The Mesolithic Industries of Fienerode

A controlled restudy

*by Olaf H. Prüfer, Cleveland U.S.A.**

Introduction

The purpose of this paper is twofold. It aims at presenting some new mesolithic material from East Germany. Furthermore it attempts to compare this material to another collection from the same sites in order to establish to what extent two prehistorians working independently of each other on the same problem will arrive at similar conclusions. A biproduct of this comparative study is an evaluation of collecting techniques, demonstrating that independent random collections at a given set of sites may yield different tool assemblages which in turn influence each researcher's interpretation of the material.

The material upon which this study is based was collected by Wlost at the Fienerode dunes between 1931 and 1938. These dunes are located in the so-called F i e n e r B r u c h , near the village of Fienerode in the former province of Prussian-Saxony (now Halle-Merseburg), East Germany. Fienerode forms part of the district of Magdeburg, sub-district Jerichow II.

During early post-glacial times the Fiener Bruch was a shallow lake. Toward the end of the Boreal period this lake began to desiccate. Thus, at the beginning of the Atlantic period the former lake had become a swamp dotted with numerous dunes, sluggish channels, and numerous groves of beech trees. During this time the dunes were inhabited by mesolithic hunters. Swamp conditions continued to prevail until the late 18th century A. D. when Frederick the Great of Prussia undertook the drainage of the Fiener Bruch.

Wlost visited the sites at twelve different occasions collecting and saving "... on principle everything, artifacts flakes and débitage. Included in this are cores, broken and chipped fragments of flint, and soil samples" (Fienerode correspondence, Aug. 8, 1957). Several years after the end of World War II, Wlost succeeded, under very adventurous circumstances, in transferring his extensive prehistoric collections to West Germany, where he sold them to the Germanische Nationalmuseum in Nuremberg.

In 1934 Bicker published a detailed monograph on the mesolithic industries of Fienerode. He too, collected on a random, non-selective basis. Wlost and Bicker do not seem to have been acquainted.

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* Diese Arbeit wurde vom Verf. 1957 in Nürnberg für die American School of Prehistoric Research durchgeführt. Sie erscheint deshalb in englischer Sprache. Eine mehr als üblich umfangreiche deutsche Zusammenfassung ist ihr indes S. 60 angefügt. Der Herausgeber.

Bicker's publication (1934) and Wlost's collections and data are the two sources upon which this study is based. Bicker (1934) deals with the finds from twenty-five dunes, many of which yielded very few artifacts. Wlost collected only at six dunes. Both collectors, however, have very substantial series of artifacts from two dunes numbered 5 and 6 by Bicker (1934). These are the sites chosen for analysis here.

The Sites

The mesolithic sites of Fienerode are all located on dunes within the Fiener Bruch. Dunes 5 and 6 are separated from each other by two miles of turf land. Bicker (1934)[1] gives no information regarding the physical nature of the dunes. Wlost (Fienerode correspondence, Aug. 8, 1957) states that every dune inspected by him is a plain sand dune, apparently without an internal nucleus of gravel or some other soil configuration.

Dune 5 is quite large and fairly high. At the time of Wlost's visits it measured approximately 130 by 65 feet. The maximum height was 18 feet. The sand was white. Dune 6 is described as being "... extremely low, circa 2 feet above the surrounding swamp" (Fienerode correspodence, Aug. 8, 1957). It covers an area of approximately 260 by 50 feet. The sand here is brown in color, apparently due to a substantial admixture of humus. For this reason, and because the artifacts from the site show a distinctive brown patina, Wlost refers to Dune 6 frequently as the 'brown dune'. It should be noted that the artifacts from all other Fienerode sites show the characteristic grey color of nordic flint which commonly occurs in the moraines of the region.

Method of Analysis

Bicker's (1934) method of analyzing the tool assemblages from Fienerode is detailed but not very satisfactory. He classifies his finds into flakes, flake-blades, blades, cores, rejects etc., without specifically paying attention to well-known, standardized, and defineable tool-types. Thus end-scrapers on blades are hidden among his various kinds of blades, while burins may occur just about anywhere in his classification. It is difficult and at times impossible to find out how many tools of any given traditional type are actually represented. They are often, as it were, 'submerged' in the super-types and their quite meaningless subdivisions. These subdivisions, in turn, are defined by their forms and supposed technological attributes, rather than by any standardized and accepted typological scheme. Thus, Bicker has developed such 'subtypes' as 'medium-sized blades with short diagonal working edge', a category which, among other things, includes burins. Ordinary retouched blades may be hidden in any number of categories such as 'blades with lateral working edge' or 'dreikanters' etc.; yet these same categories often include a variety of other tools. In this cumbersome manner Bicker has defined many non-existent types, while at the same time,

[1] Bicker, F.-K., Dünenmesolithikum aus dem Fiener Bruch. Jahresschrift für Vorgeschichte der Sächsisch-Thüringischen Länder, 22. Halle 1934.

Code No.	Dune 5		Dune 6		Tool Types
	Wlost	Bicker	Wlost	Bicker	
1	1 468	122	664	29	Plain blades
2	14	145	33	18	Retouched blades, dorsal
3	5	—	15	—	Retouched blades, ventral
4	—	—	2	—	Retouched blades, dorsal-ventral
5	11	14	16	1	Notched blades
6	1	5	31	4	Retouched and pointed blades
7	—	2	8	3	Backed blades
8	—	13	—	—	Truncated, terminally retouched blades
9	—	5	3	—	Truncated, terminally notched blades
10	40	64	79	22	Endscrapers on blades, simple
11	2	1	10	—	Endscrapers on blades, double
12	15	38	20	9	Round scrapers on flakes
13	—	5	2	1	Twists
14	12	9	53	6	Burins on blades
15	5	47	36	7	Burins on flakes
16	11	10	25	3	Burins on core fragments
17	—	—	17	—	Flakes with prepared striking platforms
18	68	670	50	116	Retouched flakes and flint fragments
19	—	3	1	1	Tanged points
20	92	356	105	112	Unutilized cores
21	73	160	147	19	Utilized cores
22	1	14	15	4	Flaked core axes ('Kernbeil')
23	—	13	1	6	Choppers
24	2	3	2	1	Discoidals
25	—	39	5	3	Polyhedrical chunks of flint
26	8	17	3	5	Symmetrical triangles
27	12	72	2	2	Asymmetrical triangles
28	1	—	1	—	Triangles with straight base
29	10	48	2	—	Triangles with inturned base
30	16	15	3	1	Lunates
31	94	52	7	3	Pointed micro-blades
32	1	—	—	—	Same as no. 30 but with retouched base
33	16	155	2	8	Unfinished or indeterminate microliths
34	6	38	—	3	Micro-burins
35	—	14	—	1	Trapezes
	1 984	2 150	1 360	388	Total

Typological analysis of the industries from Fienerode Dunes 5 and 6.

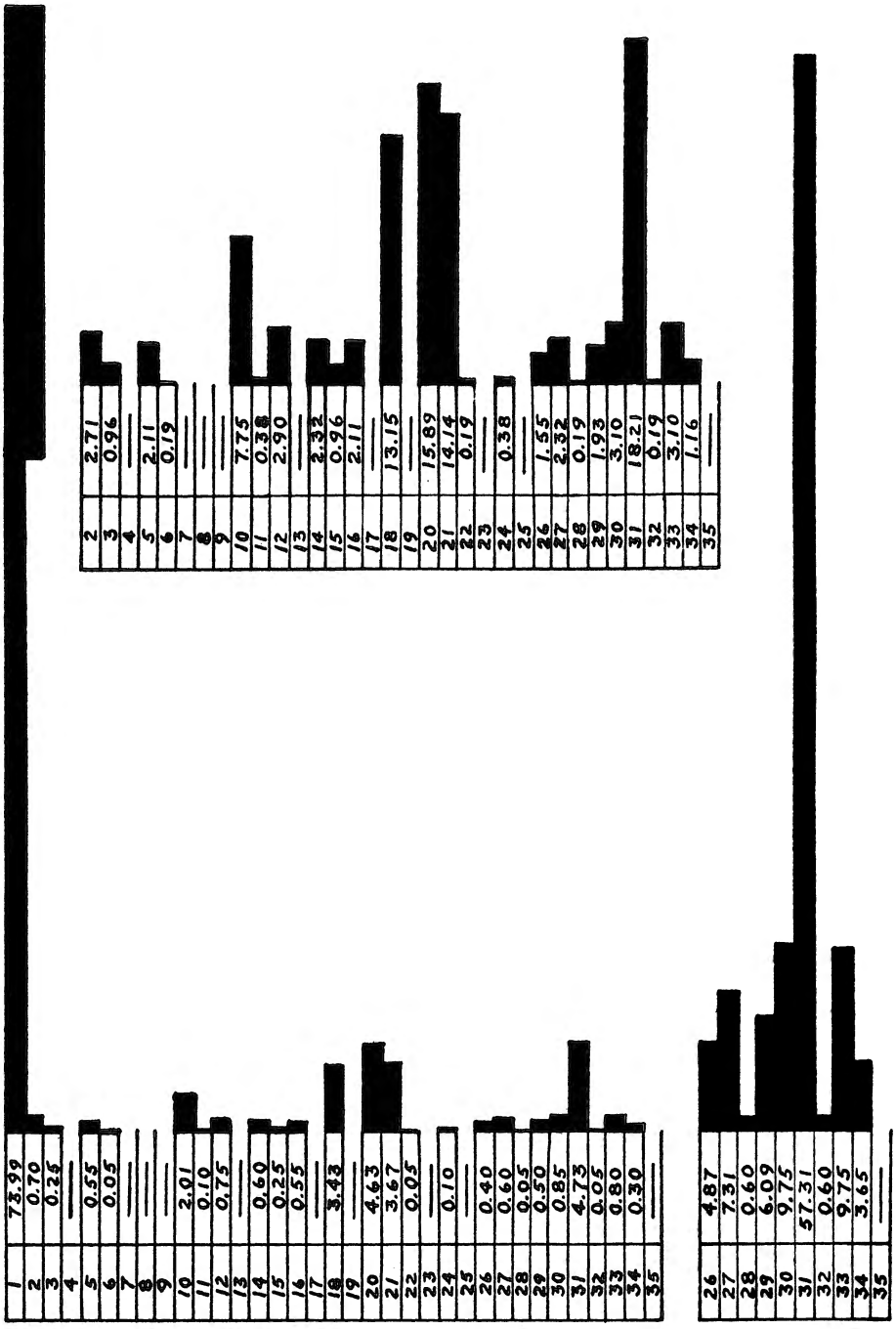

Fig. 1. Histogram for Dune 5, Wlost collection.

he neglected to define existing ones such as burins, end-scrapers on blades, and retouched blades – to mention only a few.

Thus, much of Bicker's material had to be re-analyzed by this writer according to a more objective scheme. Fortunately Bicker's decriptions and numerous illustrations are, on the whole, very detailed and complete. Nonetheless, this re-analysis must be accepted with some caution because it may well be that some tools, such as ventrally retouched blades for instance, have remained undetected in Bicker's typological classification.

Except for the statement that large quantities of débitage were collected, Bicker gives no precise quantitative data on this point. His analysis by tool dimensions is restricted to a non-quantitative classification in terms of large, medium-sized, and small artifacts.

The present writer's typological system attempts to be as objective as possible. It is guided by the maxim that only clearly defineable, recurrent forms are acceptable as types. Refined sub-divisions, which may lend themselves to debate as to their validity, have been avoided because of their subjective nature.

The Wlost collection has been grouped in dimensional categories of 2 centimeters, in order to establish whether or not a significant difference exists between the industries of Dunes 5 and 6. The resultant comparative tables have then been statistically analyzed by means of a chi-square in order to ascertain the level of significance of the dimensional differences. Because of the incomplete data, this could not be done with the Bicker collection.

The table on page 33 shows the range and quantitative distribution of tool types from Dunes 5 and 6 in the Wlost and Bicker collections.

The Industry of Dune 5

The total assemblage from Dune 5 in the Wlost collection consists of 14,280 specimens. 1,984 of these are artifacts and deliberately retouched débitage; 12,296 are plain débitage. 144 artifacts and 1,710 rejects show the craquelé effect of having been exposed to fire. The predominant flint raw material is grey nordic flint. A very few specimens in the débitage show light brown patination.

The size range of the artifacts in groups of 2 centimeters is as follows:

0—2	2—4	4—6	6—8
469	1 426	85	4

The débitage has not been measured in detail, but it was noted that on the whole its dimensions are larger than those of the artifacts. Many specimens exceed 10 centimeters in length.

The Bicker collection from Dune 5, as re-analyzed by this author, consists of 2,150 artifacts.

Plain Blades:

Fig. 5: 5—12.
Wlost: 1468.
Bicker: 122.
Plain blades are the most common single tool type in the Wlost collection. They are well-made. In the Bicker series they are not common.

Retouched Blades, dorsal:

Fig. 5: 4.
Wlost: 14.
Bicker: 145.
These tools are carelessly worked. Consecutive retouch is virtually non-existent. Both heavy, and fine nibbled retouch flaking occurs. The Bicker series may include ventrally and dorsal-ventrally retouched specimens.

Retouched Blades, ventral:

Wlost: 5.
Bicker: —.
These small tools have consecutive nibbled flake scars along one edge ef the lower face. If they exist in Bicker's series they are unidentifiable and may be hidden among the dorsally retouched blades of this classification.

Retouched Blades, dorsal-ventral:

Wlost: —.
Bicker: —.
For comment on possible tools of this kind in Bicker's series, see previous category.

Notched Blades:

Fig. 5: 19.
Wlost: 11.
Bicker: 14.
All specimens of this series in the Wlost collection are dorsally notched. The notches are of varying sizes; they are tidily flaked. No double-notching has been noted. All except one specimen are made on plain, unretouched blades. Two cases suggest that they were intended for the manufacture of geometric microliths.

Retouched and Pointed Blades:

Wlost: 1.
Bicker: 5.
Contrasted with Dune 6 the scarcity of this type is noteworthy.

Backed Blades:

Wlost: —.
Bicker: 2.
Bicker also calls these Gravette blades. For description see Dune 6.

Truncated, Terminally Notched Blades:

Wlost: —.
Bicker: 5.
For description see Dune 6.

End-scrapers on Blades, simple:

Fig. 5: 18.
Wlost: 40.
Bicker: 64.
This series in the Wlost collection is carelessly worked. Really good forms are rare. Some specimens are little more than blades with finely flaked ends. Thick and thin specimens occur. All are remarkably short. The Bicker series may include some double-ended specimens that could not be identified. The illustrated Bicker specimens are much better made than those in the Wlost collection.

End-scrapers on Blades, double:

Fig. 5: 14.
Wlost: 2.
Bicker: 1.
The specimen from the Bicker collection listed here is illustrated; only for that reason could it be identified. More specimens may be hidden among the simple end-scrapers.

Round Scrapers on Flakes:

Fig. 5: 13.
Wlost: 15.
Bicker: 38.
Except for a few very good specimens these artifacts are untidy and fairly amorphous. In some cases the functional, retouched end covers the entire circumference, in others this is only partial.

Twists:

Wlost: —.
Bicker: 5.
For description see Dune 6.

Burins on Blades:

Fig. 5: 2.
Wlost: 12.
Bicker: 13.
Most of these are made on rather poor blades. The burins vary from very fine and delicate to coarse and crude. On the whole the impression is that of an untidy set of artifacts. The types represented in the Wlost collection are:
a) angle burins (simple): 6
b) burins on the angle of blades (simple): 3
c) becs-de-flute (simple): 3.

Burins on Flakes:

Fig. 5: 3.
Wlost: 5.
Bicker: 47.
All specimens in the Wlost collection are on relatively small flakes. The burin blows are tidy and well-defined. Types represented are:
a) angle burins (simple): 1
b) angle burins (polyhedrical): 1
c) transverse burin (polyhedrical): 1

d) bec-de-flute (simple): 1
e) double-ended burins: 1
Note the large number of burins on Flakes in the Bicker series.

Burins on Core Fragments: Fig. 5: 1.
Wlost: 11.
Bicker: 10.
This series consists of rather coarse artifacts which lies in the nature of the core fragments utilized. They also render typological subdivisions meaningless.

Flakes with Prepared Striking Platforms: Wlost: —.
Bicker: —.
For description see Dune 6.

Retouched Flakes and Flint Fragments: Wlost: 68.
Bicker: 670.
This series includes all flakes and flint fragments with deliberate retouch flaking or incontrovertible signs of having been utilized. The retouch is generally fine, nibbled rather than heavy. None of the specimens is a clearly defineable tool type. Note the large number of specimens in the Bicker series.

Tanged Points: Wlost: —.
Bicker: 3.
For description see Dune 6.

Unutilized Cores: Wlost: 92.
Bicker: 356.
Essentially three kinds of cores could be identified. Pyramidal, cylindrical, and non-descript cores. Sometimes the pyramidal forms have blade scars all around, sometimes only half-way around the circumference. The same applies to the cylindrical cores which are often alternately flaked. All these are blade cores. The non-descript cores are occasionally blade cores; more often flakes have been removed from them. On the whole the Bicker cores are similar to those of the Wlost collection. Note the large number of specimens in the Bicker series.

Utilized Cores: Fig. 5: 15—16.
Wlost: 73.
Bicker: 160.
These are cores, frequently of the regular-shaped pyramidal kind, which show signs of retouch working. Some of them, especially the pyramidal ones, seem to have been used as planers.

Flaked Core Axes ('Kernbeil'):

Fig. 6: 29.
Wlost: 1.
Bicker: 14.
Grouped in this series are true core-axes of mesolithic type and picks. They have been lumped because only the „type" specimens can be defined. There is a series of transitional forms which may either be classed as core-axes or picks. The Wlost specimen is an axe. Fragmentary.

Choppers:

Wlost: —.
Bicker: 13.
For description see Dune 6.

Discoidals:

Fig. 5: 17.
Wlost: 2.
Bicker: 3.
These are round disc-shaped flakes or cores which are more or less concentrically flaked on both faces.

Polyhedrical Chunks of Flint:

Wlost: —.
Bicker: 39.
For description see Dune 6.

Symmetrical Triangles:

Fig. 6: 20—21.
Wlost: 8.
Bicker: 17.
These geometric microliths are isoceles triangles where the sides are shorter than the base. The base is unretouched. Well-made.

Asymmetrical Triangles:

Fig. 6: 22—24.
Wlost: 12.
Bicker: 72.
These geometric microliths are scalene triangles where the sides are shorter than the base. The base is unretouched. Well-made.

Triangles with Straight Base:

Wlost: 1.
Bicker: —.
These geometric microliths are isoceles triangles where the sides are shorter than the base. The base and one side are retouched. Well-made.

Triangles with Inturned Base:

Fig. 6: 27.
Wlost: 10.
Bicker: 48.
These geometric microliths are triangles with either an inturned base (in the case of isoceles triangles where the base is shorter than the sides), or with the shorter side being inturned (in the case of the asymmetrical, scalene

forms). There seems no functional difference between the two. Both types occur in the Wlost and Bicker series. Well-made.

Lunates:

Fig. 6: 25—26.
Wlost: 16.
Bicker: 15.
These geometric microliths are half-moon shaped. The arc is retouched. Some specimens are poorly made.

Pointed Micro-blades:

Fig. 6: 28, 31—33.
Wlost: 94.
Bicker: 52.
These tools, made in the microlithic tradition are small more or less obliquely truncated and finely retouched blades. The base is unretouched. They have a wide range of sub-forms, including Zonhoven points, types with parallel sides, types with pointed but unretouched base, types with straight base, etc. In all cases the aim was a pointed working end; in no case are the sides or bases retouched. These tools are probably projectile points.

Pointed Micro-blade with Retouched Base:

Wlost: 1.
Bicker: —.
This well-made unique specimen has a straight, delicately retouched base. Otherwise it is similar to the previous category.

Unfinished or Indeterminate Micro-forms:

Wlost: 16.
Bicker: 155.
This series is a catch-all for a number of clearly microlithic but undefineable forms, and for some obviously unfinished triangles etc. The great quantitative difference between Bicker and Wlost should be noted.

Micro-burins:

Fig. 6: 30.
Wlost: 6.
Bicker: 38.
These biproducts of the manufacture of geometric microliths are poorly represented in the Wlost collection of either dune.

Trapezes:

Wlost: —.
Bicker: 14.
These geometric microliths with two retouched shorter sides do not occur in the Wlost series of either dune.

Truncated and Terminally Retouched Blades:

Wlost: —.
Bicker: 13.
These specimens have straight, not oblique, truncations. The truncations are retouched. Not represented in Wlost collection of either dune.

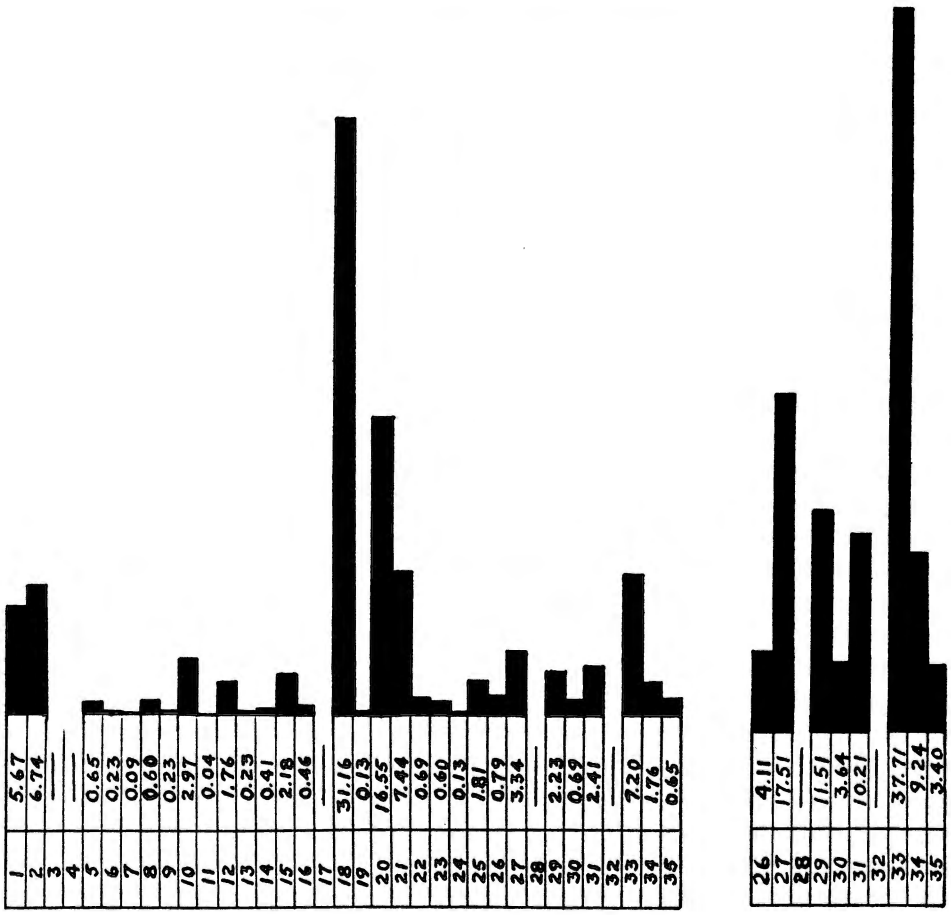

Fig. 2. Histogram for Dune 5, Bicker collection.

The Industry of Dune 6

The total assemblage from Dune 6 in the Wlost collection consists of 5,281 specimens. 1,360 of these are artifacts and deliberately retouched débitage; 3,921 specimens are plain débitage. 45 artifacts and 211 rejects show the craquelé effect of having been exposed to fire. The raw material is nordic grey flint. The vast majority of all specimens exhibits light to deep brown patination.

The size range of the artifacts in groups of 2 centimeters is as follows:

0—2	2—4	4—6	6—8	8—10	10—12
35	736	496	77	13	3

The débitage has not been measured in detail, but it was noted that, just as in the case of Dune 5, its dimensions somewhat exceed those of the artifacts. There seems to be no significant difference between the débitage sizes of the two dunes.

The Bicker collection from Dune 6, as re-analyzed by this author, consists of 388 artifacts.

Plain Blades:
Fig. 7: 34—40, 61.
Wlost: 664.
Bicker: 29.
They represent the most common single tool type in the Wlost collection. Well-made. Note their scarcity in the Bicker series.

Retouched Blades, dorsal:
Fig. 7: 49.
Wlost: 33.
Bicker: 18.
Nibbled retouch dominates this series. However, fairly heavy marginal retouch is quite conspicuous. The blades are on the whole well-made and well-retouched. They are rather heavy. Consecutive retouch is more common here than at Dune 5. For Bicker series see comments under Dune 5.

Retouched Blades, ventral:
Fig. 10: 69.
Wlost: 20.
Bicker: —.
For description and comments see Dune 5.

Retouched Blades, dorsal-ventral:
Wlost: 2.
Bicker: —.
These specimens have consecutive nibbled retouch flaking on alternating edges of both faces. If they occur in the Bicker series they are hidden among his various retouched forms.

Notched Blades:
Fig. 10: 68.
Wlost: 16.
Bicker: 1.
See comments under Dune 5. Two specimens are ventrally notched.

Retouched and Pointed Blades:
Fig. 8: 58—60.
Wlost: 31.
Bicker: 4.
This series includes both retouched pointed blades and obliquely truncated and retouched blades. Both forms point toward the same function. All specimens in the Wlost collection are made on large blades.

Backed Blades:
Fig. 8: 50—52.
Wlost: 8.
Bicker: 3.
These are remarkably well-made, delicate, rather long blades with steep backing retouch flaking. Bicker calls them Gravette blades.

Truncated, Terminally Notched Blades:
Fig. 8: 56—57.
Wlost: 3.
Bicker: —.
The function of these curious tools is not clear.

End-scrapers on Blades, simple:
Fig. 8: 53—55.
Wlost: 79.
Bicker: 22.
Contrasted with the specimens in the Wlost collection from Dune 5, those from Dune 6 are very well made. One specimen has the scraping end applied ventrally. Few have genuine lateral retouch. For Bicker series see Dune 5.

End-scrapers on Blades, double:
Wlost: 10.
Bicker: —.
For both, Bicker and Wlost, see Dune 5.

Round Scrapers on Flakes:
Fig. 10: 67.
Wlost: 20.
Bicker: 9.
For both, Bicker and Wlost, see Dune 5.

Twists:
Fig. 7: 46.
Wlost: 2.
Bicker: 1.
These tools are made on blades, one end of which symmetrically comes to a point as a result of retouching on one half of the upper, and one half of the lower face.

Burins on Blades:
Fig. 7: 48; 11: 78—82, 84.
Wlost: 53.
Bicker: 6.
These tools are made on better defined blades than their counterparts from Dune 5. The types represented in the Wlost colection are:
a) angle burins (simple): 23.
b) burins on the angle of blades (simple): 10.
c) burins on the angle of flakes (simple): 7.
d) becs-de-flute (simple): 8.
e) becs-de-flute (polyhedrical): 3.
f) double-ended burins: 8.

Burins on Flakes:
Fig. 11: 76—77, 83, 85.
Wlost: 36.
Bicker: 7.
For descriptions and comments see Dune 5. The types represented in the Wlost collection are.
a) angle burins (simple): 10.
b) angle burins (polyhedrical): 1.
c) burins on the angle of flakes (simple): 7.
d) burins on the angle of flakes (polyhedrical): 4.

e) transverse burins (simple): 3.
f) transverse burins (polyhedrical): 1.
g) becs-de-flute (simple): 2.
h) becs-de-flute (polyhedrical): 1.
i) double-ended burins: 7.

Burins on Core Fragments:
Wlost: 25.
Bicker: 3.
Same as Dune 5.

Flakes with Prepared Striking Platforms:
Fig. 10: 66.
Wlost: 17.
Bicker: —.
This is a very curious series of tools. The flakes are made in the Levallois tradition. All specimens are quite large. If they occur in the Bicker series, they must be hidden or classed among the unlisted débitage.

Retouched Flakes and Flint Fragments:
Wlost: 50.
Bicker: 117.
For descriptions and comments see Dune 5.

Tanged Points:
Fig. 7: 41.
Wlost: 1.
Bicker: 1.
The specimens in both collections and at both dunes belong to the curiously amorphous group of tanged points common in the northern and eastern European mesolithic.

Unutilized Cores:
Wlost: 105.
Bicker: 112.
For descriptions and comments see Dune 5. Note the unusually high proportion of these cores in Bicker's series if compared with his total number of tools.

Utilized Cores:
Fig. 10: 71, 74—75.
Wlost: 147.
Bicker: 19.
For descriptions and comments see Dune 5.

Flaked Core Axes ('Kernbeil'):
Fig. 9: 62—64; 10: 65.
Wlost: 15.
Bicker: 4.
For description and comments see Dune 5. These artifacts are quite massive, a factor that is poorly expressed in the drawings.

Choppers:
Wlost: 1.
Bicker: 6.
These tools are bifacially worked nodules of flint. The working edge exhibits alternate flaking; the butt is

usually heavy. Sometimes these tools are vaguely heart-shaped, resembling tiny hand-axes. But this resemblance is, of course, fortuitous. In Bicker's descriptions are figured many such tools, especially at Dune 5, but only those which are indubitably choppers have been included in the re-analysis. The other specimens are almost certainly flake cores.

Discoidals:
Fig. 10: 70.
Wlost: 2.
Bicker: 1.
For descriptions and comments see Dune 5.

Polyhedrical Chunks of Flint:
Wlost: 5.
Bicker: 3.
These are massive chunks of flint chipped all around the surfaces, thus giving them a roughly polygonal shape. They are crude; they are not cores but purposeful tools. Bicker suggests they may have served as sling-shot.

Symmetrical Triangles:
Fig. 7: 43—44.
Wlost: 3.
Bicker: 5.
For descriptions and comments see Dune 5.

Asymmetrical Triangles:
Fig. 7: 42, 47.
Wlost: 2.
Bicker: 2.
For descriptions and comments see Dune 5.

Triangles with Straight Base:
Wlost: 1.
Bicker: —.
For descriptions and comments see Dune 5.

Triangles with Inturned Base:
Fig. 7: 45.
Wlost: 2.
Bicker: —.
For descriptions and comments see Dune 5.

Lunates:
Wlost: 3.
Bicker: 1.
For descriptions and comments see Dune 5.

Pointed Micro-blades:
Fig. 10: 72—73.
Wlost: 7.
Bicker: 3.
For descriptions and comments see Dune 5.

Pointed Micro-blade with Retouched Base:
Wlost: —.
Bicker: —.
For descriptions and comments see Dune 5.

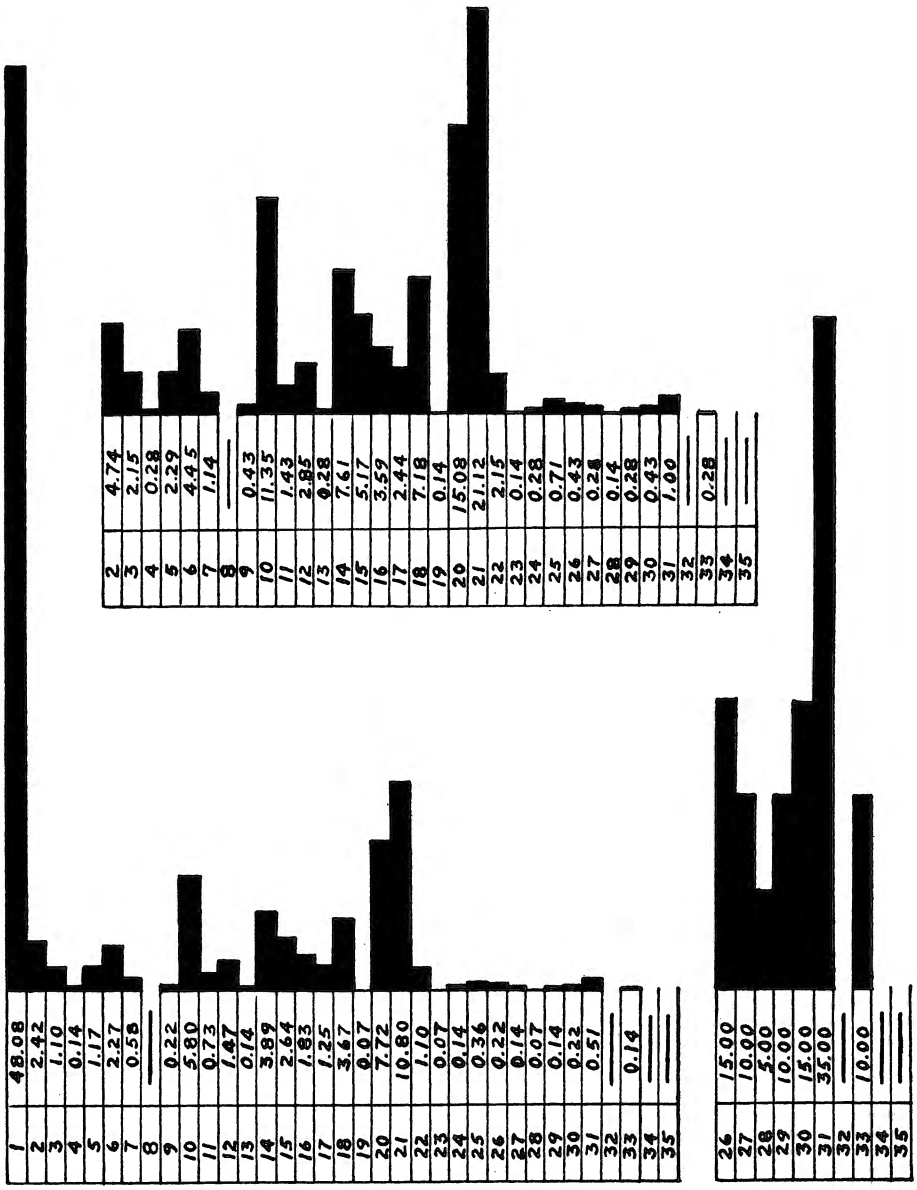

Fig. 3. Histogram for Dune 6, Wlost collection.

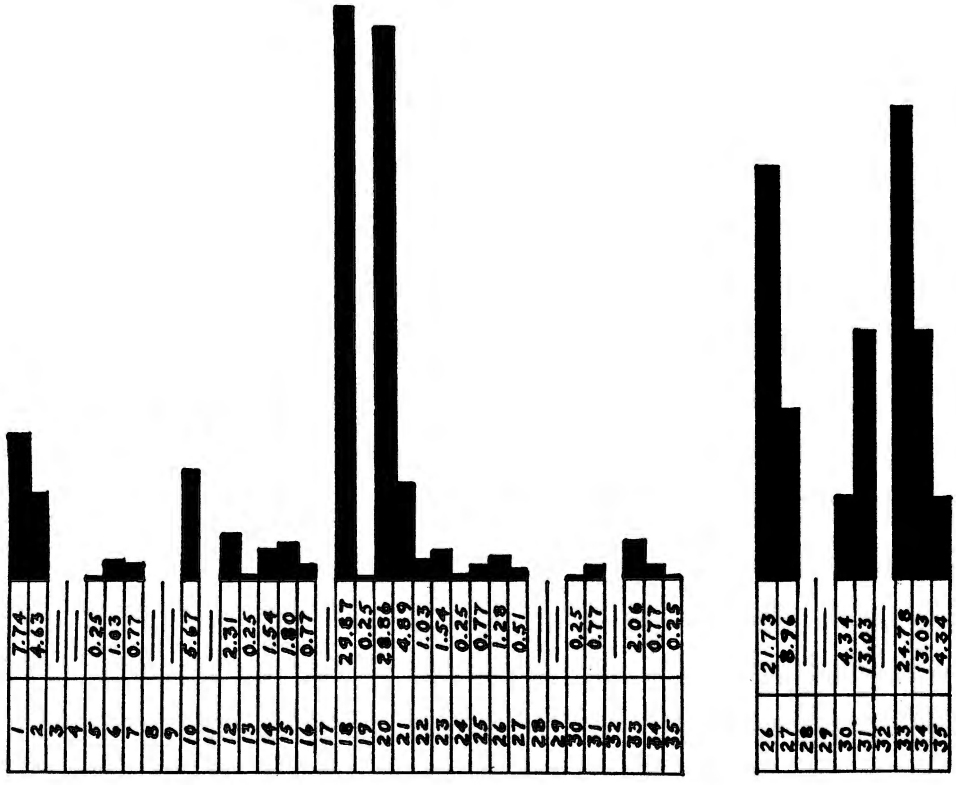

Fig. 4. Histogram for Dune 6, Bicker collection.

Unfinished or Indeterminate Micro-forms:	Wlost: 2. Bicker: 8. For descriptions and comments see Dune 5.
Micro-burins:	Wlost: —. Bicker: 3. The fact that the Wlost collection does not contain this type must be accidental, it is a necessary biproduct of the microlithic technique.
Trapezes:	Wlost: —. Bicker: 1. For descriptions and comments see Dune 5.
Truncated and Terminally Retouched Blades:	Wlost: —. Bicker: —. For descriptions and comments see Dune 5.

Discussion

It should be stated at the outset that this paper makes no attempt to re-examine the cultural affiliations of the Fienerode industries from Dune 5 and 6 within the northern and eastern European mesolithic complex. This author is quite satisfied that within broad limits the industries from Dunes 5 and 6 belong into a discreet cultural horizon of the mesolithic. What is intended here, is to find out to what extent the industries from the two dunes are identical within this cultural horizon.

Bicker states that "... Dune 6 would be culturally different from Dune 5 if the former had types which do not occur on Dune 5 despite the quantitative wealth of that site. But if the material of Dune 6 is similar to that of Dune 5, then we can conclude, in my opinion, that we have here the same culture and the same temporal position, even if certain types of tools are absent [at Dune 6] which were noted at Dune 5" (1934:83). After reviewing the evidence, he comes to the conclusion that "... it is absolutely certain ... that Dune 6 has yielded not a single tool type that is not known from Dune 5 as well. In view of this great agreement between the industries I cannot but declare: Dune 6 represents the same culture as Dune 5" (1934:95).

Whatever discrepancies do exist between the two industries Bicker readily explains. The curious size differences between the tools from Dunes 5 and 6 he attributes to the supposed fact that the inhabitants of the latter dune had bigger flint nodules at their disposal. Seeming typological differences, Bicker believes, reflect the greater scarcity of material on Dune 6, a factor that has also been noted by Wlost.

The remainder of this paper will be devoted to a discussion of the similarities and differences between the two sites as revealed by statistical operations. First, however, two observations made by Wlost and Bicker have to be considered. They both have noted the fact that the artifacts of Dune 6 show various degrees of brown patination. None of the other dunes of Fienerode exhibits this feature. How can it be explained? Bicker simply states that the flint material from Dune 6 is yellow-brown without offering an explanation. This writer, upon close examination, came to the conclusion that the flint from Dune 6 is of the same kind as that of the other dunes. The difference is due to patination; the material is common grey nordic flint derived from local moraines. Many palaeolithic and later stone assemblages of Central Germany made of local grey nordic flint show various degrees of brown patination. This phenomenon has been discussed by Grahmann[2] (1955:531–32). He points out that this brown patination can not be correlated with age. It is the result of flint having been exposed to the effect of alternating ground water and ground air fluctuations in permeable sands or gravels. In the case of Dune 6 it must be remembered that the dune is exceedingly low. It was thus exposed to the ground water of the surrounding swamp. No doubt the dune was at times flooded. In this manner the artifacts may have acquired their brown patina. The other dunes, being much higher, were less

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[2] Grahmann, R.: *The Lower Palaeolithic site of Markkleberg and other Comparable Localities near Leipzig.* Trans. Amer. Phil. Soc., n. s. Vol. 45, pt. 6. Philadelphia.

exposed to ground water; hence the flint material found on them had retained its original grey color.

The second observation made by Wlost and Bicker, and confirmed by this writer concerns the difference in size of the artifacts from Dunes 5 and 6. Those from Dune 6 are considerably larger than those from Dune 5. The explanation offered by Bicker does not explain this phenomenon, because the débitage from the two sites does not reflect a similar dimensional difference. In any case, Bicker's argument quoted earlier, seems unsound. Flint nodules and fragments from the moraines occur in great quantities all over the Fienerode region. The inhabitants of Dune 5 made smaller tools not because larger pieces of raw material were not available to them, but for some other reasons. It is not possible to establish these on the basis of the limited evidence from two sites, but the statistical evidence given below, indicates that the dimensional differences between the two industries are highly significant.

The assemblages from Dunes 5 and 6 were examined and compared in terms of two factors. One of these, as indicated, is dimensional, i. e. the tools were measured for their lengths and then subjected to a chi-square analysis[3]. The other factor involves the quantitative distribution of tool types occuring at the two dunes. The data derived from this analysis are plotted on histograms. Both, the Wlost and Bicker collections are thus graphically represented and compared.

The chi-square analysis of the two industries was carried out in three different ways. First the entire series comprising macro- and micro-forms was analysed in size groups of two centimeters. The hypothesis was that there is no difference between the dunes with regard to these size categories. The chi-square analysis shows that the probability of this being correct is considerably less than 0.01. Therefore there is a difference of considerable significance. The second chi-square was run on the macroforms from both dunes. All geometric microliths are excluded. The hypothesis is the same and the dimensions are grouped in categories of two centimeters. The result is similar to that obtained on the complete series. The chances that the hypothesis is correct are well below the 0.01 level. Therefore the observed size differences between the industries of the two dunes are significant. The final analysis was made on the geometric microliths from both sites. The sizes were grouped in categories of one centimeter. The chances that the hypothesis is correct are at the 0.30 level. Therefore the hypothesis must be accepted. There is no significant difference betwen the sizes of the microliths from Dunes 5 and 6.

It is obvious from these results that whatever caused the difference between the two industries in terms of size is not connected with the microlithic components.

The quantitative distribution of tool types plotted on histograms involves two series. One covers the Wlost collections, the other the material found by Bicker as re-analyzed by the present author. The comparisons made between the industries can best be discussed in the following manner. First the assemblages from the two dunes

[3] The quantity chi-square ($\varkappa^2$) is calculated by means of the formula $\varkappa^2 = \Sigma \frac{E}{(O-E)^2}$ where O equals the observed and E the expected frequencies.

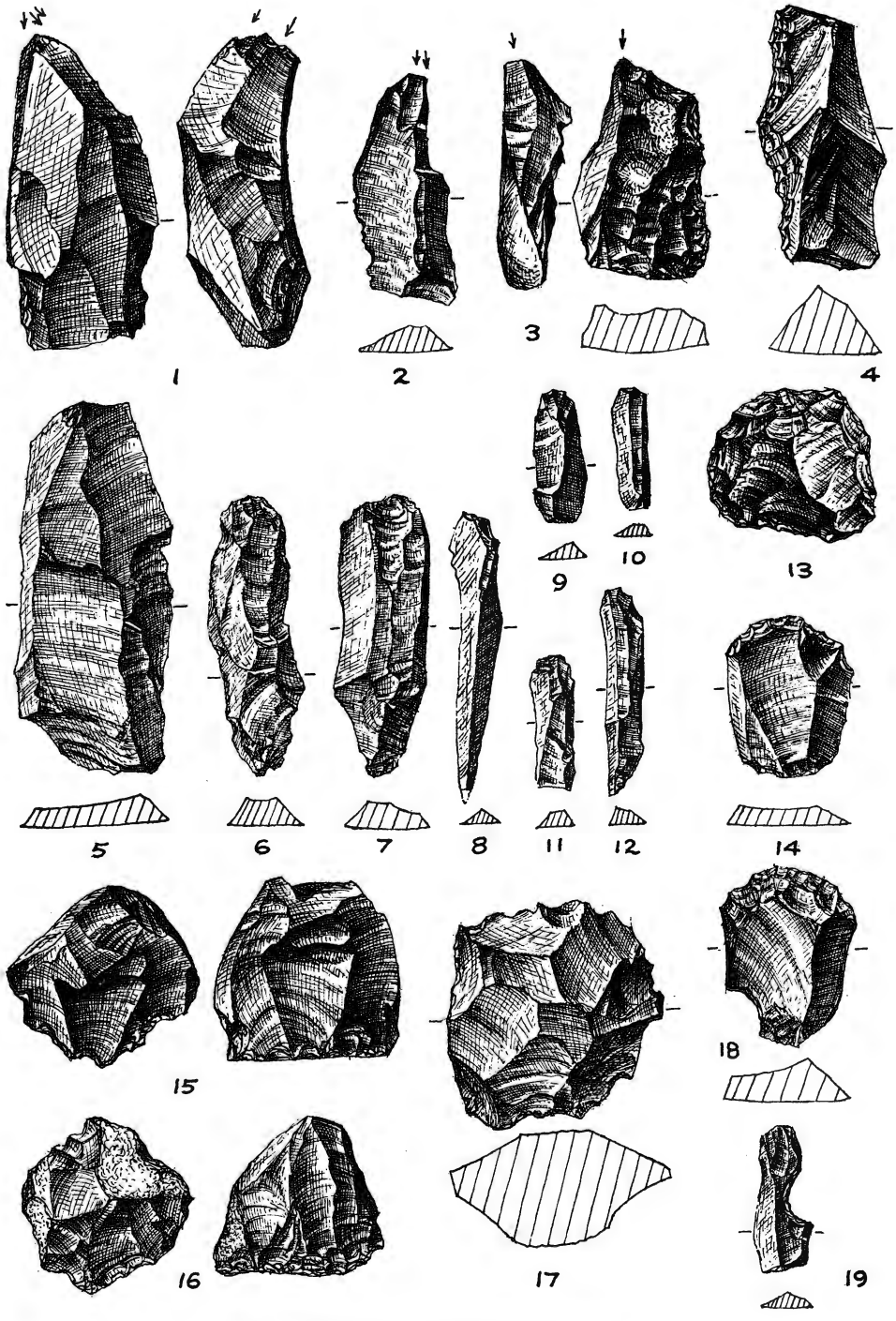

Fig. 5. Artifacts from Fienerode, Dune 5. 1/1.

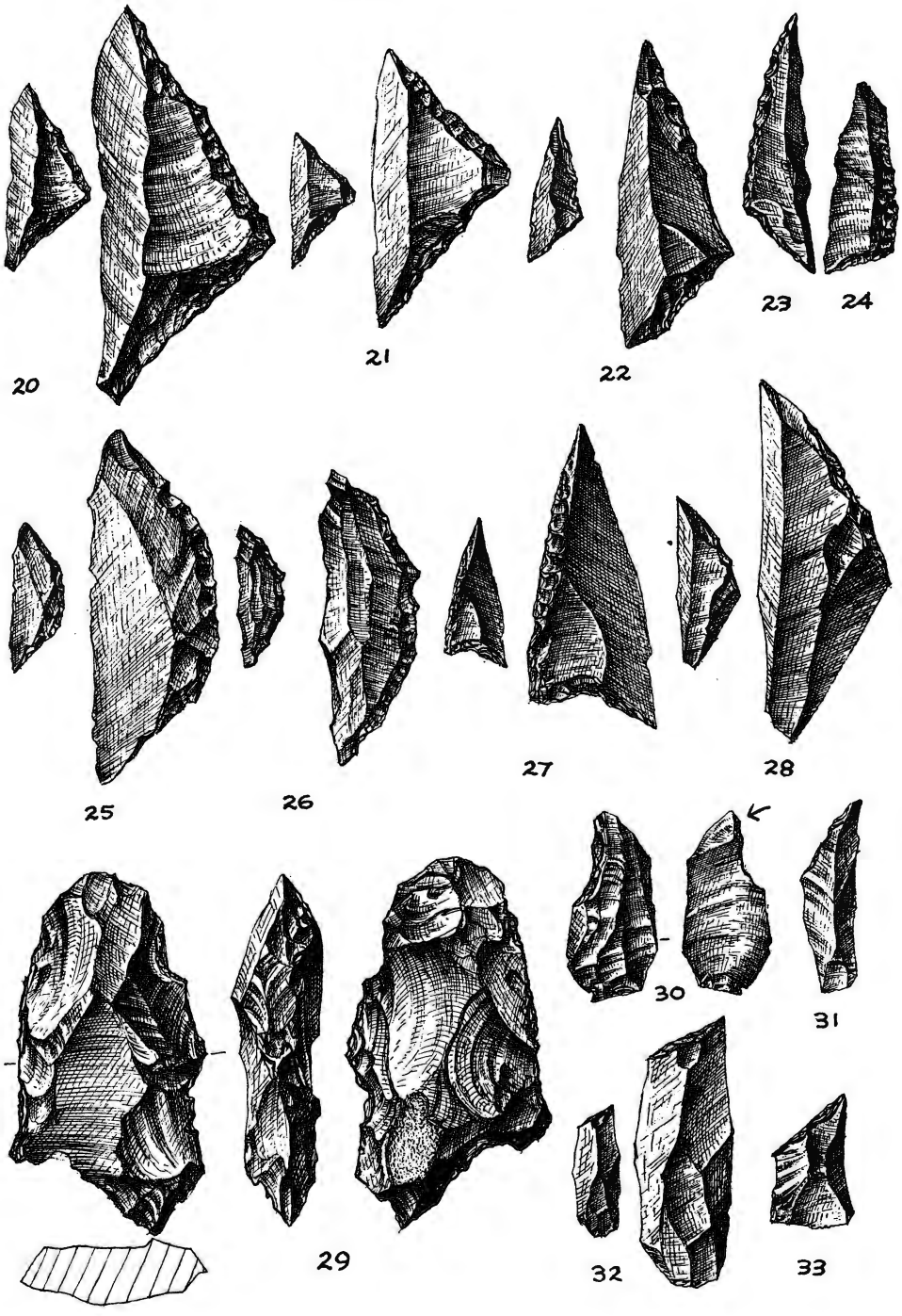

Fig. 6. Artifacts from Fienerode, Dune 5. 1/1; 20a, 21a, 22a, 25a, 26a, 27a, 28a = 2/1 n. Gr.

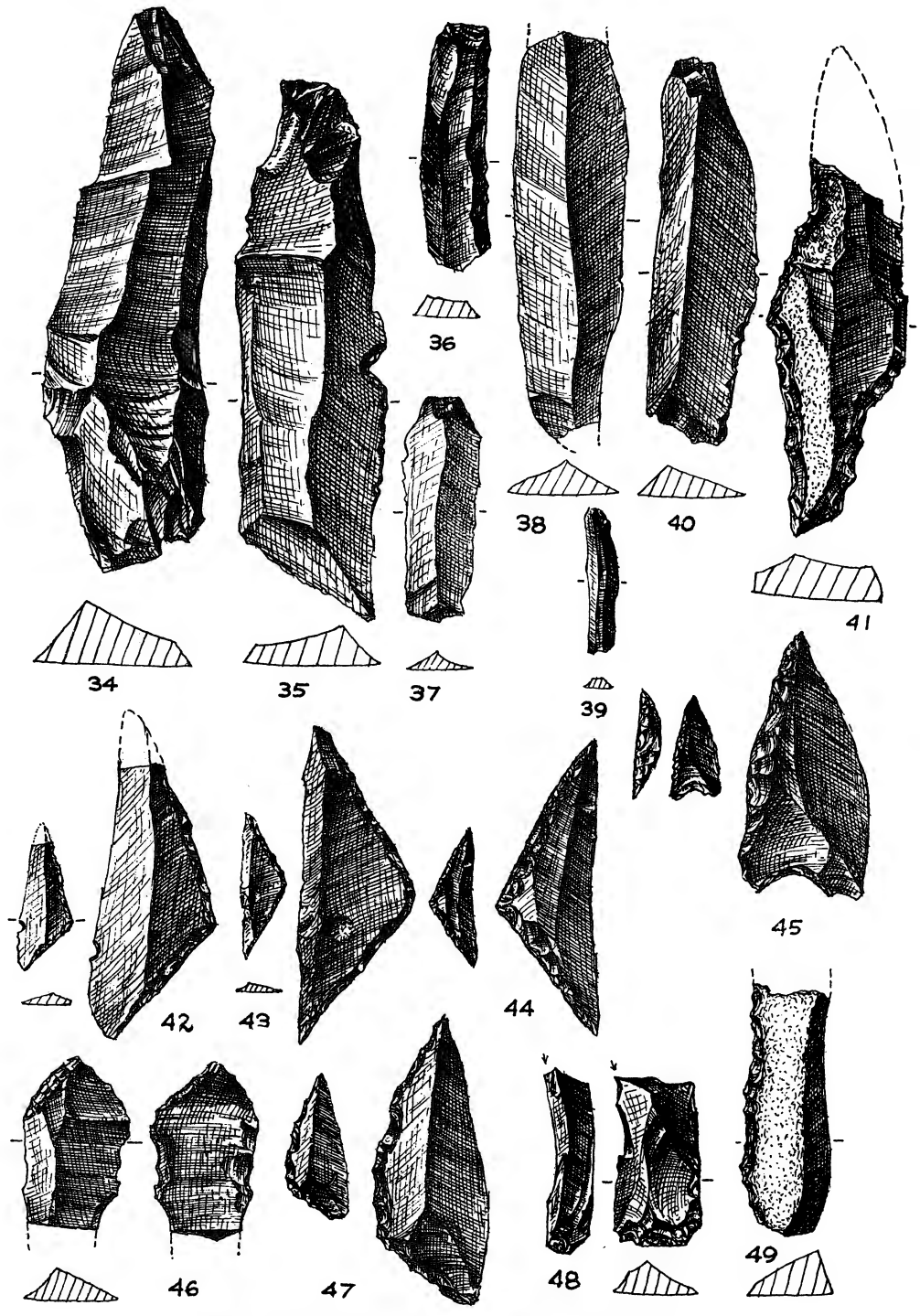

Fig. 7. Artifacts from Fienerode, Dune 6. 1/1; z. T. 2/1.

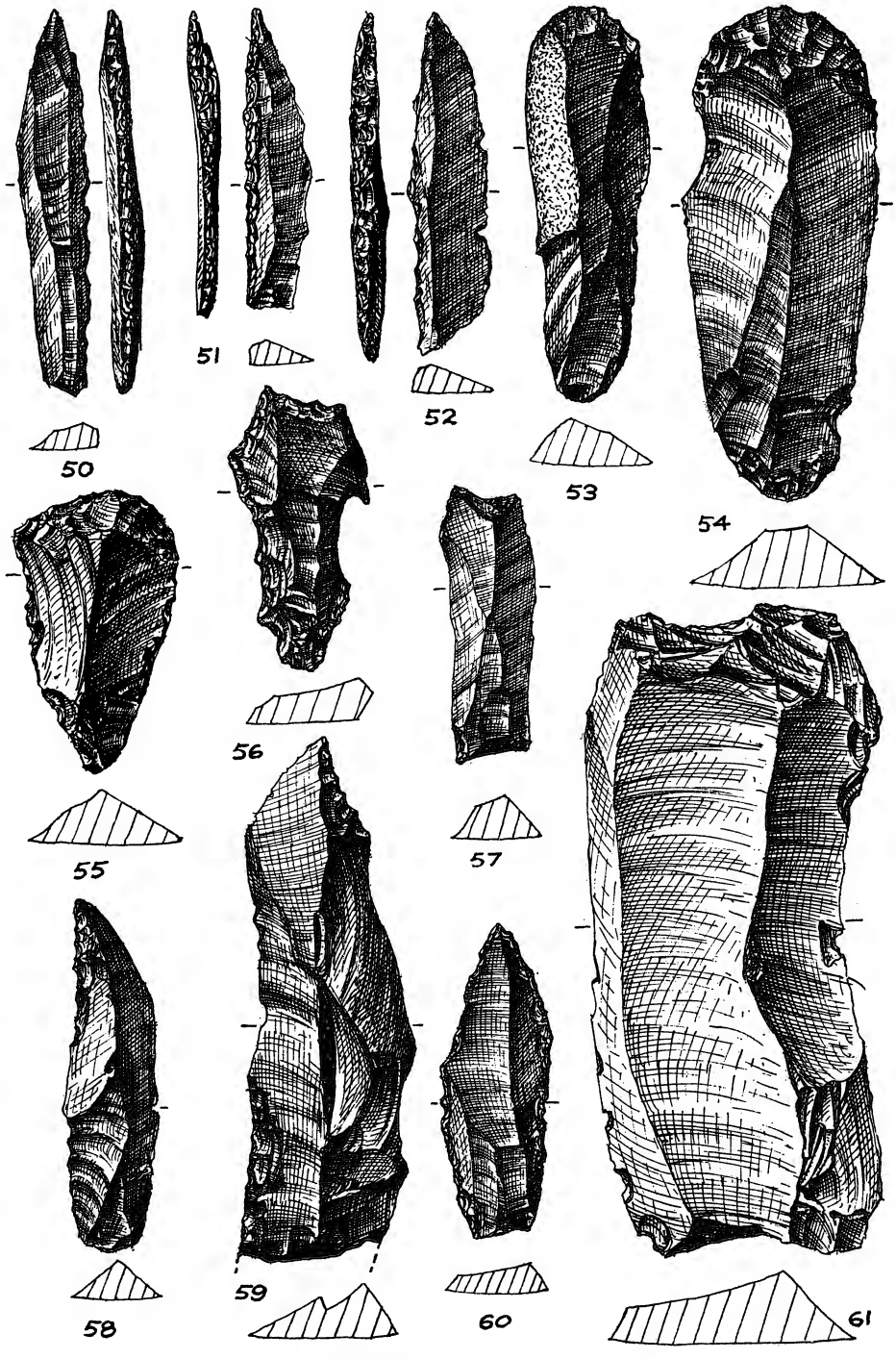

Fig. 8 Artifacts from Fienerode, Dune 6. $^1/_1$.

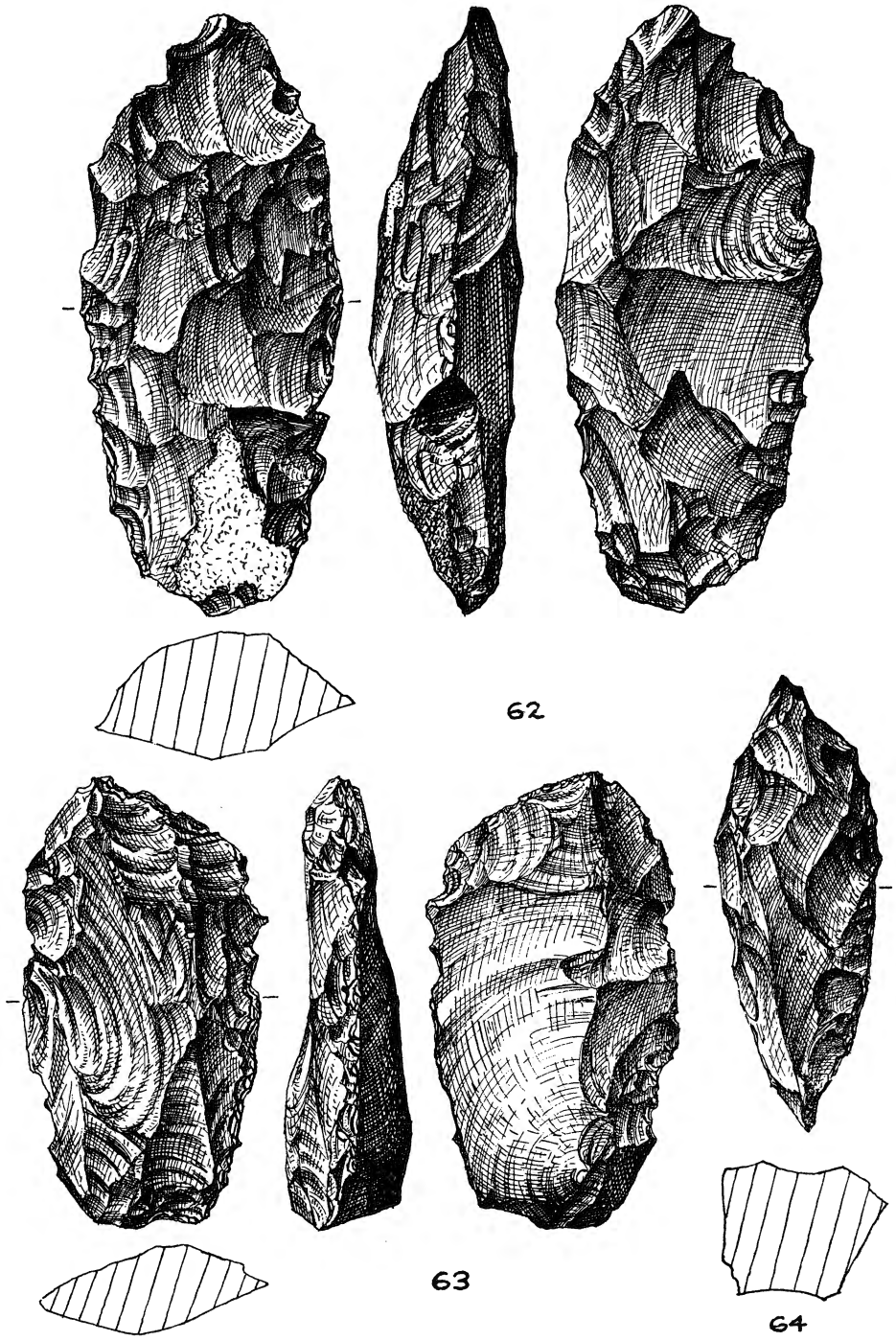

Fig. 9. Artifacts from Fienerode, Dune 6. 1/1.

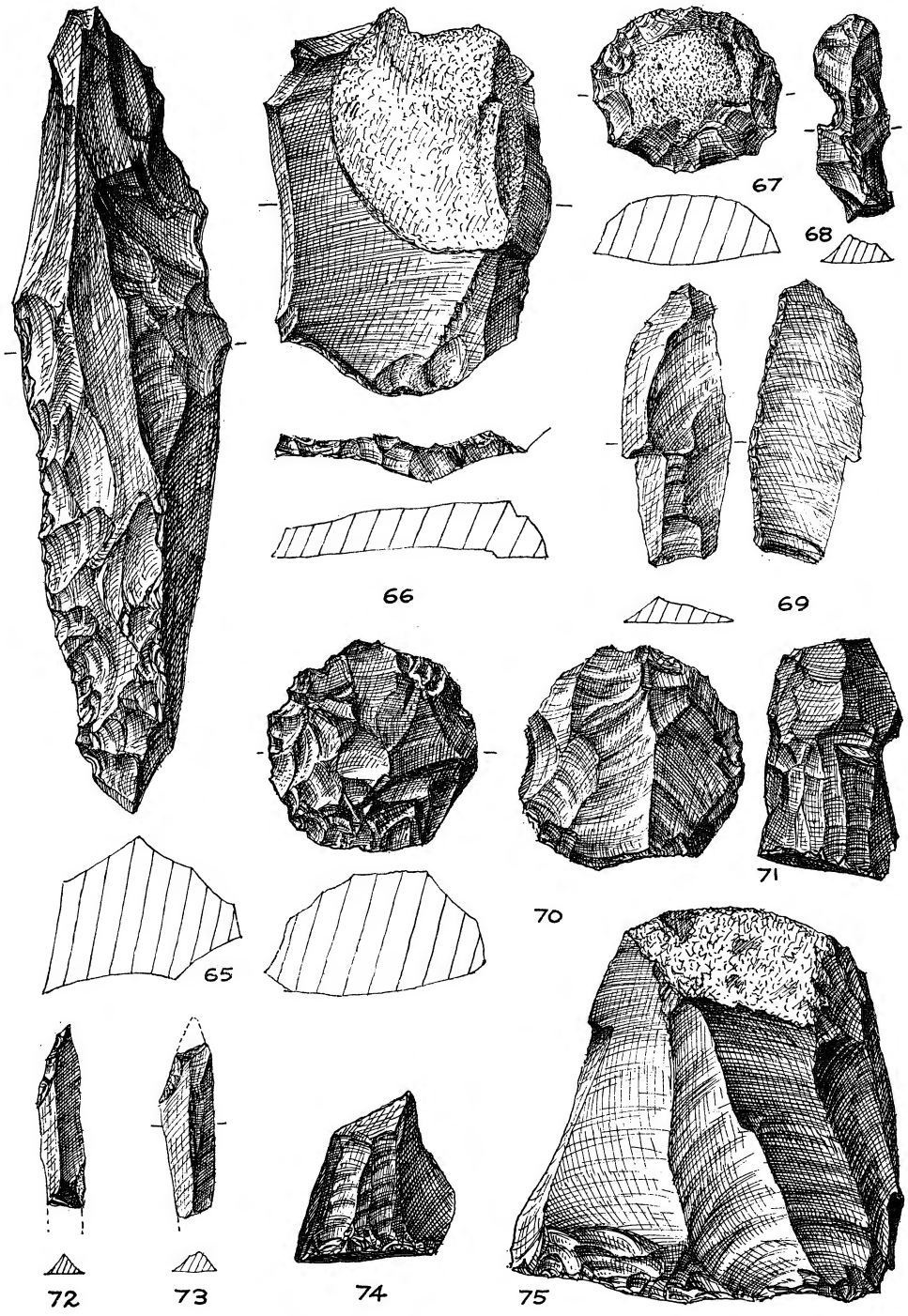

Fig. 10. Artifacts from Fienerode, Dune 6. 1/1.

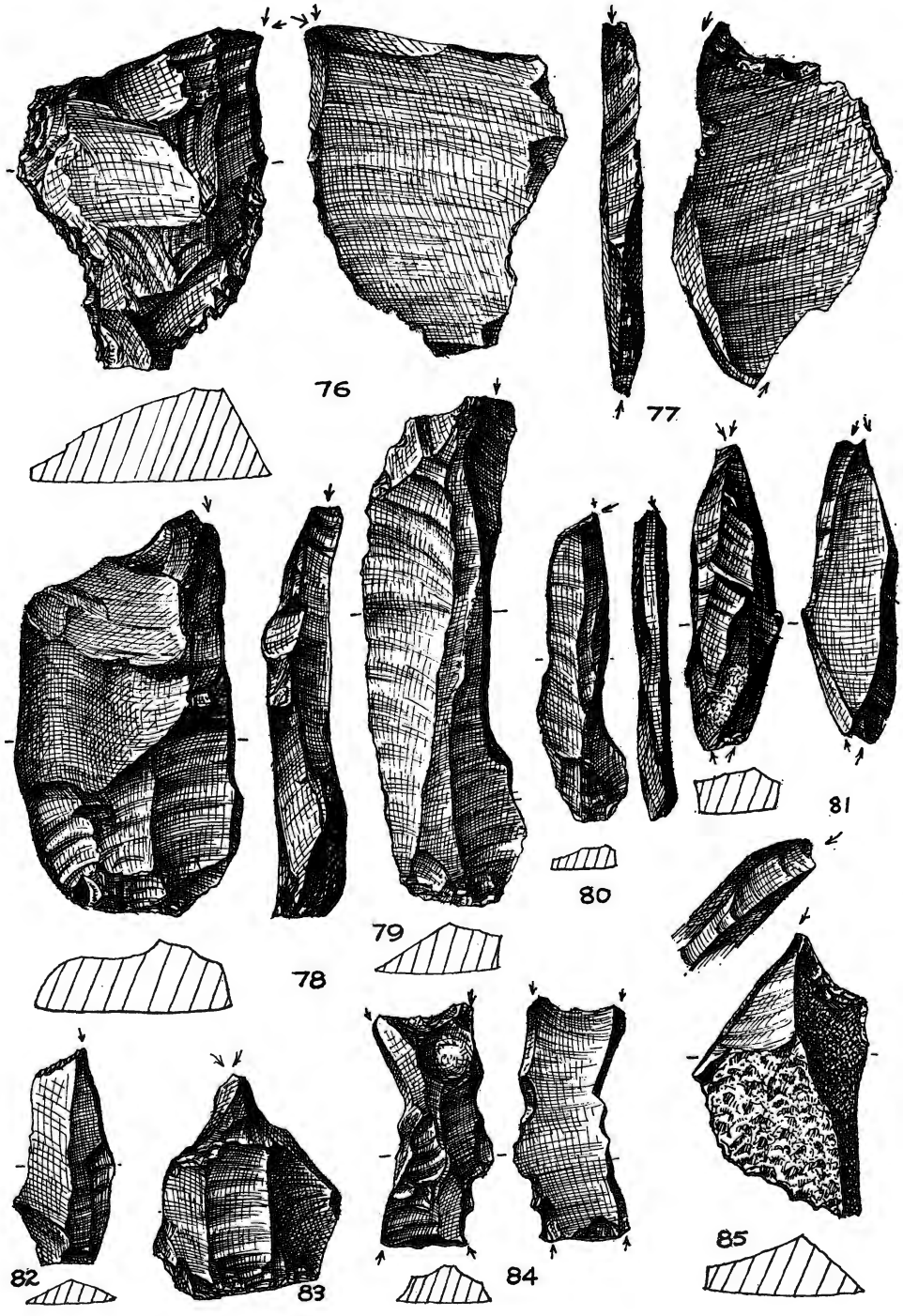

Fig. 11. Artifacts from Fienerode, Dune 6. 1/1.

as represented in the Wlost collection are compared for distributional similarities and differences. The same is done for the Bicker series. This constitutes a comparison of the material within each collection. The next step involves a comparison of the materials from each dune as represented in the Wlost and Bicker series. This constitutes a comparison of the material between each collection.

The material in the Wlost collection shows several significant points of agreement regarding the type distribution between Dunes 5 and 6. The most obvious agreement between the two sites is in the vast numbers of plain blades that both dunes have yielded (Dune 5: 73.99%; Dune 6: 48.08%). At both sites plain blades outnumber all other tools, and in the case of Dune 5, the majority of all tools belong into this category. The histograms show similarities between Dunes 5 and 6 in the distribution of simple end-scrapers on blades, cores, both utilized and unutilized, and retouched flakes and flint fragments. Among the microliths both sites show a degree of agreement in the numerical distribution of pointed micro-blades. These agreements are not point by point, but the cadence of the histograms shows similarities in the relative frequencies of the types listed, if the latter are viewed in their 'environment' on the graphs. Similarly there is agreement in the cadence of the graphs' middle section, i. e. between types 28–31.

The discrepancies between the two sites consist essentially of types that were found to be present at one, and absent at the other dune. The Wlost collection from Dune 5 does not contain types 4, 7, 9, 13, 17, 19, 23, 25, all of which have been noted at Dune 6. Neither of the Wlost series has yielded types 34, 35 and 36, which, however, Bicker reports. The significance of these discrepancies is discussed below.

The remaining differences between the two assemblages in the Wlost collection are quantitative. They appear to be of a minor kind, and can readily be studied on the histograms.

The material in Bicker's series also shows considerable agreement between the quantitative distribution of types at the two sites. Within their 'environment' on the graphs plain blades and dorsally retouched blades clearly stand out, though their cadence is reversed. At either site end-scrapers on blades (simple) are strongly represented and are conspicuous in their 'environment'. At both sites types 18, 19, 20, 21, 22 from a similar cadence. Type 33 among the microliths, i. e. the unfinished or indeterminate microliths, stand out in their area on the graphs.

The discrepancies between the two series in the Bicker collection are similar in kind to those noted for Wlost. In Bicker's series Dune 5 did not yield types 3, 4, 17, 28, 32, none of which occurs at Dune 6 either. In addition types 9, 11, 29, 36 are absent in the series from Dune 6. The absence of certain types, notably 3, 4, 11 and 32, in the Bicker series may be deceptive. They may not have been identified as special forms by Bicker himself. Thus they would have eluded this writer in his reanalysis, especially if Bicker failed to illustrate them.

A dune by dune comparison of the Wlost and Bicker collections has yielded somewhat unexpected results. Though from a purely typological point of view most of the

types noted by Bicker have also been reported by Wlost, their distributions for each dune are curiously discrepant.

The points of agreement are few. In the case of Dune 5 simple end-scrapers on blades (type 10) and round scrapers on flakes (type 12) stand out in their 'environments'. The other elements of agreement consist of a significant rise of types 18, 19, 20, 21 within their respective areas on the histograms. It should be noted, however, that in the case of the Bicker series from Dune 5 the quantities of tools involved, both absolutely and percentage-wise, are vastly greater than in the case of the corresponding Wlost series. Furthermore the cadence of types 26, 27, 28 are similar, though few artifacts are involved in either collection.

The discrepancies between the Wlost and Bicker series from Dune 5 are great. The most important difference lies in the area of plain blades. Both, absolutely and percentage-wise this type is predominant in the Wlost collection, while it is very poorly represented in Bicker's series (Wlost: 1468 specimens = 73%; Bicker: 122 specimens = 5%). On the other hand dorsally retouched blades are very well represented in Bicker's collection, while they are rare in Wlost's series. There is of course a possible element of distortion here, since Bicker's series may include some ventrally and dorsally-ventrally retouched forms which remained undetected in the re-analysis. The Wlost collection suggests, however, that even if this were correct, it could not account for more than a few such specimens having been accidentally included in the general series of retouched blades: They are uncommon at Fienerode.

As noted above, the cadence of types 18, 19, 20, 21 agrees in both series. But it must be underlined, that the numbers of tools involved in each series greatly differ. Type 33 is quantitatively very much better represented in Bicker's collection than in Wlost's. In the case of type 31 this situation is reversed.

Finally it should be emphasized that the remainder of the distributional columns of the two histograms for Dune 5 show little agreement, though the quantities involved are rather small if compared with those types that are the subject of the major discrepancies.

With regards to the two series of artifacts from Dune 6 the same comments apply that have been made for Dune 5. Here too the areas of agreement cover the cadence of types 18, 19, 20, 21, with the same limitations applying here as at Dune 5. Both collections for Dune 6 show that simple end-scrapers on blades dominate their 'environment' on the histograms. In the microlithic range the cadence of types 26, 27, 28 also resembles that of Dune 5. It should be noted, however, that this impression may be unreliable because neither Bicker's nor Wlost's series of microliths is very large.

The areas of disagreement between the two collections from Dune 6 are equally strong as in the case of Dune 5. Again, plain blades are extremely common in Wlost's series, while they are very rare in Bicker's (Wlost: 664 specimens = 48%; Bicker: 29 specimens = 7%). The same comments made for Dune 5 apply to the group of types 18, 19, 20, 21 of Dune 6. The same holds true for types 31 and 33.

There remains to be discussed the significance of certain types which occur exclusi-

vely in the one or the other of the two collections. Also the lack of certain types in the collections requires some comment. Types 35 and 36 have only been noted by Bicker. Among these type 35 (trapezes) is represented at both sites, while type 36 (truncated and terminally retouched blades) was only noted at Dune 5. Why these types do not occur in the large Wlost series must remain unexplained; they certainly are quite common in Bicker's collections. Type 17 (flakes with prepared striking platforms) has only been noted in the Wlost series from Dune 6, where it is represented with 17 specimens. This type does not accur at Dune 5. Whether or not Bicker's collection included it, is a moot point. Bicker may merely have overlooked it, though it is certainly a strikingly remarkable type which is thoroughly out of line with the remainder of the assemblage from the dunes.

It has already been mentionned that certain types that have been listed as not present in Bicker's series from both sites, may actually be present. The text and illustrations of Bicker's study (1934), in these cases, are not sufficiently detailed to permit identification of the types. Certain other types which appear to be at one or both sites of either collection are naturally rare; hence they may simply not occur in the respective series for that reason. On the other hand such forms as choppers (type 14) are fairly common in Bicker's series from both dunes, yet they are either absent or very rare in Wlost's collections. The reasons for this curious distribution are not clear. They seem to be connected with general differences that exist between the collections of Wlost and Bicker.

Finally one more point should be noted. Wlost's collection from Dune 6 is quite large (1360 artifacts); that of Bicker is relatively small (388 artifacts). In this connection it is interesting to note that both series have yielded an almost equally small number of microliths (Wlost: 20; Bicker 23). This suggests that microliths are rare at Dune 6 in absolute terms, otherwise there should be some degree of proportionality in their distribution.

Conclusions

The following conclusions can be drawn from this study of the mesolithic industries of Dunes 5 and 6 of Fienerode. The statistical analysis of the size variations between the industries of Dunes 5 and 6 as represented in the Wlost collection, indicates that the observable variations are highly significant, and that they are not due to the microlithic elements of the industry. The causes for this phenomenon are not ascertainable on the basis of the limited evidence from two sites. Certainly the reasons for this difference in size offered by Bicker are not valid.

The comparison of the two collections made independently and in a random manner at Dunes 5 and 6 demonstrates the following facts. There is considerable typological and distributional agreement between the two sites if they are compared collection by collection. Hence Bicker's conclusion to the effect that the two sites represent one and the same 'culture' is more or less acceptable as long as it is based on typological and distributional grounds. If, however, the histograms of each collection for

one and the same site are compared, the industries appear to be very dissimilar. The quantitative distributions of types for one and the same site are very different, suggesting quite different industries, or facies, though in fact the collections thus compared were made at the same site. From this we may conclude, that even though the collecting techniques of both, Wlost and Bicker, were explicitly non-selective and random, with large series of artifacts and débitage involved, such random collections do not necessarily result in similarly composed tool series. Therefore, two independently made, large, random collections from the same site may result in different interpretations as to the 'culture's' affiliations. In this connection the conclusions reached here are the more interesting, because the within comparison of the two assemblages yielded similar results, namely that Dunes 5 and 6 were in many respects identical. The differences clearly lie in the actual composition of each collector's series of artifacts, rather than in faulty interpretations of the data as they stand. The reasons for this may be due either to defects in the supposedly random, non-selective collecting techniques of the two collector's involved, or in some other factors inherent in the distribution of the material on the sites, or both. This writer is inclined to believe that both factors are involved, but that the second one is more important, because the comparatively large numbers of tools involved in each series should be a reasonably good insurance against unconscious selectivity during the collecting process.

In sum, the 'objective' differences between the two industries rest in their differing dimensions, in the absolutely smaller number of microliths at Dune 6, in the different coloration of the flint material, and in minor differences of type distribution. The considerable 'subjective' differences emerge in comparing the different collectors' series from the same sites. They appear to be connected with the distribution of the material at the sites and with more or less intangible factors involving the supposed random, non-selective collecting techniques.

Acknowledgements

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Zusammenfassung

Die vorliegende Studie verfolgt einen doppelten Zweck. Zunächst handelt es sich um die Vorlage zweier großer, bisher unveröffentlichter Serien mesolithischer Artefakte aus Mitteldeutschland. Dieses Material wurde, nach einer eingehenden Typen-

analyse, mit zwei ebenfalls großen, 1934 von K.-F. Bicker veröffentlichten, Artefaktserien verglichen. Der Zweck dieser Übung war festzustellen, inwieweit zwei unabhängig voneinander arbeitende Prähistoriker zu gleichen oder ähnlichen Schlüssen kommen, wenn sie sich mit denselben vorgeschichtlichen Komplexen befassen. Als wichtiges Nebenprodukt dieser Studie konnte der Verfasser feststellen, daß voneinander unabhängige, in statistischer Hinsicht nicht selektive Aufsammlungen auf identischen Oberflächenstationen, durchaus verschiedene Typenzusammensetzungen aufweisen können, die in der Folge zu verschiedenen Interpretationen ein und desselben Fundkomplexes führen können.

Das bisher unveröffentlichte Material auf dem die vorliegende Arbeit teilweise fundiert, wurde von dem verstorbenen Ingenieur Wlost 1931–38 auf den Fieneroder Dünen aufgesammelt. Diese Dünen befinden sich im sogenannten Fiener Bruch, in der ehemaligen Provinz Preußisch-Sachsen (heute Halle-Merseburg), Regierungsbezirk Magdeburg, Kreis Jerichow II.

In früh-postglazialer Zeit war der Fiener Bruch ein flacher See, der gegen Ende des Boreals auszutrocknen begann. Zu Beginn des Atlantikums hatte sich der ehemalige See in einen von Dünen und Buchenhainen unterbrochenen Sumpf verwandelt. In diese Periode fällt die mesolithische Besiedlung der Dünen.

Wlost unternahm im Ganzen zwölf Begehungen der Fieneroder Dünen. Seine Aufsammlungsmethode war statistisch einwandfrei. In einem Brief an den Verfasser unterstreicht er daß „ . . . grundsätzlich alles aufgelesen wurde was Artefakt, Abschlag oder Hilfsgerät war. Dazu gehören auch Kernstücke und angeschlagenes Rohmaterial . . . " Einige Jahre nach Ende des letzten Krieges gelang es Wlost, unter abenteuerlichen Umständen, seine sehr großen vorgeschichtlichen Sammlungen aus der Ostzone in die Bundesrepublik zu retten, wo sie sich, das Fieneroder Material einbegriffen, heute im Besitz des Germanischen Nationalmuseums in Nürnberg befinden.

Im Jahre 1934 veröffentlichte F.-K. Bicker eine Monographie über das Dünenmesolithikum von Fienerode. Die Aufsammlungen Bickers ebenso wie die Wlosts, sind vom statistischen Standpunkt aus betrachtet, durchaus einwandfrei. Bickers Monographie und Wlosts Sammlungen sind die beiden Grundpfeiler, auf denen die vorliegende Arbeit aufgebaut ist. Bicker behandelt 25 Stationen, von denen viele nur sehr spärliches Material lieferten, während Wlost nur 6 Stationen bekannt waren. Beide Sammlungen enthalten aber wichtige Artefaktserien von den von Bicker als Düne 5 und Düne 6 bezeichneten Stationen. Die Artefakte dieser beiden Dünen bilden die Grundlage der folgenden Analysen.

Die Dünen 5 und 6 sind etwa drei Kilometer voneinander entfernt. Bicker (1934) gibt keinerlei Einzelheiten über die geologische Beschaffenheit der Dünen. Nach Wlosts Angaben handelt es sich um echte Sanddünen ohne feststellbare kiesige Kerne. Ebenfalls Wlost zufolge, ragt Düne 5 etwa 4 Meter aus dem sie umgebenden Gelände empor. Sie ist ungefähr 40 Meter lang und 20 Meter breit. Der Dünensand ist weiß. Düne 6 wird von Wlost als ein „ . . . zirka 80 Meter langer, zirka 15 Meter breiter Acker, . . . der bei Schlechtwetter kaum zu begehen war, da die Düne nur zirka

0.50 Meter über der vermoorten Umgebung gelegen ... " beschrieben. Der Sand dieser Düne ist braun gefärbt und mit moorigem Humus vermischt. Wegen der braunen Färbung des Sandes und der Artefakte von Düne 6, bezeichnet Wlost diese Station auch als „Braune Düne". Es sei hier darauf hingewiesen, daß, abgesehen von Düne 6, das Fundgut sämtlicher Fieneroder Stationen die charakteristisch weiß-graue Färbung des typischen nordischen Feuersteins aufweist.

Zur Methodik der hier vorgenommenen vergleichenden Analyse ist folgendes zu sagen. Bickers (1934) Analyse des Fieneroder Fundgutes ist zwar detailliert, aber typologisch durchaus unzulänglich. Dank der eingehenden Beschreibungen und erfreulich zahlreichen Abbildungen, gelang es jedoch ohne größere Schwierigkeiten, die Bickerserien auf dasselbe, allgemein gültige Typenschema zu reduzieren, das der Verfasser für die Sammlung Wlost ausgearbeitet hat. Dieses Schema bewegt sich in konventionellen Bahnen; vor allem wurde versucht sinnlosen typologischen Haarspaltereien aus dem Wege zu gehen und somit ein so „objektiv" wie mögliches Typensystem aufzubauen.

Die Wlost'schen Serien wurden in Größenkategorien von 2 Zentimetern aufgeteilt um festzustellen ob zwischen den Industrien der beiden Dünen ein statistisch bedeutsamer Größenunterschied besteht. Mit Hilfe des Chi-Quadrat Tests konnte die Größenordnung dieses Unterschieds berechnet werden. Da Bicker keine präzisen Größenangaben macht, konnte die statistische Operation nur an der Sammlung Wlost vorgenommen werden.

Als weiteres analytisches Hilfsmittel wurden Histogramme benutzt. Die sich in den beiden Sammlungen befindlichen Artefaktserien wurden für jede Düne nach Typen geordnet in histogrammatischer Form graphisch dargestellt. In der Folge wurden die Typenserien der beiden Dünen innerhalb der Wlost'schen und Bicker'schen Sammlungen miteinander verglichen. Als nächster Schritt wurden, Düne für Düne, die beiden Sammlungen untereinander verglichen.

Die Sammlung Wlost von Düne 5 enthält 1984 Artefakte und 12296 Abfälle. Bickers Serie enthält 2150 Geräte und „viele" Abfälle. Die Sammlung Wlost von Düne 6 enthält 1360 Artefakte und 3921 Abfälle. Bickers Serie enthält 388 Geräte und „viele" Abfälle.

Bevor im Folgenden die Resultate der vergleichenden Analysen vorgelegt werden, sei darauf hingewiesen, daß der Verfasser hier nicht versucht an der von Bicker vorgeschlagenen kulturellen Zugehörigkeit des Fieneroder Mesolithikums innerhalb der grob umrissenen mittel- und ostdeutschen Kulturentwicklung zu rütteln. Zweck dieser Arbeit ist es – abgesehen von der Materialvorlage an sich – festzustellen, ob sich innerhalb eines solchen Horizontes feinere Variationen feststellen lassen, und worin solche Variationen bestehen. Zunächst seien hier Bickers Schlußfolgerungen über Düne 5 und Düne 6 zitiert: „Düne 6 würde von Düne 5 kulturell verschieden sein, wenn auf Düne 6 Typen vorkämen, die wir von Düne 5 trotz des überaus reichhaltigen Materials nicht kennen. Wenn aber das auf Düne 6 gefundene Material durchaus mit dem von Düne 5 übereinstimmt, können wir m. E. ruhig schließen, daß hier

dieselbe Kultur und dieselbe Zeitstellung vorliegt, auch wenn einzelne Typen fehlen, die uns von Düne 5 bekannt sind" (Bicker, 1934:83). Nach eingehendem Studium konnte Bicker daher zu dem Schluß kommen: „Als unbedingt sicher aber hat zu gelten, daß auf Düne 6 kein einziges Gerät gefunden worden ist, dessen Typ wir von Düne 5 noch nicht kennen. In Anbetracht dieser großen Übereinstimmung stehe ich nicht an zu erklären: Auf Düne 6 liegt die gleiche Kultur wie auf Düne 5 vor" (Bicker, 1934:95).

Bestehende und auf Anhieb erkennbare Unterschiede zwischen den beiden Industrien lassen sich, Bicker zufolge, leicht erklären. Der Größenunterschied zwischen den Artefakten von Düne 5 und Düne 6 erklärt er damit, daß der Moränensilex auf Düne 6 „. . . in zum Teil etwas größeren Knollen als auf Düne 5 zur Verfügung gestanden hat" (Bicker, 1934:83). Eine Analyse des Abfalls von beiden Stationen in der Sammlung Wlost zeigt jedoch eindeutig, daß dieser Schluß nicht zutrifft. Die Abfälle sind auf beiden Stationen größenmäßig annähernd identisch, und in beiden Fällen sind die Dimensionen des Abfalls größer als die der Artefakte.

Typologische Unterschiede der beiden Industrien erklärt Bicker als durch die quantitativ bedeutend geringeren Funde von Düne 6 bedingt. Die quantitativen Beziehungen der einzelnen Typen von den beiden Dünen zueinander, bleiben unerörtert. Das Vorkommen oder Nichtvorkommen eines Typs ist bei Bicker entscheidend.

Bicker stellt zwar fest, daß das von der Düne 6 stammende Silexmaterial, im Gegensatz zu dem von den anderen Dünen, braun gefärbt ist, aber er gibt für dieses Phänomen keinerlei Erklärung. Die gelb-braune bis braune Verfärbung ist durch Patinierung zu erklären, da es sich bei dem Silex ohne jeden Zweifel um den gängigen weiß-grauen nordischen Feuerstein handelt. Alternierender Kontakt des Materials mit Grundwasser und Atmosphäre, bedingt durch die sehr geringe Höhe der Düne über dem umgebenden Gelände, sind für das Phänomen verantwortlich.

Die Chi-Quadrat Analyse der Größenkategorien des sich in der Sammlung Wlost befindlichen Artefaktmaterials zeitigte folgende Resultate. Auf Grund der Hypothese, daß kein statistisch wesentlicher Größenunterschied zwischen den Industrien der beiden Dünen besteht, konnte festgestellt werden, daß für die beiden Industrien (gemessen in Kategorien von 2 Zentimetern), Makro- und Mikroformen zusammen, die Wahrscheinlichkeit, daß die Hypothese zutrifft unter dem 0.01 Niveau liegt. Der feststellbare Unterschied ist daher statistisch-mathematisch sehr bedeutend. Für die Makroformen der beiden Stationen in 2 Zentimeter Kategorien, zeitigte der Chi-Quadrat Test dasselbe Resultat. Eine getrennte Chi-Quadrat Analyse der Mikroformen, bei gleicher Hypothese, aber in Kategorien von 1 Zentimeter, ergab jedoch den Wahrscheinlichkeitsgrad von 0.30. Der Größenunterschied zwischen den Mikroformen der beiden Stationen ist daher in diesem Falle unerheblich.

Der statistische Befund deutet darauf hin, daß der Größenunterschied der beiden Industrien wesentlich, d. h. nicht zufallsbedingt ist. Wodurch er bedingt ist, läßt sich an Hand von nur zwei analysierten Stationen nicht feststellen. Jedoch beruht er nicht

auf den für mesolithische Industrien diagnostischen Mikroformen, sondern er liegt in den Makroformen verborgen.

Die Histogramme für die beiden Artefaktserien der Sammlung Wlost stimmen in wesentlichen Punkten überein. Zunächst zeichnen sich beide Serien durch großen Reichtum an unretuschierten Klingen aus. Viele Typen weisen ein sehr ähnliches Distributionsbild auf den graphischen Darstellungen in ihrer „Umgebung" auf. Zum Teil sind die „Kadenzen", oder das Gefälle, ganzer Typenserien beinahe identisch (z. B. Typen 19–22 und 29–32). Ein intern ähnlich übereinstimmendes, aber, wie wir weiter unten sehen werden, von der Wlost'schen Serie durchaus verschiedenes Bild, ergibt sich aus dem Studium der Histogramme der Sammlung Bicker.

Auf Grund der graphischen Analyse kann man daher zu dem Schluß kommen, daß jede der beiden Sammlungen in sich geschlossen betrachtet, die Folgerung zuläßt, daß die Serien von den beiden Dünen, eine im großen und ganzen einheitliche Kultur darstellen. Vergleicht man jedoch, Düne für Düne, das Material beider Sammlungen, so ergibt sich ein sehr unterschiedliches Bild. Das einheitliche Bild der Dünen innerhalb jeder Sammlung verschwindet, so daß der Eindruck entsteht, es handle sich bei der Serie von Düne 5 in der Sammlung Wlost um eine andere Industrie oder Fazies als bei jener der Sammlung Bicker. Dasselbe gilt für Düne 6. Die Histogramme für ein und dieselbe Düne bei dieser Form des Vergleichs ergeben ein völlig unterschiedliches Bild. Abgesehen von den durchaus verschiedenen „Kadenzen" ganzer Typengruppen, sticht die relativ und absolut geringe Anzahl unretuschierter Klingen in der Sammlung Bicker besonders ins Auge. Dieser Befund steht in diametralem Gegensatz zu dem der Wlost'schen Serien.

Es sei darauf hingewiesen, daß Bicker sowohl als auch Wlost nach eigenen Angaben nonselektiv sammelten. Wie läßt sich also die Unterschiedlichkeit der beiden Sammlungen, eine Unterschiedlichkeit, die umso frappanter ist, da innerhalb jeder Sammlung für die beiden Dünen ein annähernd identisches Bild besteht, erklären?

Es ergeben sich unter den vorliegenden Umständen drei mögliche Erklärungen:

1. Die angeblich statistisch einwandfreien, non-selektiven Aufsammlungsmethoden der beiden Sammler sind, wahrscheinlicherweise durchaus unbewußt, defektiv.
2. Das Artefaktmaterial, trotzdem es in sehr großer Anzahl, anscheinend willkürlich verstreut auf der Oberfläche der Dünen liegt, verteilt sich auf den Stationen in einer auf Anhieb nicht erkenntlichen Weise so, daß selbst eine vollkommen nonselektive Sammelmethode die unterschiedliche Distribution des Materials wiederspiegelt. Mit anderen Worten, die Zusammensetzung einer Aufsammlung, auf einer sehr reichhaltigen, scheinbar wahllos mit Artefakten bestreuten Station, hängt letztlich davon ab, wo der betreffende Sammler zu sammeln beginnt und ob er, wahllos alles aufhebend, Artefakte und Abfälle, die Station in ihrer Gänze systematisch absucht.
3. Es besteht die Möglichkeit, daß beide Faktoren in der Divergenz der Serien eine Rolle spielen.

Der Verfasser dieser Arbeit hält die dritte Alternative für die Wahrscheinlichste. Allerdings sei betont, daß in dieser Kombination von Faktoren wohl der zweite die größere Rolle spielt, da allein die relativ große Anzahl von aufgesammelten Geräten und Abfällen, was die Sammeltechnik anbetrifft, die statistischen Fehlerquellen auszugleichen tendiert.

Zusammenfassend kann gesagt werden, daß die „objektiven" Unterschiede in dem wesentlichen, aber vorläufig unerklärbaren, Größenunterschied der beiden Industrien, der unterschiedlichen Färbung des Rohmaterials, sowie in geringfügigen typo-quantitativen Distributionsdivergenzen bestehen. Die erheblichen „subjektiven" Verschiedenheiten lassen sich auf vielleicht unbewußte Fehlerquellen in der Aufsammlungsmethode und in der auf Anhieb nicht erkenntlichen differenzierten Verteilung der Geräte auf den Stationen zurückführen.