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STATISTICS AND GRAPHS IN THE STUDY OF FLINT ASSEMBLAGES

I. *Introduction*

(fig. 1)

A large number of Palaeolithic and Mesolithic sites have been investigated in the Netherlands in the last ten years; and many others have been brought to light through the examination of public and private collections. In connection with these, comparative studies have been made of collections in Western Germany, Northern France, Britain, Belgium and Denmark. The volume of this material to be described and analysed has become so extensive as to render it virtually impossible to do so by the usual methods; especially since it is desired to achieve a full presentation of all the ascertainable information concerning the entire material without making the report so bulky as to be unusable.

The best solution to this difficulty of presentation has been found to lie in the statistical analysis of the material and the presentation of the results in the form of graphs supplemented by tables. Such a method has been developed by the writer for the non-polished lithic material of Palaeolithic, Mesolithic and Neolithic sites.

The flint assemblages of the Ahrensburg and Tjonger cultures and the Mesolithic of the provinces of Brabant and Limburg, and of some Belgian sites, have been studied by the writer together with Brother Aquilas Wouters and Mr. J. Verheylewighen; the Danubian sites of the Netherlands with Mr. A. Bruyn; and some Mesolithic sites in the northern provinces with Mr. P. Houtsma¹. The sites of the Hamburgian, the Creswellian, and the Tjongerian from the northern provinces of the Netherlands, Germany and Britain have been studied by the present writer; who has also worked out the application of the method, on the basis of a large amount of available material, to the Palaeolithic handaxe cultures and the Levalloisian.

The studies, now approaching completion, will appear in English, German or French as separate articles in subsequent volumes of *Palaeohistoria*. Part II (see below p. 7) of this series is intended as a short preliminary account of the method, principally for the late Palaeolithic. In Part. III (see below p. 27), written together with Brother Aq. Wouters, a preliminary account is given of the applica-

tion of the method to the Mesolithic material from sites of the Netherlands, compared with some of the most important find-spots of Northwestern and Central Europe. The translation of the Dutch, German and French type-names into English involves difficulties, and the English names used here are merely tentative proposals. The translation is by Jay Butler.

The use of statistical methods and graphs allows a more thorough and intensive evaluation of the growing volume of material from Palaeolithic, Mesolithic and Neolithic sites, and enables the results to be presented both concisely and legibly.

Mere description of the complicated data tends to become cumbersome and unreadable; whereas the employment of tables and graphs makes it possible to set out the facts fully and at the same time to render them quickly and readily comprehensible. These methods are also well suited for the comparison of different groups. The writer has devised a method for the graphical presentation of the statistically analysed material from a large number of sites which makes it possible to grasp quickly not only the percentages of the various types, but also the significant typological characteristics, dimensions and indices, all in their correct relationship to each other.

Histograms are employed, with the different values indicated by bars drawn on squared paper. Such bars, standing out plainly in black-on-white, are easily read and compared, even after considerable reduction. Accumulation diagrams such as those used by D. de Sonneville-Bordes and F. Bordes are also less advantageous, since (1) not more than four lines can be drawn together, making it impossible to compare more than four cultures in one diagram; (2) the exact quantities of the components can be read off only with difficulty; (3) the sequence and number of components have too great an influence on the form of the diagram. Accumulation diagrams with different sequences and numbers of components can seldom or never be compared with one another, and to indicate the quantities of the components a number of indices must be provided, requiring special tables or graphs.

The diagram here employed is divided into a main graph, giving the proportions of the various types together with various indices, and, below it, a series of supplementary graphs in which the most important characteristics and dimensions of the types are indicated.

The types and dimensions are given of the artefacts which are the most important in the Northwest European Upper Palaeolithic and Mesolithic. For other regions and other cultures the types, characteristics and indices can be varied as may be necessary, without rendering the graphs useless for comparison.

The absolute quantities of the types, indices and dimensions are given in tables, which will accompany each graph in the forthcoming publications, but are not given in the preliminary accounts.

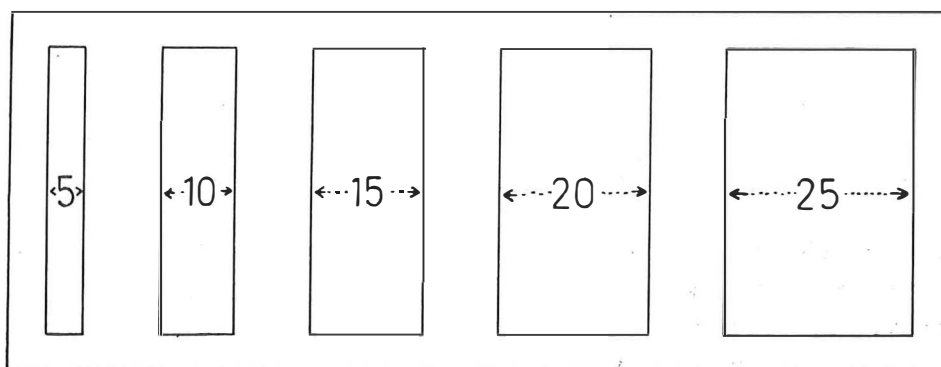
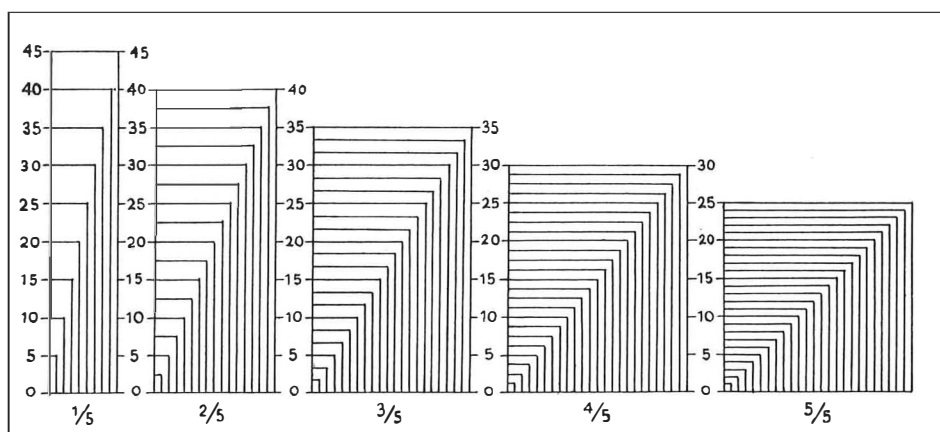
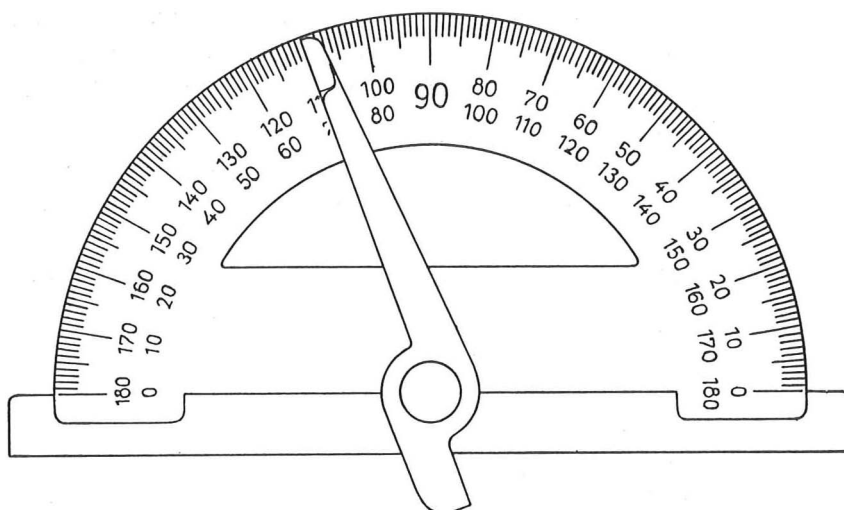


Fig. 1

Many dimensions and quantities are also given in these tables which are less significant for comparative purposes, and which are not included in the graph. The tables also give absolute counts for find-places which have yielded too little material to be used in the graph.

In the main diagram (see Pl. I and II), a distinction is made between implements probably used for hunting and possibly fishing and fighting (the points being the principal implements in this category in the Palaeolithic and the microliths in the Mesolithic) and implements for the working of bone and antler, such as graters and *Zinken* together with implements for cutting and dressing skins, such as scrapers, knives, and retouched blades. The number of hunting implements may vary greatly with accidental circumstances. If, for example, the carcass of a large animal shot with many projectile points (some perhaps broken) had been dragged to the site or if a hunter re-fitted his projectiles with new points and dropped the old broken ones on the spot, an accumulation would be found. The number of tools is less subject to accidental variation. Since the number of points or microliths is large, they are counted separately to avoid unduly depressing the proportions of other types of implements.

In classifying the types for the main graph the most essential consideration must be strict definition and clear differentiation. For comparative purposes, no criterion should be used which is not based on an objective typology, and which could not be verified independently by any investigator. If, for example, one gives separate figures for long and short scrapers without stating the exact length-breadth ratio employed to distinguish them, the figures have no value. One could not even be certain that the same person would arrive at the same result on a second counting of the same material. The solution to this problem is usually quite simple. Thus, in the case of scrapers, I classify all examples with a length-breadth ratio of more than 2:1 as long scrapers, and all examples with a ratio of less than 2:1 as short scrapers.

To facilitate the counting and measurement of the artefacts, recording forms are printed in advance, and a number of special measuring devices have been prepared. These instruments are illustrated in fig. 1. First a simple device for measuring angles (flaking angle, scraper angle, graver angle, angle of retouch, etc.) is utilized. The second device is used to determine the length-breadth ratio and the length of microliths. Triangles are measured on it with the unretouched edge placed vertically; points with the longitudinal axis vertical; quadrangles with the largest unretouched edge vertical. The implements are then sorted into their size-groups. The scales may be edged with a raised strip of celluloid 1 to 2 mm thick; so that the microliths may be accurately placed against the raised edges. Making the instruments of transparent celluloid permits them to be used also for measuring drawings. For rapidly assigning blades, scrapers, graters, etc. to the various

length and breadth groups rectangles of celluloid ca 1 mm thick, ruled, as shown in fig. 1 (lower), are utilized.

In describing the cultures and variants we have avoided terms such as Hamburgian I, II and III or Tardenoisian I and II, since these terms imply successive 'stages' for which there is actually no concrete evidence. The groups of sites displaying good agreement need not in most cases represent successive stages in a sequence, but may merely be different variants, with a greater or lesser extension in space. They may be more or less contemporary or they may be of different ages. Tidy developmental sequences can only be postulated for individual types of artefacts taken out of their context.

NOTE

¹ Mr. W. Adrian counted and measured mesolithic and palaeolithic sites in the region of Bielefeld in Germany.