the distal point. The angle between the short sides (measured relative to the two points of the microlith) varies between 110–159°. Mean length is 2.6 cm, breadth 0.8 cm.

The 6 isosceles triangles with two concave sides are all right handed (fig. 8: 7). They are very uniform and regular, with an angle between the short sides of 110–125°. The 2 concave sides are definitely the remains of the 2 notches from near the bottom of which the burin blows were directed towards the distal and proximal ends. Mean length is 2 cm, breadth 0.7 cm.

The most common group consists of slightly scalene triangles with one concave side (fig. 8: 17–19, 24–25). Of the 65 examples, 59 have the concave side towards the proximal end, 33 are left handed, in 24 cases the raw material is the distal end of the blade, and 42 are slightly imperfect. 2 right handed examples have a small unretouched section next to the junction of the two short sides (fig. 8: 25). Mean length is 2.9 cm, breadth 0.7 cm, and angle between the 2 short sides 129°. Most of the thin microliths are in this group, with a mean thickness of 0.2 mm.

Of the slightly scalene triangles with both sides concave (fig. 8: 6, 10–11 and 16), 24 are left handed and 9 right handed. With one exception, the shortest side is at the proximal end. 3 have microburin facets at the proximal point, while 2 have them at both ends. 12 are on distal ends; three of the left handed ones have retouch on the hypotenuse at the distal point, while two of the right handers have hypotenuse retouch at the distal point – in one case this is exceptionally carried out from the dorsal surface. The third longest microlith from the site belongs to this group, of which the mean length is 3.1 cm, breadth 0.7 cm, and the angle between the short sides 146°.

The fragmentary triangles include 25 proximal ends (20 right handed), 16 distal ends (10 left handed) and 2 medial fragments. 5 have microburin facets at the proximal point, 3 at the distal point.

The large number of microlith fragments reflects the careful methods of excavation. Of the total, 50 are point fragments, 30 are medial fragments, 6 are burnt, 5 points have traces of microburin facets, 33 have straight and the rest oblique breaks.

Of the triangles, 108 were determinable as left handed, 79 as right handed.

Axes

The best preserved of the 8 core axe fragments is a small symmetrical axe (not an adze); it is made on a powerful flake, the ventral side of which is partially preserved (fig. 9: 3). It has convex, trimmed broad surfaces, and a pointed butt. The edge has been partly removed by a transverse blow. Another blow was then made towards the most convex of the broad surfaces. Length is 8.7 cm, breadth 4.3 cm and thickness 2.1 cm. Butt width is 2.7 cm, butt thickness 1.1 cm, edge breadth 2.7 cm and weight 60 g. An edge flake of a presumed symmetrical axe is about 3.4 cm wide, and has an edge angle of 53°. A fragment 2.7 cm long, 3.3 cm wide and 2.7 cm thick derived from a symmetrical adze. A butt fragment with trimmed sides (fig. 9:2) could derive from an (a)symmetrical adze. Length is 7.3 cm, butt breadth 2.7 cm and butt thickness 1.4 cm. A fragment of the body of a symmetrical adze with trimmed sides measures 5.8 cm in length, 4.2 cm in breadth and 2.2 cm in thickness. An edge flake from an adze has an edge breadth of 3.2 cm and an edge angle of 57°. An edge and side fragment of an adze measures 5.7 cm in

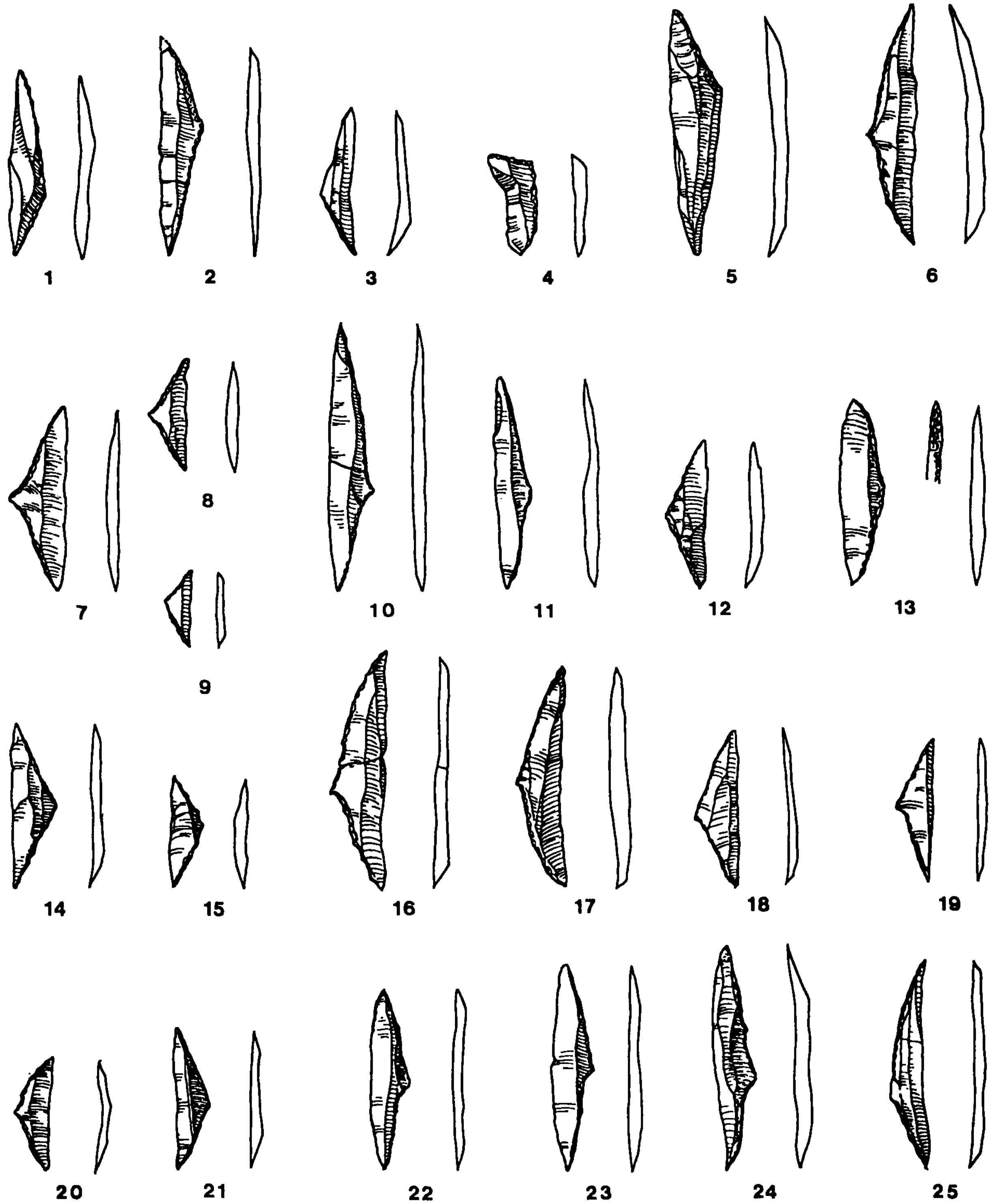
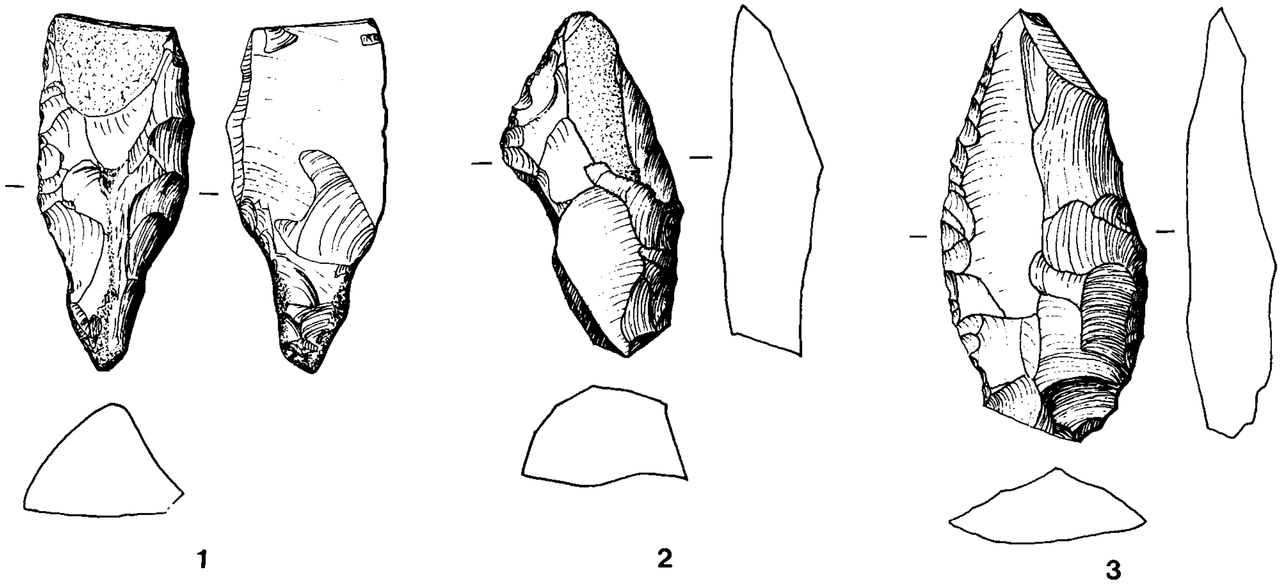


Fig. 8. Lanceolate microliths (4 – 5) and triangels (1 – 3, 6 – 25). J. Bacher del. 1:1.



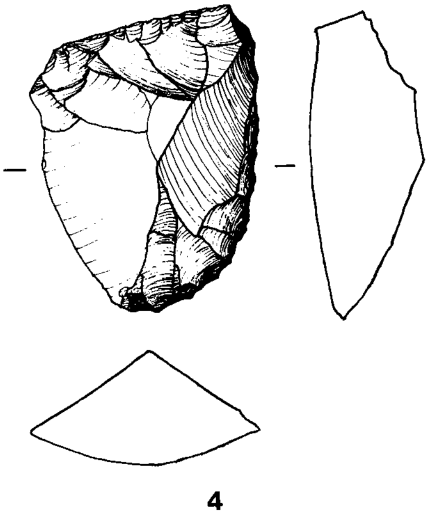


Fig. 9. Pressure stone (1), core axes (2 – 3) and an edge resharping flake (4). N.A. Boas del. 2:3.

length, and has an edge angle of 67°. A fragment 5.7 cm in length, 4.6 cm in breadth and 2.4 cm in thickness has the character of an adze, with an angle of 68°. Edge and sides are trimmed, and the butt is formed by a small irregular cortex area 3.6 × 1.1 cm.

A symmetrical flake axe with flat flaking from the central cultural level of the site has unfortunately been lost. It was very similar to one from Flaadet (Skaarup 1979: 83, fig. 24, 4).

Pressure stones

A pointed piece is triangular in shape and cross section (fig. 9: 1), and is 7 cm long, 3.2 cm broad and 2.2 cm thick. The sides are steep, regularly scar flaked towards the dorsal side. One edge is trimmed, the other has a microblade scar 3.8 cm in length struck from a small rectangular "butt surface" at the broad end of the piece. The pointed end has crush marks extending 3 cm up the three sides from the rounded point. The fragment could have been used as a pressure stone/borer for smoothing off the approximately 2 cm diameter holes in for example antler mattocks.

Another fragment is frost shattered, and is also of irregular, triangular shape. The two edges have scalar working on a 5 cm long section down towards the tip, which has powerful crush marks. Length is 8.8 cm, breadth 4.6 cm, thickness 2.1 cm. It is interpreted as a kind of fabricator (a hammer or pressure stone).

Hammer stones

An irregularly round hammer stone has 3 areas of powerful crush marks, and 2 cortex covered areas. Maximum diameter is 6.1 cm, minimum 5.3 cm. The other hammerstone is a triangular, foursided and lightly worked piece of natural flint with crush marks at both ends. One hitting surface is about 2.4 cm across, the other about 3.3 cm, and shaped as a ridge about 1 cm across.

Floral and Faunal remains

About 100 g charcoal were collected from various places on the site. Charcoal from the east side of the area of reddish sand, and about 7 g hazelnut shells from the same place and the immediate surroundings, have been used for radiocarbon dates (see below).

Two fragments of burnt bone, about 1 cm across, were also found.

CULTURAL AFFINITY AND DATING

The settlement at Rude Mark fits into the centre of the Danish Maglemosian Culture, near the transition from the earlier to the later part. Specialised microlith production is a characteristic of the find, and the quantity of triangles is greater than from any other site from the early Maglemosian. Classic scalene triangles of Sværdborg type are scarcely represented, while the slightly scalene pieces with concave sides appear in numbers never before seen. The latter type appears only rarely in Scandinavian and North German finds from the early Maglemosian Culture (Blankholm et al. 1968: 95, and Skaarup 1979: 68 and 99).

The presence of waisted blades, the presence of only a few primitive burins on breaks, and the relatively large number of slightly scalene triangles as in Sønder Hadsund and Duvensee 2, shows the affinities between Rude Mark and the early Maglemosian.

The small number of artifacts in most categories makes comparisons with other sites difficult. The proportions of the various types of microliths must therefore be used to show the chronological position of the site. The percentages of the various microliths place Rude Mark in the lanceolate seriation between Sønder Hadsund and Stallerupholm. In a seriation of slightly scalene triangles the site would fall between Sønder Hadsund and Linnebjär (cf Skaarup 1979: 100 diagr. 3). The number of triangles relative to lanceolates shows, however, that the site should in fact be moved down towards the transition between the earlier and later Maglemosian Culture. Similarly, both lanceolates and triangles are longer and narrower than the examples at for example Flaadet (fig. 16, a–b). The blade cores from Rude Mark also have a smaller striking area and are higher than those from Flaadet.

The mean width of the Rude Mark triangles is 7.5 mm. When compared to the Maglemosian settlements in east Zealand, this puts Rude Mark between Orelund Vest with a value of 8.6 mm and Ulkestrup I with 7.2 mm (K. Andersen 1983: table VII). The latter is C14 dated on hazel nuts to 6190 + 100 bc (Andersen, Jørgensen and Richter 1982: 77). C14 dates from the central fireplace/roasting area at Rude Mark are:

K 4217, hazel nuts	6240 + 130 bc
K 4218, charcoal	6150 + 85 bc
K 4219, charcoal	6110 + 120 bc

The hazelnuts are in closest context with the settlement material and should give the most reliable date. The dates of the charcoal samples, however, seem to be too late compared to the archaeological datings. Contemporaneity between Rude Mark and Ulkestrup I gains further support from the relative proportions of lanceolates and triangles; at Rude Mark this is 1:3, very close to that at Ulkestrup I. Lanceolates predominate on sites of the earlier Maglemosian Culture, while triangles are extremely predominant in the later Maglemosian. The characteristic keeled and handled cores of the later Maglemosian do not appear at Rude Mark (Henriksen 1976: 22).

THE CHARACTER OF THE SETTLEMENT

The cultural level preserved under the plough soil was not very deep. In the furrow between 2 of the strip fields running E–W over the site the cultural level had been almost completely removed from a zone about 1.5 m wide. Another furrow runs partly along the north edge of the excavation, and partly 12 m further south, through the central reddish area or hazel nut roasting location. All the distribution maps show a drop in the frequency of finds connected with these furrows. The ploughing of the earth up onto the fields to form ridges has on the other hand protected the cultural level in the approximately 10 m wide area between the furrows.

Treefalls disturbed about ⅙ of the settlement. The holes were evenly spread, and so provide chance areas where the original distribution of finds can be checked. In the distribution maps, this is plotted by m^2. The m^2 areas which include treefalls in the central part of the settlement are particularly rich. Against this, the m^2 areas with treefalls at the edge of the site have few finds. The isorithmic distribution map of flakes (fig. 13) shows a N-S oriented rectangular concentration of 11 × 8 m at most. The mean value of 54 pieces/m^2 covers an area of about the same shape and orientation of about 9 × 6 m. A physical barrier in the form of a hut wall might be responsible for the latter concentration, because the centre of the area is made up of the hazel nut roasting area with concentrations of nut shells and burnt flint; and because a partial clearance of the stone scatter was undertaken from this area. The distribution of different categories of waste, flakes, and blades (fig. 11), cores and core removals (fig. 10), microburins (fig.

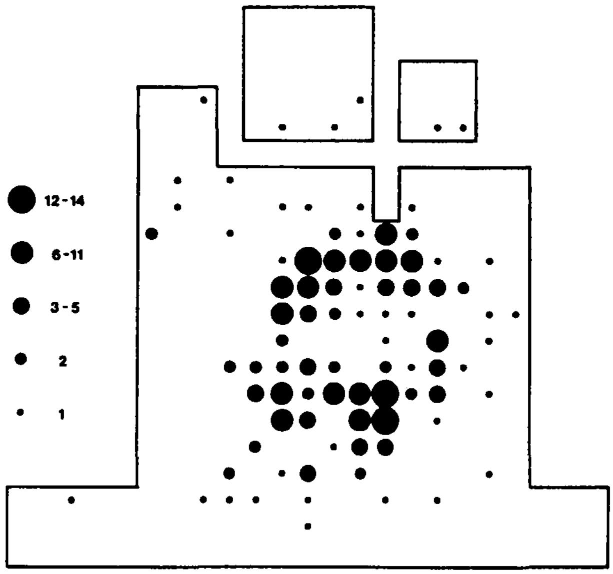


Fig. 10. Distribution of cores and removals.

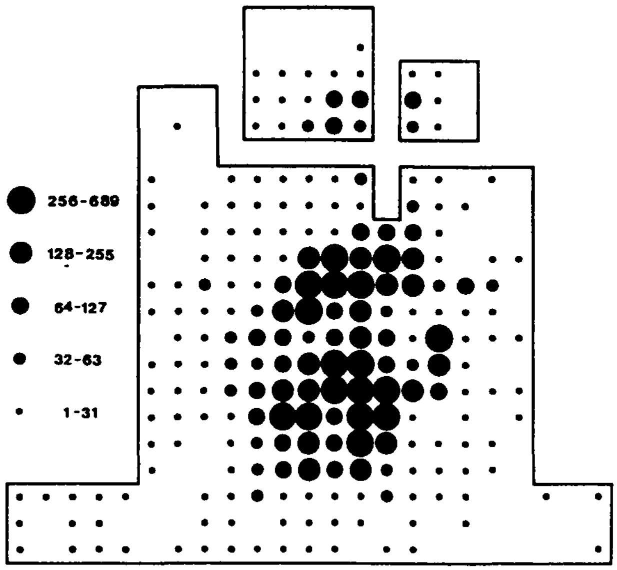


Fig. 11. Distribution of flakes and blades.

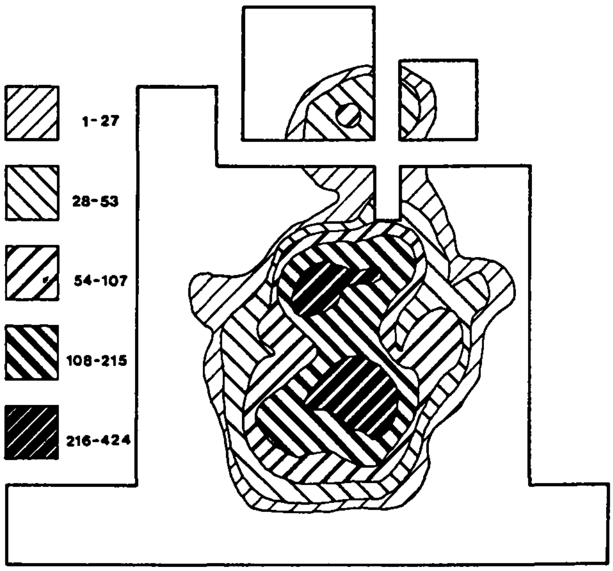


Fig. 12. Distribution of waste flakes.

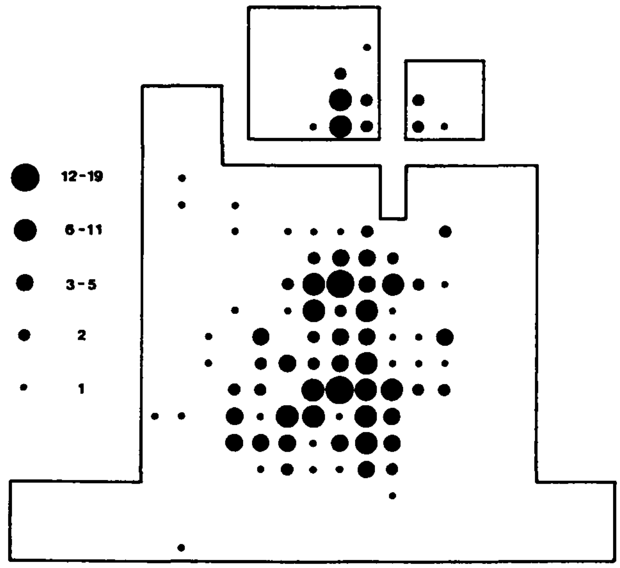


Fig. 13. Distribution of microburins.

13) and the predominant artifact group, namely the microliths, show a similar picture with only a small deviation.

Regarding the smaller, northern concentration of flint, it can be seen that the division of the large concentration into two parts is artificial, caused by the later field system. The furrow has created the tongue-shaped extension of the finds to east and west, with a corresponding reduction of finds in the central area (cf fig. 12). The lower frequency between the large southerly and small northerly flint concentrations is on the other hand genuine. This area is in fact directly between two furrows, where the heaped earth of the ancient field has provided some protection for the remains of the settlement.

Comparing the distributions (fig. 10–14), it is clear

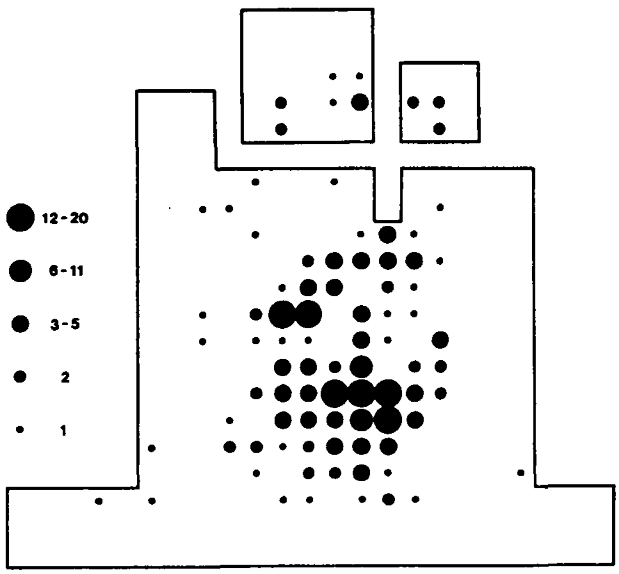


Fig. 14. Distributions of microliths.

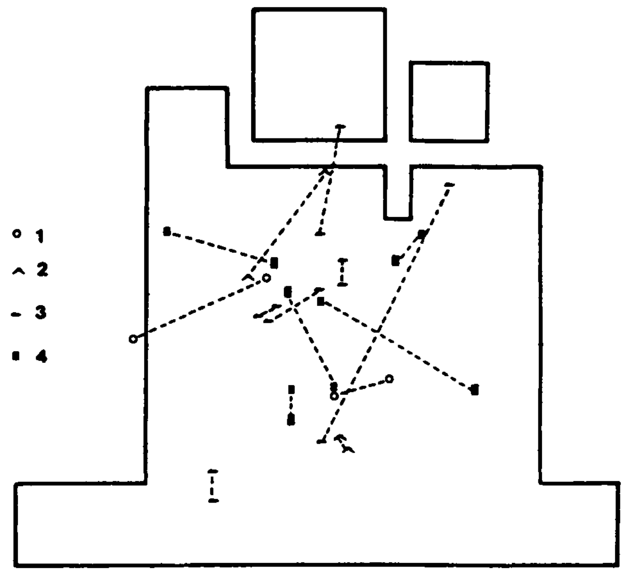


Fig. 15. Distribution of conjoined pieces. 1, lanceolate. 2, segment. 3, triangle. 4, core.

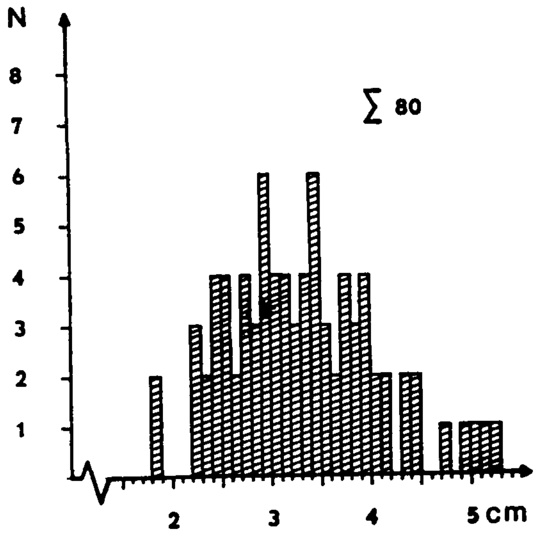


Fig. 16 a. Diagram. Length of lanceolate microliths.

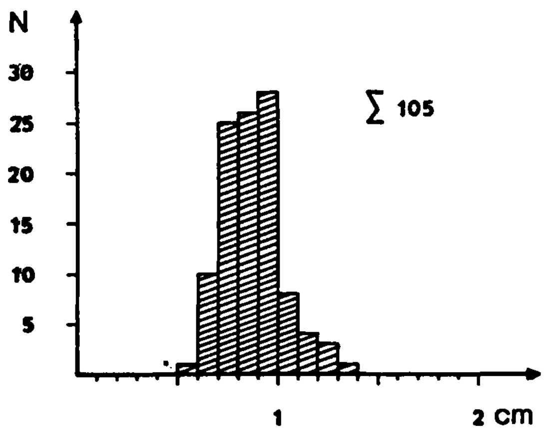


Fig. 16 b. Diagram. Width of lanceolate microliths.

that the small northern concentration must be regarded as a secondary "flint working area", as opposed to the larger southern "flint preparation area" where primary working of the flint cores took place. Cores and core removals are remarkably rare in the small concentration (fig. 10), while blades, microburins and microliths are well represented (figs. 11 and 13–14). The northern concentration can thus be viewed as a microlith production locus, using blades and flakes brought there for the purpose. ⅔ of the microliths here are isosceles triangles.

The larger find concentration tends to show a circular distribution of cores and core removals (fig. 10) around the "roasting location", but has a more even distribution of flakes and removals (fig. 11–12). Burins are exactly similar, while microliths concentrate south of the "roasting location" (fig. 14). Microburins distribute themselves similarly to flakes and blades (figs. 11 and 14).

It has been possible to reunite broken fragments of the following objects: 5 cores with core removals; 2

broken lanceolates; 2 segments; and 6 triangles. The distribution map of re-united tools shows (fig. 15) that transport of the separated fragments was considerable. One triangle was re-united from 2 fragments found 11 m apart, NE and S of the large flint concentration. Fragments of one lanceolate and one core were each found one in the small northern and one in the large southern concentration, which emphasises the links between the two. Transport of separated pieces seems to have taken place mainly N-S.

In conclusion, it can be said that Rude Mark forms a well-delimited unit, when the find and its conditions are considered. Distribution divides into a large, oval flint working area round a hearth or hazel nut roasting site, and a smaller flint concentration. The same picture emerges from 10 other Maglemosian settlements in southern Scandinavia and northern Germany (Grøn 1983, 32–42). It is tempting to regard the small patch as the site of a possible hut, south of which the various activities took place. These activities were centred on microlith production. There are few scrapers, burins and axes. The preparation of hunting equipment was the main activity; apparently, processing the prey did not take place to any great degree.

The aurochs from Prejlerup, C14 dated to 6460 bc, was shot with a combination of microliths similar to that found at Rude Mark (Aaris-Sørensen 1984: 178; Petersen and Brinch Petersen 1984: 178), including the characteristic scalene triangles with concave sides. This is a type which qualitatively and quantitatively form an important part of the inventory from Rude Mark.

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NOTES

1. The work was carried out by the author as director of excavation, one temporarily employed assistant, and 4 young unemployed people from Odder.
2. OOM j. nr. 22. Rude Mark, Saksild Parish, Hads Herred.
3. Intrusive materials, which mainly derived from the plough soil: Late glacial: 1 tanged point. Kongemose culture: 1 trapeze, 1 rhombic arrowhead, 1 handled core. Norslund culture: 1 oblique transverse arrowhead. Early Neolithic B material: 39 flakes, 9 flake scrapers, 7 axe fragments (polished thinbutted), 1 axe fragment (stone, thinbutted), 2 transverse arrowheads (on flakes), 39 potsherds (including a fragment of a lugged beaker), 1 blade knife. Late Neolithic/Early Bronze Age: 2 heart shaped arrowheads, flat flaked, 1 dagger fragment, flat flaked, 1 potsherd. Iron Age: 16 potsherds. Viking Period: 1 potsherd with "Slavic" wavy line decoration. Medieval/Recent: 25 potsherds, 1 sherd of stone ware.
4. This work uses the statistical mean, i.e. the middle number when the values are arranged in sequence. This must not be confused with the average, which is sometimes used as the mean by others (Skaarup 1979: 73, table 24 compared with diagram 10, according to which the mean lanceolate breadth is 0.9, and not (as stated in table 24) 1.1 cm.)

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