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An analysis of stylistic variation in some late Mesolithic assemblages from northwestern Europe

by

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Introduction

Recent investigations into the Mesolithic occupation of northwestern Europe have argued for the existence of a number of regional human populations. These suggestions have emerged from both theoretical considerations (CLARK 1975, PRICE 1981) and from the observed archaeological record (ARORA 1973, NEWELL 1973, ROZOY 1978, KOZŁOWSKI & KOZŁOWSKI 1979, GOB 1979, DOLUKHANOV *et al.* 1980). Approaches to the archaeological data have differed widely in methodology, ranging from the analysis of specific artifact types and lithic raw materials to considerations of gross assemblage variability. These studies may also be distinguished by the theoretical model upon which the archaeological data is projected, from the construction of purely archaeological taxonomic units to attempts at the delineation of social groups based upon anthropological models. This paper presents a stylistic analysis of certain microlithic types in an attempt to identify more precisely regional characteristics in lithic artifacts which may reflect distinct social territories. In addition some problems of more general concern related to the existence and recognition of prehistoric social groups will be considered.

Social territories

Provisionally, it can be expected that the spatial distribution of lithic styles will reflect hunter-gatherer social units variously described as maximum bands (STEWARD 1969), dialectical tribes (BIRDSELL 1953), or characterized by closed mating networks (WOBST 1976). The concept of a social territory (CLARK 1975) is particularly useful in this regard as it represents a spatial equivalent to the above-mentioned social units. Successful identification of social territories in the archaeological record may facilitate the study of prehistoric settlement patterns,

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and where possible, related subsistence activities. Their recognition may also give clues or provide independent data concerning band size and demographic trends. The definition of and interrelationships between social territories, the natural environment, subsistence and settlement strategies, and human populations comprise a "regional approach" to the study of prehistoric human adaptations (cf. STREUVER 1968, PRICE 1981).

It is recognized, however, that the study and identification of social territories represents a considerable abstraction from the archaeological data ; flexibility must be encouraged until such time that theory and data are reconciled in archaeological contexts. At the present time the concept of a social territory serves as a reasonable point of departure to the study of regional variation in the Mesolithic. The investigation of prehistoric social territories may proceed from both theoretical considerations (based on data from ethnography and ecology) and from the analysis and interpretation of archaeological data. While the two approaches complement one another, this paper will focus only upon the latter.

The northwest European Mesolithic is notably lacking in surviving examples of ornament and decorative art, which may well be best suited for the identification of ethnicity among hunter-gatherers. In a region where stone implements comprise the principal information regarding material culture the delineation of social territories can be approached by the analysis of spatially restricted artifact types, stylistic attributes, and lithic raw materials. The presence or absence of characteristic artifact types or the frequency of specific attributes, insofar as they reflect a cultural preference or traditional mode of expression, may be termed "style". The identification of style would then require that functionally equivalent artifacts be compared (see below). This paper will focus on the stylistic analysis of microlithic armatures. Indeed many studies of lithic artifacts which have attempted to delimit regional human groups or measure social distance have dealt primarily with various kinds of projectiles (TAUTE 1968 ; ARORA 1973, 1976 ; WILMSEN 1974 ; KAY 1975, 1980). A notable exception (in that it involves the analysis of backed blades) is recent work on the Epipaleolithic of northeast Africa (CLOSE 1977, 1978).

Methods

Microlithic armatures, or the type-group of armatures, were chosen as the units of analysis. A type-group denotes a set of artifacts *assumed* to be functionally equivalent, despite variation between individual types. As defined here the type-group 'armatures' is equivalent to the type-group 'points' as used by NEWELL (1973) and PRICE (1975) and includes triangles, trapezes, and microlithic points. This selection was made for a number of reasons : (1) The microlithic armatures exhibit quite standard forms and are most likely to reflect stylistic preferences. (2) Alone or in combination, some may be attributed to specific time horizons within the Mesolithic of north-western Europe. (3) Each microlithic type, or even

"sub-type" may be treated as an analytically discrete unit to control as much as possible for functional variation within the type-group.

For each site examined, microliths were classified in two typologies currently used in Holland, Belgium, and France. As a matter of convenience the typology described by NEWELL & VROOMANS (1972) and PRICE (1975) was used for the analysis. The description of trapeze morphology in later discussions, however, follows the G.E.E.M. (1969) guidelines. Types defined in this manner provided the initial breakdown for the analysis of specific attributes. Attributes thought to contain potential stylistic information were recorded for each artifact including a standard series of continuous attributes (e.g. length, width, thickness) and a series of qualitative attributes which include lateralizations, truncation and/or base shapes, the type of retouch, the angle and origin of the retouch, position of the bulb with respect to asymmetric pieces, and additional retouch. These attributes then provide the data base for making qualitative or statistical decisions about the character of intersite variability.

Initially a series of tests designed to compare each site with one another for each attribute under consideration were undertaken ; tests include Student's t-test for continuous attributes and the chi-square test or Fisher's exact test for qualitative attributes. As these statistics do not provide measures of similarity or difference between all sites taken simultaneously, cluster analysis was also performed in order to examine the mutual relationships between the sites. The results of these latter procedures are discussed below.

A note on tool function

As mentioned above, the notion of style is often contrasted with that of function. For many of the microlithic types examined in this study, surviving examples recovered in their hafts or found imbedded in skeletal fragments (PEQUART *et al.* 1937 ; STROBEL 1959 ; MALMER 1969 ; NOE-NYGAARD 1973, 1974) and edge-damage studies (ODELL 1978, LARSSON 1980) argue for their use as projectile tips or barbs in arrow points or harpoons. More precise functional identification does not seem possible at the present time despite significant advances in the field of microwear analysis (HAYDEN 1979, KEELEY 1980). Indeed the microwear traces which could be expected to differentiate various hunting equipment have not been determined, nor has the problem been adequately treated by experiment.

Other studies of stylistic variation in lithic artifacts have assumed that function can be equated with overall dimensions of the artifact (CLOSE 1977, 1978 ; CLOSE, WENDORF & SCHILD 1979). Aside from the fact that this relationship is untested and unproven, some arguments have been forwarded to the contrary (STILES 1979). Therefore without claiming that functional considerations have been eliminated, the rather narrow set of currently known or suggested functions for microlithic armatures have been put forward. In terms of the analysis each specific type is treated independently as an additional control.

Analysis of some late Mesolithic assemblages

The late Mesolithic period in northwest Europe is distinguished on the basis of artifact typology and bracketed in time by a number of radiocarbon dates (NEWELL 1973, JACOBI 1976, ROZOY 1978, LARSSON 1980). Typologically the microlithic component is dominated by specific forms of trapezoidal microliths which likewise serve as chronological index fossils. The majority of dates for late Mesolithic assemblages fall within a period from about 8000 B.P. to about 6500 B.P.

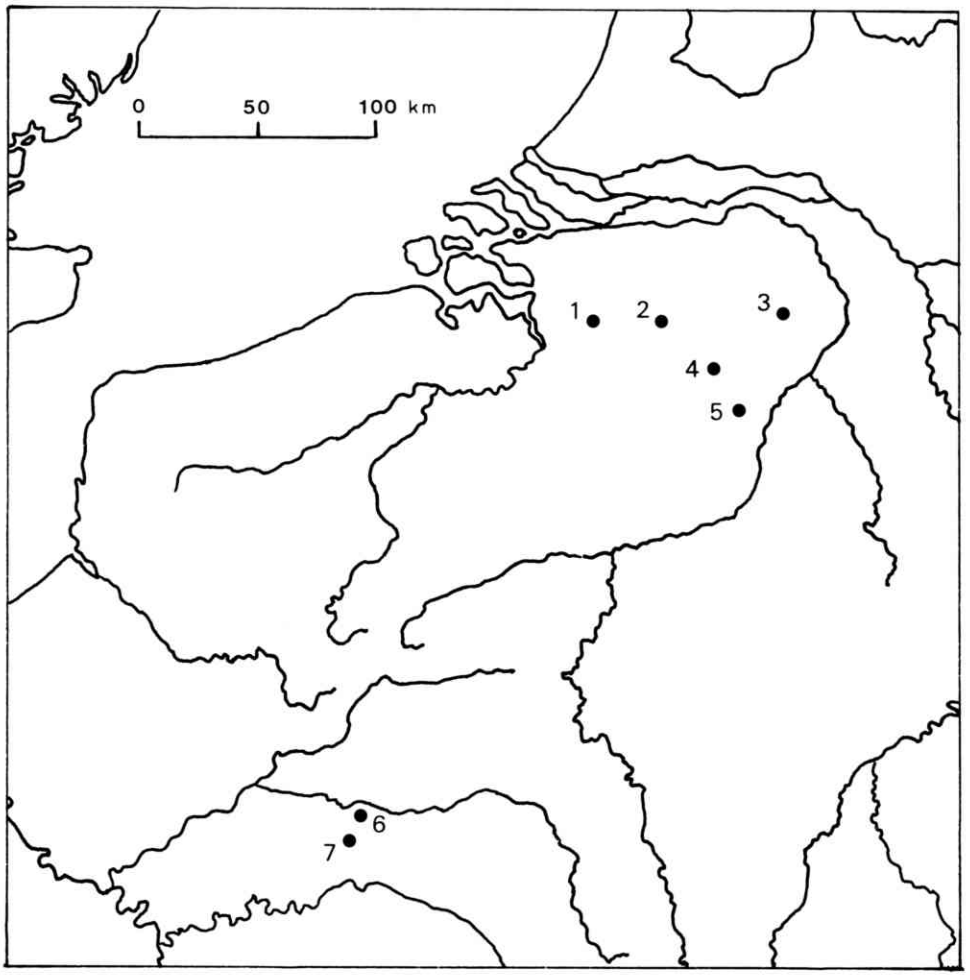

FIG. 1. – Location of the late Mesolithic sites discussed in the text. 1) Brecht-Thomas Heyveldt ; 2) Weelde-Paardsdrank 1, 4 & 5 ; 3) Maarheeze ; 4) Lommel, collection GOOSSENS ; 5) Opglabbeek-Ruiterskuil ; 6) Montbani 13 ; 7) Allée Tortue II, IV & X.

Eleven sites from southern Holland, Belgium, and northern France, within a study area of about 80,000 km^2, are included in the analysis. The sites, located in Figure 1, fall within two principal regions : the Dutch-Belgian Kempen and the Tardenois region of northern France. Published sites include Opglabbeek-Ruiterskuil (Vermeersch *et al.* 1974), Weelde-Paardsdrank 1, 4 & 5 (Huyge & Vermeersch 1982), Montbani 13 (Rozoy 1978), and Allée Tortue II (Parent 1967). The sites of Brecht-Thomas Heyveldt, Lommel, Maarheeze, and Allée Tortue IV & X are unpublished. Except for the surface collection from Lommel, the artifactual material derives from excavated sites and in one instance, Brecht, from a controlled surface collection with limited tests. While the full picture of local late Boreal/Atlantic environments is not completely established, all of the sites are located in comparable geomorphological settings, most often upon dune sands in proximity to former lakes or marshes. There is presently no direct information regarding the season or duration of occupations, and relatively few organic remains of any kind are preserved. The sites (only data for the microlithic component is available for Maarheeze) exhibit roughly comparable tool inventories and type frequencies.

Because triangular microliths and microlithic points are rather rare among these assemblages, only right angle and rhombic trapezes are considered. Even so, individual sample sizes are at times dangerously low. Specific attributes recorded for both types include the shape of the small and the large truncations, position of the bulb (flaking direction) with respect to the large point, and the lateralization (Table 1). The type and origin of the secondary retouch was not included as regular and abrupt backing originating from the ventral surface is essentially a universal characteristic in these assemblages.

The data presented in Table 1 were then adapted for cluster analysis by first converting each value to a percentage for the relevant attribute. Secondly each percentage score was transformed according to a method described by Close, Wendorf & Schild (1979) given as

$$\varnothing(i) = \sin^{-1}(P(i)/100)^{1/2}$$

where P(i) is the percentage frequency of variable i, and $\varnothing$ is expressed in radians. This transformation "to some extent 'de-correlates' the values" converting percentages to angles of which the sines are the square roots of the probabilities (Close, Wendorf & Schild 1979 : 218). Missing values for a variable were substituted with the average value for that variable in all other assemblages.

A cluster analysis was then performed on the computer facility at the Computer Center, Katholieke Universiteit te Leuven. Squared Euclidean distance was used to calculate a matrix of coefficients between sites and Ward's method was used for the hierarchical linkage procedure. This clustering option is part of a suite of programs available with Clustan 1C, Release 2 (Wishart 1978). The results of the analysis were plotted as a linkage dendrogram which is reproduced in Figure 2.

TABLE 1

Absolute frequencies for the attributes of each variable included in the analysis of late Mesolithic assemblages. Data for Montbani 13 is from Rozoy (1978).

	Allée Tortue II	Allée Tortue IV	Allée Tortue X	Brecht	Lommel	Maar-heeze	Mont-bani 13	Opglab-beek	Weelde 1	Weelde 4	Weelde 5
Right angle trapezes											
Small truncation											
Straight	2	9	10	10	18	2	85	3	33	27	7
Concave	11	32	28	5	5	3	195	1	8	11	7
Large truncation											
Straight	12	34	32	14	20	4	–	4	36	27	10
Concave	1	6	0	0	1	0	–	0	3	7	1
Convex	1	1	7	2	2	1	–	0	3	4	2
Position of bulb											
Large point	2	14	–	4	14	1	–	3	12	15	6
Small point	4	20	–	6	9	4	–	3	28	20	6
Lateralization											
Right	16	31	38	16	23	5	235	4	42	36	14
Left	4	10	1	0	0	0	50	0	0	2	0
Rhombic trapezes											
Small truncation											
Straight	1	4	5	16	17	6	15	19	12	19	9
Concave	4	9	6	5	4	0	22	4	5	1	3
Large truncation											
Straight	3	10	8	19	15	3	–	12	11	9	9
Concave	0	1	0	2	6	0	–	0	1	0	2
Convex	2	2	3	2	6	3	–	10	4	10	3
Position of bulb											
Large point	1	3	–	8	7	3	–	9	7	6	4
Small point	3	9	–	8	14	3	–	12	7	12	8
Lateralization											
Right	5	8	11	21	21	6	37	23	17	19	13
Left	0	5	0	0	0	0	3	0	0	1	0

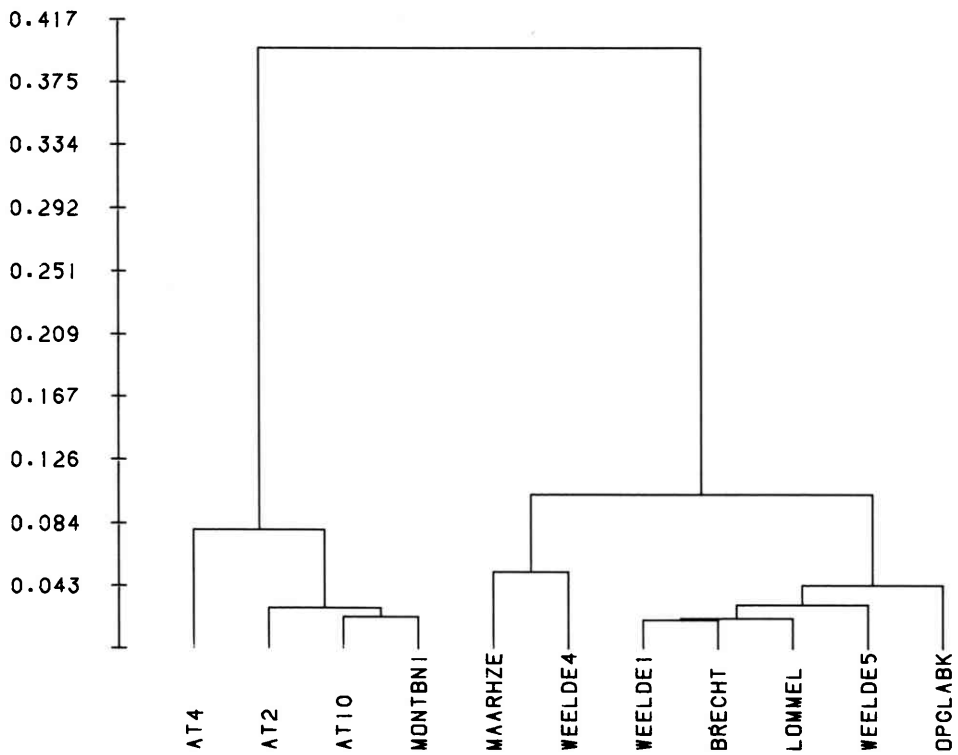

FIG. 2. – Linkage dendrogram of eleven late Mesolithic assemblages. The analysis is based upon the data for right angle and rhombic trapezes given in Table 1. AT refers to Allée Tortue.

The most striking observation from the dendrogram is the separation of sites into two clear clusters. The first comprises the four sites of the Tardenois region of northern France, the second includes the seven sites found in the Dutch-Belgian Kempen. A reexamination of the original data reveals that variation in the shape of the small truncation and to a lesser extent the frequencies of right vs. left lateralizations could account for the greater part of the observed differences between the two primary clusters. Variation in both of these attributes has been recognized by ROZOY (1978) in his comprehensive synthesis of the franco-belgian Mesolithic. While sample sizes are generally small it can be shown by a series of chi-square tests that an increase in sample size, for example by combining the data for each type of trapeze, tends to amplify rather than ameliorate the differences between sites of the Dutch-Belgian Kempen and those of northern France. Secondary clusters within each major group show little temporal or spatial significance, and given the probabilistic nature of the observed frequencies for the variables, are less amenable to interpretation.

More subtle characteristics not included as a part of the cluster analysis can also be noted. For example, the numerous occurences of concave small truncations in the Tardenois region often exhibit a marked extension or "foot" at the intersection of the small truncation and the small base. This feature has also been noted by Rozoy (1978 : 501) who states : "Dans le Tardenois, le concavité est souvent une véritable angulation, la partie gauche de la petite troncature étant sensiblement perpendiculaire aux bords de la lamelle et sa partie droite descendant plus ou moins nettement". This is almost certainly a secondary stylistic feature of the Tardenois assemblages.

Discussion and conclusions

It has been argued that the variation described above is primarily related to style, and if Rozoy (1978) and Huyge & Vermeersch (1982) are correct in their assessment of the chronological patterning of sites in northern France and in Belgium and southern Holland respectively, subtle chronological variation can be effectively excluded to account for these stylistic differences. A more secure series of absolute dates, particularly from France, would of course strengthen this argument. The present analysis would indicate that regional stylistic preferences are being monitored.

This conclusion tends to reinforce previous suggestions regarding cultural differentiation within the later northwest European Mesolithic. The Rhein Basin Kreis (Newell 1973) encompasses within its distribution the seven sites from the Dutch-Belgian Kempen included in this analysis. The Rhein Basin Kreis is defined by the presence of surface retouching on microliths, characteristic types of leaf-shaped points, and the use of Wommersom quartzite. Both surface retouch and leaf-shaped points are encountered, however, in the Tardenois region, albeit less frequently. The Limbourgien (Rozoy 1978) and the Rhein-Meuse-Schelde culture (Gob 1979) may be regarded as roughly, though not entirely, synonymous with the Rhein Basin Kreis.

Up to this point industries to the east of the study area have yet to be considered. While no late Mesolithic assemblages have been examined from the Ardennes, east and south of the Meuse River, there is reason to suggest the existence of a distinct social territory in this region. The first indication can be found in the distribution of Wommersom quartzite, mentioned above. The utilization and distribution of Wommersom quartzite becomes very important in the late Mesolithic and sustains high frequencies on archaeological sites in Belgium and southern Holland, often at distances far from its source near Tienen, Belgium. Its quasi-absence in the region of the Ardennes strongly suggests a lack of regular social interaction with adjacent areas west of the Meuse. Secondly, the absence of characteristic Rhein-Meuse-Schelde A assemblages in the Ourthe Basin (Gob

1979) and the probable late appearance of trapezes (GOB's R.M.S.-B culture) in this region lend support to this argument.

It is doubtful that the relatively strong regionalization noted above for late Mesolithic industries similarly obtains during earlier Mesolithic periods. An analysis of early Mesolithic industries by this author did identify clear stylistic variation in the microlithic component of the lithic industry, particularly among the C- (Tardenois) points. However, preliminary results suggest that this variation may be largely chronological in character, with few differences observable on a regional scale. While this conclusion must still be regarded as tentative, a picture of increasing stylistic differentiation through time is emerging, and parallels the broad demographic and socio-cultural trends observed throughout northwestern Europe during the course of the Mesolithic (NEWELL 1973, PRICE 1981). A more detailed treatment of stylistic variation in the earlier Mesolithic will be forthcoming.

Excluding a consideration of the late Mesolithic occupation of the Ardennes, the results of the present analysis together with the spatial distribution of Wommersom quartzite would suggest that two contiguous social territories could be defined. To this conclusion, however, a note of caution should be added. Only eleven sites have been included in the analysis, and while a separation was observed on a regional scale, more sites should be included to confirm this pattern. Furthermore, an expanded geographic distribution of similarly analyzed assemblages would be necessary to define the spatial extent and approximate boundaries of these regions. There is still a great deal of work to be done in order to accumulate a satisfactory data base upon which the more synthetic studies of socio-cultural variation can be founded. This paper has explored a methodology whereby the existing and yet forthcoming data can be integrated and interpreted.

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REFERENCES

ARORA, S. K.
1973 Mittelsteinzeitliche Formengruppen zwischen Rhein und Weser. *In* S. K. KOZŁOWSKI, *The Mesolithic in Europe*. Warsaw : 9-22.

1976 Die Mittelsteinzeit im westlichen Deutschland und in den Nachbargebieten. *Rheinische Ausgrabungen*, **17** : 1-68.

BIRDSELL, J. B.

1953 Some environmental and cultural factors influencing the structure of Australian aboriginal populations. *American Naturalist*, **87** : 171-207.

CLARK, J. G. D.

1975 *The Earlier Stone Age settlement of Scandinavia.* London, Cambridge University Press, 282 p.

CLOSE, A. E.

1977 The identification of style in lithic artefacts from North East Africa. *Mémoires de l'Institut d'Egypte*, **61**.

1978 The identification of style in lithic artefacts. *World Archaeology*, **10** : 223-237.

CLOSE, A. E., WENDORF, F. & SCHILD, R.

1979 *The Afian : a study of stylistic variation in a Nilotic industry.* Dallas, Southern Methodist University, 301 p.

DOLUKHANOV, P., KOZŁOWSKI, J. K. & KOZŁOWSKI, S. K.

1980 *Multivariate analysis of Upper Palaeolithic and Mesolithic stone assemblages.* Warszawa-Krakow, 103 p.

G.E.E.M.

1969 Epipaléolithique-Mésolithique : les microlithes géométriques. *Bull. Soc. préhist. française*, **66** : 355-366.

GOB, A.

1979 Le Mésolithique dans le bassin de l'Ourthe. *Helinium*, **19** : 209-236.

HAYDEN, B.

1979 *Lithic use-wear analysis.* New York, Academic Press, 413 p.

HUYGE, D. & VERMEERSCH, P. M.

1982 Late Mesolithic settlement at Weelde-Paardsdrank. *Studia Praehistorica Belgica*, **1** : in press.

JACOBI, R. M.

1976 Britain inside and outside mesolithic Europe. *Proc. prehist. Soc.*, **42** : 67-84.

KAY, M.

1975 Social distance among Central Missouri Hopewell settlements : a first approximation. *American Antiquity*, **40** : 64-71.

1980 The Central Missouri Hopewell subsistence-settlement system. *Missouri archaeological Society Research Series*, **15**.

KEELEY, L. H.

1980 *Experimental determination of stone tool uses : a microwear analysis.* University of Chicago Press, 212 p.

KOZŁOWSKI, J. K. & KOZŁOWSKI, S. K.

1979 Upper Palaeolithic and Mesolithic in Europe : taxonomy and palaeohistory. *Prace Komisji Archeologicznej*, Varsovie, **18**.

LARSSON, L.
1980 Ageröd I : B – Ageröd I : D : a study of early Atlantic settlement in Scania. *Acta Archaeologica Lundensia*, Series 4°, **12**.

MALMER, M.
1969 Die Mikrolithen in dem Pfeil-Fund von Loshult. *Meddelande Fran Lunds Universitets Historiska Museum, 1966-68* : 249-255.

NEWELL, R. R.
1973 The post-glacial adaptations of the indigenous population of the Northwest European Plain. *In* S. K. KOZŁOWSKI, *The Mesolithic in Europe*. Warsaw : 399-440.

NEWELL, R. R. & VROOMANS, A. P. J.
1972 *Automatic artifact registration and systems for archaeological analysis with the Philips P1100 computer : a Mesolithic test case*. Oosterhout.

NOE-NYGAARD, N.
1973 The Vig Bull. New information on the final hunt. *Bulletin of the geological Society of Denmark*, **22** : 244-248.
1974 Mesolithic hunting in Denmark illustrated by bone injuries caused by human weapons. *Journal of archaeological Science*, **1** : 171-197.

ODELL, G. H.
1978 Préliminaires d'une analyse fonctionnelle des pointes microlithiques de Bergumermeer (Pays-Bas). *Bull. Soc. préhist. française*, **75** : 37-49.

PARENT, R.
1967 Le gisement Tardenoisien de l'Allée Tortue à Fère-en-Tardenois (Aisne). *Bull. Soc. préhist. française*, **64** : 187-208.

PEQUART, M. and St.-J., BOULE, M. & VALLOIS, H.
1937 Téviec, station nécropole mésolithique du Morbihan. *Archives de l'Institut de Paléontologie humaine*, **18**.

PRICE, T. D.
1975 *Mesolithic settlement systems in the Netherlands*. Unpublished Ph. D. thesis, Department of Anthropology, University of Michigan.
1981 Regional approaches to human adaptation in the Mesolithic of the North European Plain. *In* B. GRAMSCH, *Mesolithikum in Europa*. Potsdam : 217-234.

ROZOY, J.-G.
1978 *Les derniers chasseurs : l'Epipaléolithique en France et en Belgique*. Charleville, 3 vol.

STEWARD, J. H.
1969 Postscript on bands : on taxonomy, processes, and causes. *In* D. DAMAS, Contributions to Anthropology : band societies. *National Museums of Canada, Bulletin* **228** : 288-295.

STILES, D.
1979 Paleolithic culture and culture change : experiment in theory and method. *Current Anthropology*, **20** : 1-21.

STREUVER, S.
1968 Woodland subsistence-settlement systems in the Lower Illinois Valley. *In* L. R. BINFORD & S. R. BINFORD, *New perspectives in archaeology*. Chicago, Aldine : 285-312.

STRÖBEL, R.
1959 Tardenoisspitze in einem Bovidenknochen von Schwenningen am Neckar. *Fundberichte aus Schwaben*, Neue Folge, **15** : 103-106.

TAUTE, W.
1968 *Die Stielspitzen-gruppen im Nördlichen Mitteleuropa*. Köln, Bohlau Verlag, 326 p.

VERMEERSCH, P. M., MUNAUT, A. V. & PAULISSEN, E.
1974 Fouilles d'un site du Tardenoisien Final à Opglabbeek-Ruiterskuil (Limbourg belge).
Quartär, **25** : 85-104.

WILMSEN, E.
1974 *Lindenmeier : a pleistocene hunting society*. New York, Harper & Row.

WISHART, D.
1978 *Clustan 1C user manual*.
University College London, Computer Centre.

WOBST, H. M.
1976 Locational relationships in paleolithic society. *In* R. H. WARD & K. M. WEISS, *The demographic evolution of human populations*. New York, Academic Press : 49-58.

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