

THE NEOLITHIC AT THE LOWER RHINE

ITS STRUCTURE IN CHRONOLOGICAL AND GEOGRAPHICAL RESPECT

BY

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INTRODUCTION

It is still possible to discover Neolithic assemblages of a new and original character, even in an overcrowded and intensively investigated part of Northwestern Europe as the Netherlands are. So it happened to the present author, during his work in the Rhine/Meuse delta, to come across a new type of pottery, that had no apparent relationships either in synchronic or in diachronic sense to anything known in this country. The excavation of this site, named Hazendonk (= Hare's hill) is now in progress (LOUWE KOOIJMANS 1974 : part III; 1975). The dating of the new pottery around 3000 b.c. is now firmly secured and the associated flint and stone industry, food economy and environment are or will be well-established within some years. In the meantime a second site has come to light near Nijmegen (JANSSEN 1974; LOUWE KOOIJMANS in prep.).

This "Hazendonk assemblage" is not the only one that made the rather simple and incomplete picture (SCOLLAR 1961 : 528) of the Dutch Neolithic increasingly varied during the last years : the Limburg Pottery (MODDERMAN 1970 : 141; 1974), Swifterbant (VAN DER WAALS 1972 : 163; DE ROEVER 1974; HACQUEBORD 1974), the first Michelsberg assemblage (LOUWE KOOIJMANS 1976), the Limburg Middle Neolithic (VAN HAAREN & MODDERMAN 1973), and the Vlaardingen Culture (VAN REGTEREN ALTENA *et al.* 1962/'63) are all defined within the last fifteen years. The blanks in the Dutch Neolithic scheme are gradually disappearing.

By these new data progress is slowly made in solving some problems of the Dutch Neolithic, but it appears to be rather difficult to apply the theme(s)

of the colloquium : "acculturation and continuity" to the Dutch Neolithic without comment, since an up-to-date general survey does not exist. The necessary framework must, moreover, be wider than only the Netherlands in view of the extent of the direct cultural relationships. So, I decided to attempt in this paper to present such a framework, needed to deal with the more etheric questions. It will be a piece of traditional archaeology, but this is necessary when one wants to evaluate the new finds (their cultural and geographical relationships) and when one wants to follow a process like "neolithization". Nor acculturation nor (dis-)continuity can be discussed in a wider context without a sound chrono-geographical framework.

Comparable surveys were given earlier by Glasbergen and Van der Waals (1961), Waterbolk (1962), Van der Waals (1964) and Schwabedissen (1966), but I hope to introduce some new elements and ideas. It certainly will be necessary to revise parts of the work when a number of important (sub-)recent excavations (e.g. Satrup, Dümmersee-Hüde I, Vlaardingen, Swifterbant, Hazendonk) will be fully published, but we do not consider this a reason to delay this attempt.

I gave the framework the traditional and logical form of a chrono-geographical scheme, a subdivision in phases and geographical representations of each phase. As always the major difficulty is the extreme inhomogeneity of the raw material : we have to do with a continuum consisting of sharply and vaguely defined, very differentiated and undifferentiated units. The lack of detail is either the result of a small number of data (finds and sites) or of a lack of characteristics. Compare for example the *Linear-*

bandkeramik (DOHRN-IHMIG 1974^b: Tab. 19, 20) with Cerny, Michelsberg with Ertebølle as examples of the abundance or lack of data. Compare Bandkeramik with Michelsberg (LÜNING 1967: Tab. 1; 1969: Abb. 1) to see the influence of the presence or lack of characteristics. In fact, the lack of highly developed decoration on pottery is the main obstacle. Plain pottery is very resistant to classification and difficult to classify when in sherds.

When one wants to work efficiently it is generally not possible to work from the sources themselves, but one has to rely upon comprehensive articles, monographic treatments and the like. Doing so, some find-critics get lost. The result is slightly coarser, but not essentially different from the maximum possible. To say it in economical sense, with less than 20 % of the effort more than 90 % of the result is gained.

In geographical sense the Lower Rhine District is situated between some major landscapes: the North German Plain, the Central and West German Hills and the Paris Basin. The Rhine/Meuse delta has a central position in the space between these major units. The author was struck by the fact that throughout the Neolithic this geographical substructure has been reflected in the cultural patterns. The "landscape" in its widest sense seems to have been the most important ordering factor. In the "borderland" between Nordic, Rhenish (*i.e.* Central German) and western or Atlantic cultures smaller units with an original character seem to have developed in more than one phase.

GEOGRAPHICAL POSITION AND NATURAL CONDITIONS

Situated at the end of the valley of the river Rhine the Lower Rhine District has the possibilities of contacts far into Middle Europe by means of that important prehistoric route. To the north(-east) it is open via the North German glacial plain, as it is to the Atlantic coastal regions by means of the Flandrian plain. The Meuse river may have played a subsidiary role as contact route to the south, but in general the Ardennes, with their NE-SW-directed folds, will have been a serious barrier. Regular overseas relationships with the British Isles, even in the earlier phases of the Neolithic must not be regarded *a priori* as improbable, since in the neolithization of these islands at any rate some kind of seaworthy means of transport was involved (WATERBOLK 1962; CASE 1969).

By a large number of investigations, result of the

dense population and intensive use of this country, the Holocene history and the natural conditions during the Neolithic are rather well understood (DE JONG 1967; 1971).

In total it is a low area with only slight relief in some places, especially along its rims. Three major landscapes can be distinguished:

- the Rhine/Meuse delta (in its widest sense), in the centre
- the sandy and loamy plains, around it
- the loess-covered hills, in the south.

They offer each very different conditions for living. A reflection of this major division in the spatial patterns of the various Neolithic phases is, therefore, not surprising. In the whole area, flat and low and aside the lower courses of a number of rivers, drainage conditions dominated the possibilities of occupation and communication. The Veluwe and the loess-covered hills form an exception. Thus badly passible marshes, peat-bogs and marshy brook-valleys have divided each of the major landscapes into smaller regions, certainly already since the beginning of the Atlantic. These regions, by their soil conditions, measure of relief, degree of internal division by brooks, etc., have a character of their own. Within these regions smaller units can be separated out, *Siedlungskammer*, which seem to have been more attractive than other districts. We recently tried to work this concept out for the Holocene sedimentation area, where the mentioned differentiation is very clear (LOUWE KOOIJMANS 1974: part I). If we take these natural units into account, the cultural differences and the concentration, presence or absence of finds can be better understood. Selfevidently other factors like the intensity of research, erosion and covering, present-day land use and the like must be considered too.

The Rhine/Meuse delta

The Holocene sedimentation area certainly was in a continuous change during the entire Neolithic (HAGEMAN 1969; PONS *et al.* 1963). The main differentiation was, however, rather stable: a belt of coastal barriers, broken by some wide tidal inlets, formed the coast; behind there was a vast marine and estuarine environment with tidal flats, salt marshes and estuarine creek systems. In a quiet phase ("regression phase") this district could change into fresh water marshes, short-lived periods of peat-formation. Between this

mostly salt or brackish district and the "high" sandy hinterland a wide swampy peat belt occurred, with reed swamps at the seaside and alder-carr more inland. The sedimentation-belts of the Rhine and Meuse, and on a smaller scale those of the rivers Scheldt, Overijssel-Vecht and Ems, lay mainly behind this peat belt. But their lower courses between clayey levels cut across it and across the salt marshes. They had their mouths in the wide estuaries or tidal inlets, mentioned above. For a good understanding of the prehistoric occupation (and the chance to discover remains of the various Neolithic phases) it is important to realize that the positions of these lower river courses and their estuaries lay at their present positions certainly as early as 3000 b.c. These river courses must have been the main contact routes between the coast and the high sands, but no Neolithic

remains have been found on their levees, since the old occupied levees have been destroyed or covered over during the later activity of the rivers. Before about 3000 b.c. the coast-line shifted landward and the small barriers were reworked constantly. No traces of occupation could survive this. But after this time the process was reversed: the coastal barrier belt grew to the west and became very broad in a relatively short time (5 km in about 1000 years) (JELGERSMA *et al.* 1970). It became an attractive landscape for Neolithic settlement. Moreover, the river levees and salt-marshes behind it were more protected.

The rising sea-level was the major factor in the development and occupation history of this area. During the Neolithic the rate appears to have been rather constantly about 23 cm per century (compared to ca. 7 cm/century now). The MHW-level rose

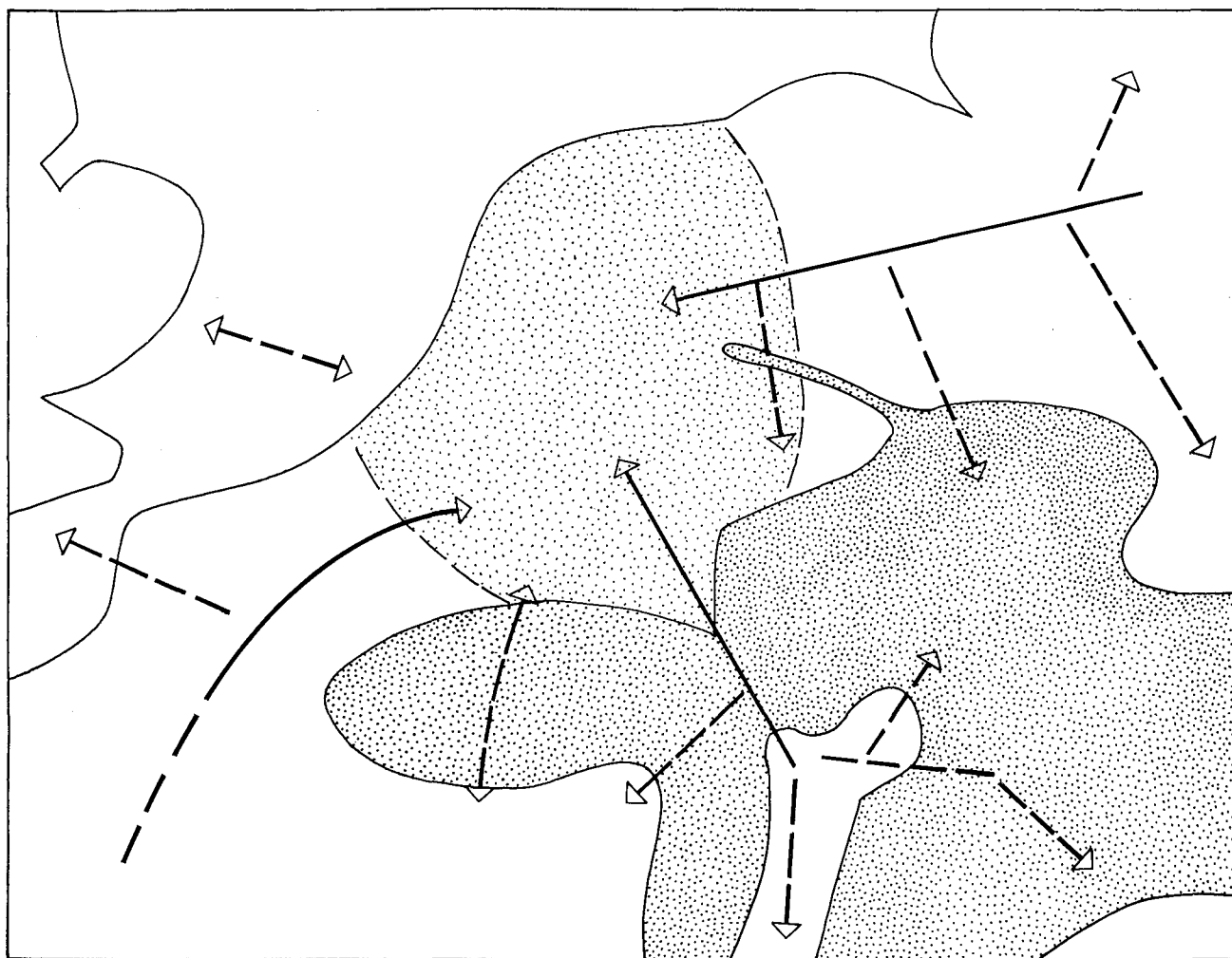


FIG. 1. — Schematic representation of the Lower Rhine District (light shading) and its contact lines with the surrounding areas. Dark shading: mountainous zone.

from $-8\text{ m}/4400\text{ b.c.}$, via $-5\text{ m}/3200\text{ b.c.}$ and $-2.70\text{ m}/2400\text{ b.c.}$, to -1.60 m at the end of the Neolithic (1700 b.c.) (LOUWE KOIJMANS 1974; ROELEVELD 1974). The transgression/regression cycles formed periods of changing possibilities for occupation. Especially the end stage of the transgression phases, when highly silted up deposits became available and when drainage was not yet hindered, seem to be most favourable. These are especially the natural levees and the sandy channel deposits of former creeks and rivers. In the period under discussion four of these "transgression phases" with relatively strong marine aggression and subsequent sedimentation can be distinguished now. The Calais II phase ended about 3300. Creek levees of the end of this phase were inhabited at Swifterbant (VAN DER WAALS 1972: 163 f.) between 3400 and 3200. A Calais III transgression phase is dated between 3200 and 2900, but no inhabited sediments are known from this time. The Calais IV^a (2600-2300) and Calais IV^b (2200-1800) sedimentation phases are followed by a Vlaardingen (2400-2100) and a Late Bell Beaker/Barbed Wire Beaker (1900-1600) occupation phase, both documented by a fair number of sites, spread all over the area. But again one may ask whether the traces of any possible inhabitation during the transgression phases would have escaped from destruction and to what extent the periodicity in the Neolithic occupation data reflects a periodicity in the occupation itself. This is a slightly different and more critical interpretation than I gave earlier (LOUWE KOIJMANS 1974: 46).

The outcropping tops of Early Holocene and Late Glacial river dunes situated in the Late Glacial river valleys at the lower courses of the IJssel and the combined Rhine and Meuse are the third type of landscape elements (beside the coastal barriers and the levees) on which occupation remains have been discovered, especially on a group near Swifterbant and on those in the Alblasserwaard. At Swifterbant Boreal Mesolithic hearthpits and finds reveal a very early use. "Swifterbant" occupation occurred shortly before the tops were covered. In the Alblasserwaard and on some of these dune-tops ("*donken*") farther east, Vlaardingen remains are fairly common. Excavations are now concentrated on the small "Hazendonk", surrounded by thick peat-layers, of which a pollen-diagram revealed questionable traces of occupation around 4000 b.c., and clear Neolithic disturbance of the natural vegetation around 3400, 3000, 2400 and 1700. In between these phases the natural vegetation had completely recovered, which

indicates the absence of occupation. There is no question that erosion or sedimentation influenced this occupation sequence, with the exception of the short period between 2300 and 1900 when a Calais IV^b fresh water clay was deposited in two phases. Since the ¹⁴C dates all agree with the ends of the transgression phases, the sequence seemed to support excellently the periodicity mentioned above. But since the first campaign (summer 1974) of the large scale investigation of this site this clear sequence has been slightly disturbed. Up till now, no "Swifterbant" or older material has been found, but there is a Michelsberg assemblage (3400 b.c.?) and archaeological remains of the phases 3000 b.c. (the new "Hazendonk pottery"), 2400 (Early Vlaardingen) and 1700 (a few late beaker sherds) were found in the peat in stratification, while in the upper Calais IV^b clay and on top of it relatively rich Late VL remains (2100 b.c.) were found. Most likely the last occupation phase had started about 2100 b.c., half-way of the Calais IV^b transgression and lasted until about 1700. The Holocene stratigraphy of thin uniform layers all around the donk permits the chronological correlation of the small occupation centres on different parts of the small sandy height by means of the old surfaces (refuse levels) that can be distinguished in the peat. Since bone refuse of the various occupation phases is preserved (even fish bones) and peat is amply at hand it will be possible to follow here the development of the Neolithic subsistence economy over many centuries. It is easy to understand that people ever returned to this point since it was the only dry place of the peat landscape within many kilometers (the nearest donk lies at a distance of 8 km). After the formation of a long sandy streamridge (c. 1900 b.c.) the site lost its special attractiveness. Later occupation (Bell Beaker, Bronze Age) concentrate on that former river course.

In my view, the most important knowledge acquired during the last 20 years seems to be the fact that people have been settling in the "delta" during the entire Neolithic and that some of the fresh sediments will have offered very favourable conditions for crop farming and animal husbandry, indeed. It seems justified to say that people settled where and when possible. The characterisation of the various Neolithic communities by time and physiographic unit not only in cultural but also especially in economic and perhaps even social respect is a time-devouring task, but will be possible by the good conditions for preservation: organic remains are abundant, because of the wet conditions. The poverty of the

archaeological material is compensated by the application of geology, palaeo-zoology and -botany and ^{14}C dating and the intensity of research. Moreover, we can regard the entire Holocene sedimentation area as one, extensive (sea-level governed) stratigraphy, also in archaeological respect. Data on occupation and finds from widely separated points are in this way connected and dated in absolute and relative sense. There is, however, no question that a certain depth gives a certain date, for there are too many factors to account for: compaction, regional variations of MHW, local drainage patterns, the river-gradients and the like. But true Neolithic stratigraphies are rare and only occur when people returned to an especially attractive point or lived at one place for a longer time. The Hazendonk certainly is such an attractive point with intermittent occupation between 3400 and 1700 b.c. At Voorschoten (GLASBERGEN *et al.* 1968) the same might be the case between c. 2400 and 2000, or perhaps a continuous occupation of some centuries. At Vlaardingen (VAN REGTEREN ALTENA *et al.* 1962/'63-1962: 322). Early Bell Beaker people might be attracted by the earlier Vlaardingen clearings, but the occurrence of Barbed Wire Beaker sherds at Hekelingen (MODDERMAN 1953; 1974) and of Bell Beaker sherds at Swifterbant seem to be accidental. In view of the small chance that settlements accidentally overlap and in view of the occurrence of a number of later long stratigraphies (Beaker—Iron Age) in the dune district (*e.g.* Monster, Velsen-Noordzeekanaal, JELGERSMA *et al.* 1970: 138 f.) and of sites with a long occupation in the peat district (LOUWE KOOIJMANS 1974: 364), some points must have been especially attractive for some reasons that we do not see (yet or any more).

One of the major problems is to what measure the information acquired on the sites in the delta is representative on a wider scale and for other environments (*i.e.* the sand areas). Are we dealing with "permanent" settlements or seasonal camps for special activities as, for instance, fishing in general or on a special type of fish, belonging to settlements elsewhere, for instance, on the higher sands? Such questions are not answered overnight. At any rate this stage of research is too early to give them.

The sand districts

The higher sandy areas consist mainly of Late Glacial cover-sands. North of the Rhine they surround Riss-glacial moraines. In the centre of the Netherlands

these are ice-pushed ridges up to 100 m in height and consisting of older fluvial gravels, sands and loams. In the eastern part these ridges are scarce and the cover-sands predominating. In the north we find the Drenthe plateau, formed by boulder clays. These glacial elements are lacking to the south of the Rhine. The subsoil of the cover-sands is formed there by the sandy and gravelly terrace deposits of Rhine and Meuse, very similar to those pushed up by the Saale-ice further north. All these regions are intersected by wide marshy valleys and brooks, that divide these landscapes up into innumerable minor units. In Neolithic times the various soil-, groundwater- and drainage conditions must have been reflected in the type of forest cover. So we see the sand district as more and more differentiated. In the seemingly uniform country the conditions for settlement and the possibilities for food production and wider contacts varied widely. Other factors that influenced the settlement pattern might have been the "scale" of the landscape (the dimensions of the units, esp. the arable units), the marsh-sand ration, the passibility.

Bad drainage conditions both in the valley-bottoms and on the flat drainage-divides resulted in the development of extensive peat bogs there. These bogs formed natural boundaries between more or less enclosed occupation districts. The most important surround(ed) the Drenthe plateau and formed the Peel-moors between North Brabant and Limburg. During the Neolithic they were not yet as extensive as in historic times. Especially the coastal peat bogs must have extended considerably less eastward (landward) in view of the 6-3 m lower level of the Mean High Water. Such a slight difference had a considerable horizontal effect in this very gently sloping, almost flat area. The positions of the routes or road-connections were largely fixed by the limited number of gaps in and between the marshes and the bogs. Until now no comprehensive study has been made on this theme: settlement pattern and natural conditions in the sand districts, so the above remarks had, out of necessity, to be of a general and sketchy character. On the dry Veluwe the Late Neolithic beakers tended to concentrate in the largest valleys, with a preference for the moist sandy soils (MODDERMAN 1962/'63), while in the wet cover-sand landscapes finds are generally made on the low ridges. Factually the number of sites is still too small to say anything about settlement density. Middle Limburg might appear to be an occupation centre, like the moist Drenthe plateau seems to be. But to what extent has this last suggestion been influenced

by the presence of the megalithic graves (*hunebedden*) and the intensive investigations? Moreover, especially in the dry sand districts inland dune formation resulted in the destruction of extensive parts of the former occupation pattern.

The major contributions to a better understanding of the occupation of sand districts are the studies by Newell (1973) of the Mesolithic, by Bakker (1973) of the TRB Culture and by Modderman (1964, VAN HAAREN & MODDERMAN 1973) of the Neolithic occupation in Middle Limburg.

The loess belt and the low mountains behind it

South of the line Mechelen-Sittard-Köln the cover-sands are replaced by the loess. There is a rather sharp boundary between both. Internally the loess-district can be differentiated into a few major landscapes. In Limburg and the Rheinland intersected Pleistocene terraces are covered. In Belgium it are densely intersected mainly Tertiary deposits in a hilly countryside. To the south these loess-covered hills and plateaus are bordered by the deeply intersected low mountain belts of Ardennes and Eiffel. East of the Rhine a small loess-zone can be made out bordering the northern limit of the Sauerland. There are some isolated patches of loess in the North German Plain.

The relatively rough mountaneous zone south of the loess is divided into blocks (Hunsrück, Taunus, Westerwald, Vogelsgebirge, Rhön etc.) by wide valleys, sometimes meeting in basins (Neuwied Basin, Mainz Basin, Wetterau), where also loess has been deposited. These are distinct *Siedlungskammer* and contact routes, as opposed to the mountain blocks in between them. On the loess the presence of flat terrain and of water will have been the major factors for settlement. Due to later colluviation (result of deforesting) the Neolithic situation was different from that of the present day. The minor valleys, now dry, and partly filled with colluvial loess, will have contained active brooks. Colluviation can also influence the find pattern: sites will have been eroded or covered.

Our insight in the occupation sequence and occupation patterns in the loess district is considerably increased by the Aldenhovener Platte project (*Aldenh. Platte* I-IV, 1971-1974; FARUGGIA *et al.* 1973; KUPER *et al.* 1974). The result of these prospections and excavations must be taken as representative for the totality of the loess zone, taking regional differences into account.

Dating

It is now possible to take objective age measurements as a basis for the chronological scheme: generally spoken ^{14}C dates are available in some quantities and brought together in a number of critical surveys: by Tauber (1972) for Denmark, Bender and Phillips (1972, also: EDEINE 1972, BLANCHET 1974) for France, Isobel Smith (1974) for Great-Britain. De Laet (1972) mentions those for Belgium, Neustupný (1968, 1969) and more recently Lünig those for Germany (LÜNIG 1969, 1970; LÜNIG *et al.* 1971; KULICK & LÜNIG 1972). For the Dutch dates we refer to Modderman (1970: 200), Bakker (1974: VI-51), Lanting *et al.* (1973), Bakker & Van der Waals (1973), Louwe Kooijmans (1974: 140). Using ^{14}C -dates as a basis one has to be critical in the sense expressed by Waterbolk (1971). Single ^{14}C -dates and extreme values, especially if the archaeological association is not very strict, must be regarded with suspicion. One of the great advantages of the use of ^{14}C -dates is that the margins of error do not increase in long-distance comparisons: it does not matter whether regions are close together or widely separated, since we always compare directly and not step by step.

Self-evidently well-defined stratigraphic data are also taken into account, but chronological implications of (presumed) typological relationships, between not very closely related assemblages are not used, to avoid circular reasoning. It must be concluded from the chronological positions whether any relationship is possible. Trade relationships (objects imported from one "culture" into another) are a different matter. They demonstrate true contemporaneity.

Cultural grouping

We have to answer the question what type of cultural units have to be indicated in the scheme; the "cultures". self-evidently? The traditional cultural units are historically grown and certainly no ideal concepts from a modern theoretical point of view. But I hope to demonstrate that they are practical. Before we plot and use them it is, however, necessary to trace what system is behind the use of various terms that are linked up with the culture concept, not making a new system, but just describing the present day customs (LÜNIG 1972 for a more theoretical approach). Doing so we render account of

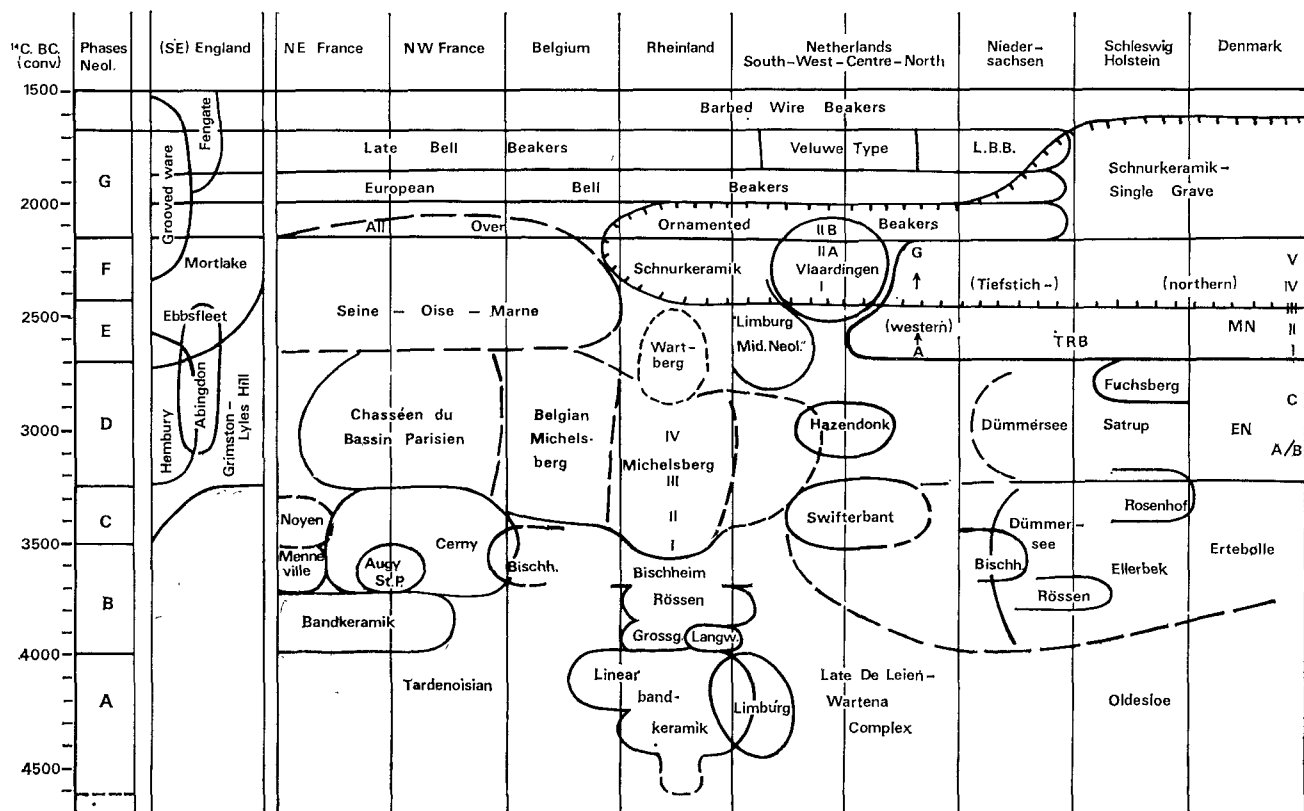


FIG. 2. — Chrono-geographical scheme of the Neolithic in the Lower Rhine District and its surroundings.

the concepts we are working with and perhaps make them and use them more strictly.

The single object or feature (German: *Fund* or *Befund*), be it material or immaterial (abstract), movable or immovable, is generally considered to be the smallest archaeological unit. Factually, however, the single characteristics of these objects and features are the smallest elements. By means of these characteristics (for instance: techniques or motifs of decoration) a classification can be made and a type can be defined as an object with a number of qualitative and/or quantitative characteristics and their variation widths. Apart from classification of single objects only distribution maps can be made, so far as ordering work is concerned.

The single object or feature may be an element of an association or assemblage, i.e. a group of objects/features occurring together (on a site or spot) and as such the remains of an activity of restricted duration. So the objects are linked together in space and time. If both criteria (space and time) are very restricted, as for instance with grave goods or most types of hoards, the association is called

closed. But often (esp. in settlements) the association is less firm and "open" (to contamination) in different degrees.

The culture is the grouping of the next order. It consists of identical (ideal case), similar, comparable or typologically related associations occurring in spatial coherence. The culture contrasts to similarly constructed groupings around it, in chronological and spatial sense. In both senses cultures can also be separated by blanks. The participating associations can be varied or restricted and in this last case they only share elements with the more complete associations but not vice versa. It seems essential that the associations reflect in the first instance occupation (such as those from settlements) and not, for instance, trade (as might be the case with hoards) or grave ritual or religion (when megaliths or burial customs are used).

In practice, in the Neolithic a culture is distinguished on the base of pottery, its various forms and decoration-characteristics, very similar to the definition of a palaeolithic culture or industry, based on flint artifacts. Sometimes a generalization of these characteristics into a pottery style is made;

the style and its occurrence (again in time and space) is then named a culture. There are good reasons for this: pottery is the most susceptible to fashion of all common prehistoric relics and thus the best surviving material to draw detailed subdivisions. It is, moreover, resistant to long-distance transport; at least this seems to be the case with Neolithic pottery in NW-Europe, and so more strictly bound to its makers than for instance axes and flint implements. As LÜNING states a (Neolithic) culture in this part of Europe factually is a part of the cultural totality, defined by a ceramical grouping (LÜNING 1972: 171).

This grouping gets additional support by types of other material or nature. The strongest support is that of a type that occurs exclusively within one culture and in its totality. But this will seldom or never be the case. No two types seem to have exactly the same spatial and chronological extent, due to factors as trade, regional variation in fashion and use etc. This is already the case within the group of pottery, with the various characteristics of this material. Moreover, proof of an exclusive occurrence needs the establishment of the absence of the type in the time and regions around. Two cultures may, moreover, share a certain type or different types may be in use in different parts of the culture. On this base relationships or subdivisions can be made or become apparent.

In the process of giving a culture more contents by the addition of more and more elements the boundaries of it become less and less sharp. The culture may get an increasing number of elements in common with its neighbours and an increasing number of elements only occurs in restricted parts of it. However, it is very logical that one wants to know more of prehistoric people than its pottery and tries to make the culture more "complete", even as complete as possible. But one may wonder whether a conclusion reached at one site is valid for the whole unit as defined by the pottery. In many cases it seems to be right, but sometimes this has been proved to be wrong. We only mention the example of the varying (landscape-bound), food-economy over short distances within the Vlaardingeng culture (CLASON 1967; GROENMAN-VAN WAATERINGE *et al.* 1968).

In my view because of this process another more abstract and generalized conception of culture has grown, which rises above the definition given above: from the contributing associations the ideal and most complete cultural assemblage is composed. This "Culture" is an assemblage of types, a "super-association" of objects, features and abstractions.

This way of working or thinking tends to sharpen boundaries and to disregard border phenomena. When one, however, realizes that cultures are built up not only of identical but by more or less closely related associations, reality is not much strained.

This conventional conception of culture is purely inductive and in use to bring order and structure in the mass of data and to make it possible to apply data from one or a few spots to a district or a certain time span. It is a means to overcome the rather restricted possibilities of prehistoric research to a modest extent. Chronology, perhaps, originally was, but is not now the first purpose in the construction of cultures. The culture too, is a means to make use of the vast quantity of material that is available from not fully documented localities, especially from not well-dated or not stratified sites. Via the typological relationships this information can be brought into use. The scarcity of sites does not permit of neglecting this information.

Cultures, especially the more extensive ones (TRB e.g.) can be split up in regional units, sometimes called "groups" (*Gruppe* in German), but rather to be named *facies* as is done, in agreement with geological terminology. Cultures can also be divided in chronological units, called *phases*. There can be a separate phasing for various *facies* of one culture, or different regional groupings for the various phases of one culture.

Groups can be intermediate between cultures and associations. They are parts of cultures, restricted in space and time. So, in the present use of the word, a group can never exist on its own. It is wrong to call a small cultural unit of an original character a group, because of its restricted distribution. A culture needs not to be split up totally into groups. It is possible (and this mostly happens), to distinguish one or two groups and to leave the remaining part of the culture undivided and unnamed. A culture, at last, can be a member of a group of related cultures.

When one wants to avoid the expressions "style", "culture" and "industry", the concept *tradition* can be used to characterize a technique or fashion embodied in one or more related associations. So it is possible to speak of the Bandkeramik tradition, the pottery tradition of the Bandkeramik or even the Bandkeramik tradition of pottery decoration and that of pottery decoration techniques.

The criteria for drawing boundaries around cultural units are ever (rather) suddenly and (rather) generally occurring changes. The boundaries thus created might be sharp and self-evident or vague. This

vagueness might be real or caused by the lack of data.

We must realize that the scheme, presented here, like every scheme, even the most detailed, is only an approximation of reality, which itself is always much more complicated. The causes are, in the first place, the restricted number of data and the resulting vagueness of the delimitation of the geographical boundaries, and secondly, the restricted number of datings and their margins of error. Thus, short-term changes are not discernable. The picture we get of the prehistoric relations is out of focus, and in different degrees in the different regions and phases. This is the major cause of apparent chronological and regional overlaps, although vague boundaries (*i.e.* gradual changes) will have existed originally.

We now enter the problem of the original coexistence of more than one culture in one area. In contrast with the schemes presented by De Laet (1966, 1972, 1974), we avoided overlaps between cultural units in other instances than those, which are attested with certainty, notably the coexistence of Vlaardingen or the later part of TRB with various Battle Axe groups (BAKKER & VAN DER WAALS 1973). This example is proof of the fact that various cultural traditions certainly can have existed side by side in this region. We do not think it to be right, however, to assume systematically a similar situation when there are no forcing reasons for it, especially not when both cultures (presumably) had a comparable subsistence economy, as for instance Chasséen and S.O.M. It is of special importance for northern France where ¹⁴C dates to my opinion show a tendency to give some cultures rather late ends. In this way we discounted our intention of objectivity to some extent and introduced an element of (argued) personal choice. In such cases one cannot set aside cultural or typological arguments completely.

Cultures are members of units called *p e r i o d s*, in this case the Neolithic. Periods are of chronological value only in restricted areas; in wider sense (in the extreme in mondial respect) they have hardly any chronological value. Factually, the Neolithic is a technical-economical or cultural stage, not a period. From a historical point of view we can understand the name "period": it has originated in a time when datings were extremely vague and was used then in restricted areas. So in prehistoric archaeology "periods" are just groupings of a higher order of cultures, that are related to each other in some respects. In the Neolithic these are the use of pottery and polished stone axes, the food-production and the

permanently occupied settlements, and the absence of bronze and iron implements. The boundaries of the Neolithic, like those of periods, are again vague since there are marginal phenomena: cultures that are not "fully Neolithic" like the "pre-pottery Neolithic", the copper-using Bell Beaker Culture, and that are intermediate to the preceding and following periods. The intermediate position might be also in geographical respect ((parts of) the Vlaardingen Culture, the *Grübchenkeramik*(?)) or in both respects (the Ertebølle Culture).

The reasons why there are no true periods, like those of the geological system might be explained as follows. First, there are no counterparts of the geological guide fossils. Type-artifacts always have a restricted distribution, a relatively long life and then are relatively rare. Secondly, the velocity of the expansion of such elements or aspects is often of the same order of magnitude as the period- or phase-length (*i.e.* the "retardation" phenomenon). If there is something like a guide fossil (*e.g.* the earliest LBK-pottery, the European Bell Beaker) a nice "horizontal" line can be drawn in the area of its occurrence.

Like cultures and groups can be divided in phases, this is possible with periods and similarly such a phase has a true chronological value, with fixed ages as lower and upper limits.

As mentioned before, the above argumentation describes the present customs, which has a right of existence by its historical tradition, that is the argumentation of some generations of prehistorians. It is a "naturally grown" structure embodying obvious and self-evident distinctions. Whether this is an ideal scheme from the theoretical point of view is out of the question. This is certainly not the case. The basic data are not ideal (there are few "complete" associations) and at any rate insufficient for the creation of an ideal scheme, in which the concept of "culture" would have been passed over. This can, however, grow out of the present scheme, by plotting more or less ideal or complete associations in it in the way we will suggest below.

We think this introduction was necessary, not only as a basis of the construction of the scheme, but especially for a correct approach of the (dis-)continuity and acculturation matters in the area under discussion. We demonstrated that it does not matter what type of cultural units are indicated in the scheme and that for instance the expressions "Neolithic", "Chasséen", "Vlaardingen", "Western TRB-phase D" or "Hazendonk" are not different in essence, but only in degree of abstraction.

Still the earlier mentioned extreme inhomogeneity of the basis data is an obstacle to uniform representation. There are various possibilities for that. We have chosen here to draw "eggs" or "balloons" around the cultural units. In this way gaps in between them (and in our knowledge) become the best visible. We see a system of blanks and concentrations, in space and time. These are concentrations of very differentiated material and detailed knowledge (e.g. LBK, Tiefstich-TRB) and blanks that yet have to be or are being filled up (e.g. Lorraine, pre-TRB Netherlands). We may ask in which measure this ill-balanced situation reflects the original variations in occupation or is largely the result of the 'filter' through which information comes to us: differences in preservation, chance of discovery, intensity of research and the like.

In view of the (dis-)continuity problem, we can consider every "balloon" as more or less homogeneous in itself, as far as pottery is concerned. There might be an internal development (a phasing), a regionalization or both. Internally "groups" might be distinguished, but these all contrast as more or less gradual changes in comparison to those at the

boundaries of the balloons. The (dis-)continuity question has, mainly, reference to the mutual affinities of the balloons. Acculturation can only take place on horizontal lines.

PHASING

It is visible in the scheme that during the greater part of the Neolithic the position of the Lower Rhine Basin in cultural respect is essential between three major spheres, a Northern, an Atlantic or Western, and a Rhenish or Middle European sphere, of which only a small corner is represented. This applies with greater force than the general respect, in which every region is lying between others. Throughout prehistory and certainly during the Neolithic major cultural boundaries crossed through the Lower Rhine District. Filling up the rooms in between the large units there are minor local groupings. This situation is the main reason why there is still no agreement in the division of the Dutch Neolithic into periods or phases. A solution might be to introduce two sequences: one for the

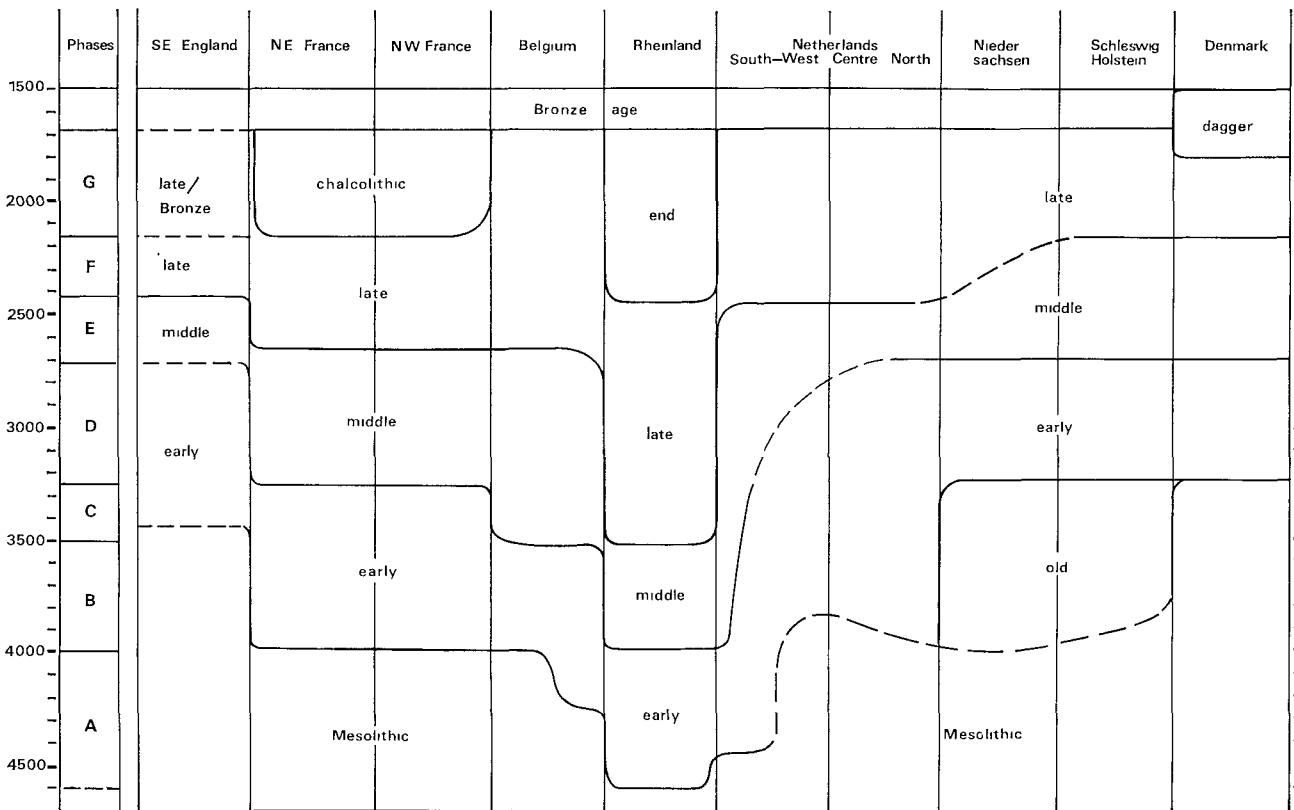


FIG. 3. — Present traditions in the subdivision of the Neolithic in the early-middle-late style in the various districts represented in fig. 2.

centre and the north, linked to the Scandinavian system, and one for the south, linked with the Rhenish and Belgian divisions. But this would be very inconvenient in a small country. Another solution, followed here, is to abandon the expressions "old, early, middle, late, end", etc., because of their emotional values.

As said above, a period like the Neolithic can be divided in phases, similarly to the phasing of a culture. These phases must have a true chronological value in the area under discussion. Such phases are not essential and have a restricted value in historical sense (*i.e.* in the reconstruction of prehistory), but they are very useful as a shelf in the discussion. A more or less natural phasing has to make use of levels in the scheme where division lines already seem to be present. Moreover, the phases must not be too long (to avoid non-synchronic major elements

to be classed in one phase), not too short (to avoid difficulties in the representation of the districts known in less detail), and of about equal duration. Some groups in some phases might have much finer subdivisions (LKB, Rössen, TRB for instance), but this is of minor interest here. Along this line of reasoning an ideal mean phase length is about 400 conventional ¹⁴C years. In some cases (Ertebølle, Cerny) this seems, however, still too fine. At this moment it seems most convenient to make a division in the Lower Rhine District into parts of 300-600 ¹⁴C years each.

The various phases are indicated with capitals similar to the system proposed by Fischer (1968) for Hessen/Thüringen and adapted by Lünig (1972: 171) for South- en West-Germany. In view of the central position of the German sequence within the West-European prehistory it seems reasonable to

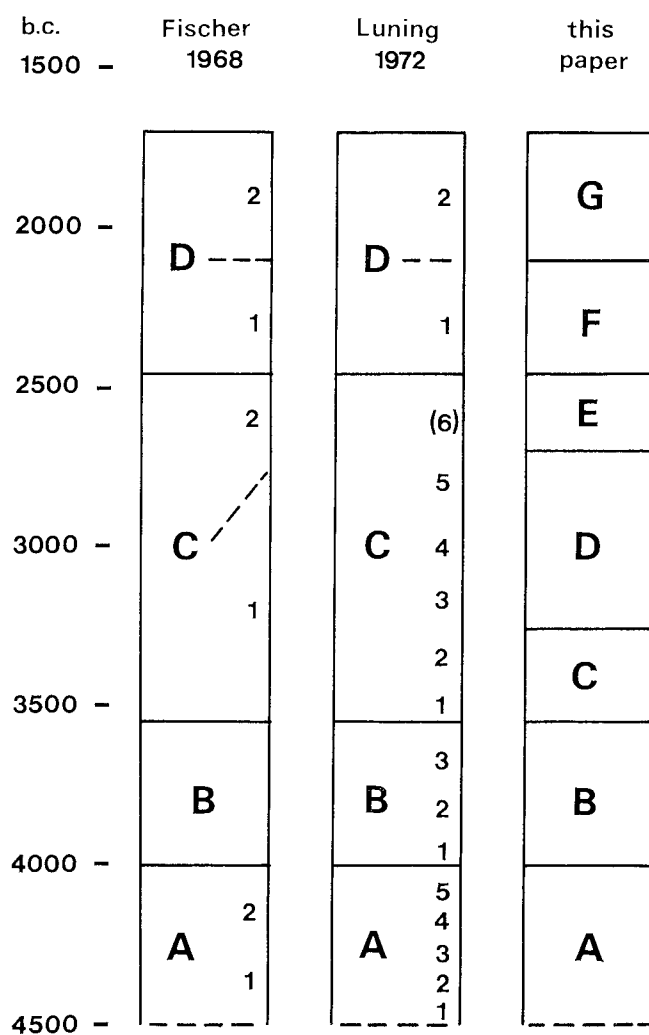


FIG. 4. — Comparison of the subdivisions of the Neolithic as proposed by Fischer (1968), Lünig (1972) and in this paper.

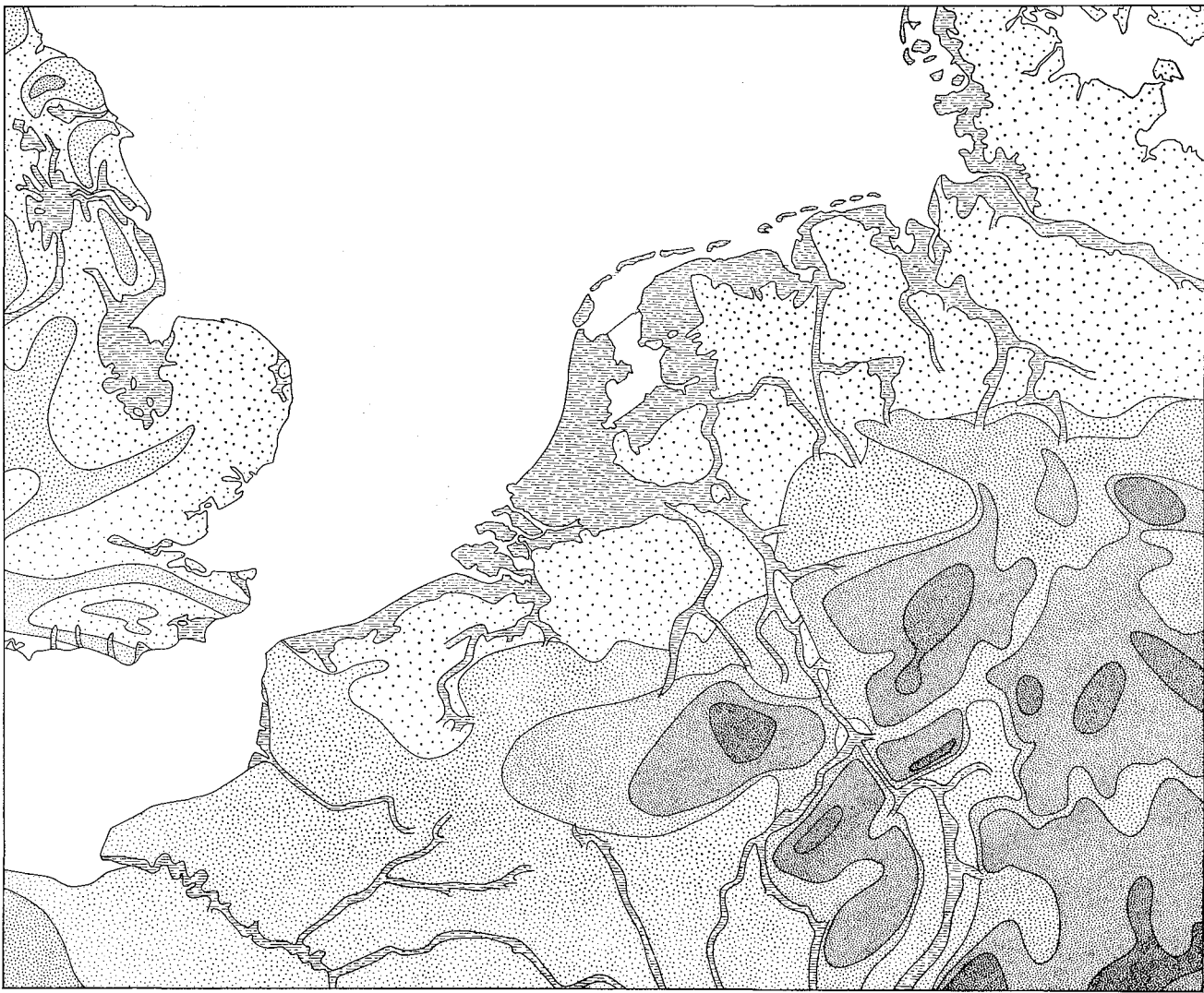
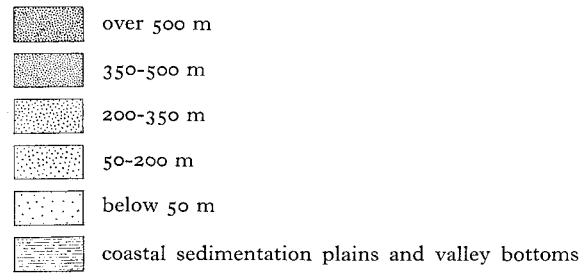


FIG. 5. — Substructure of the maps of the figs. 6-11.



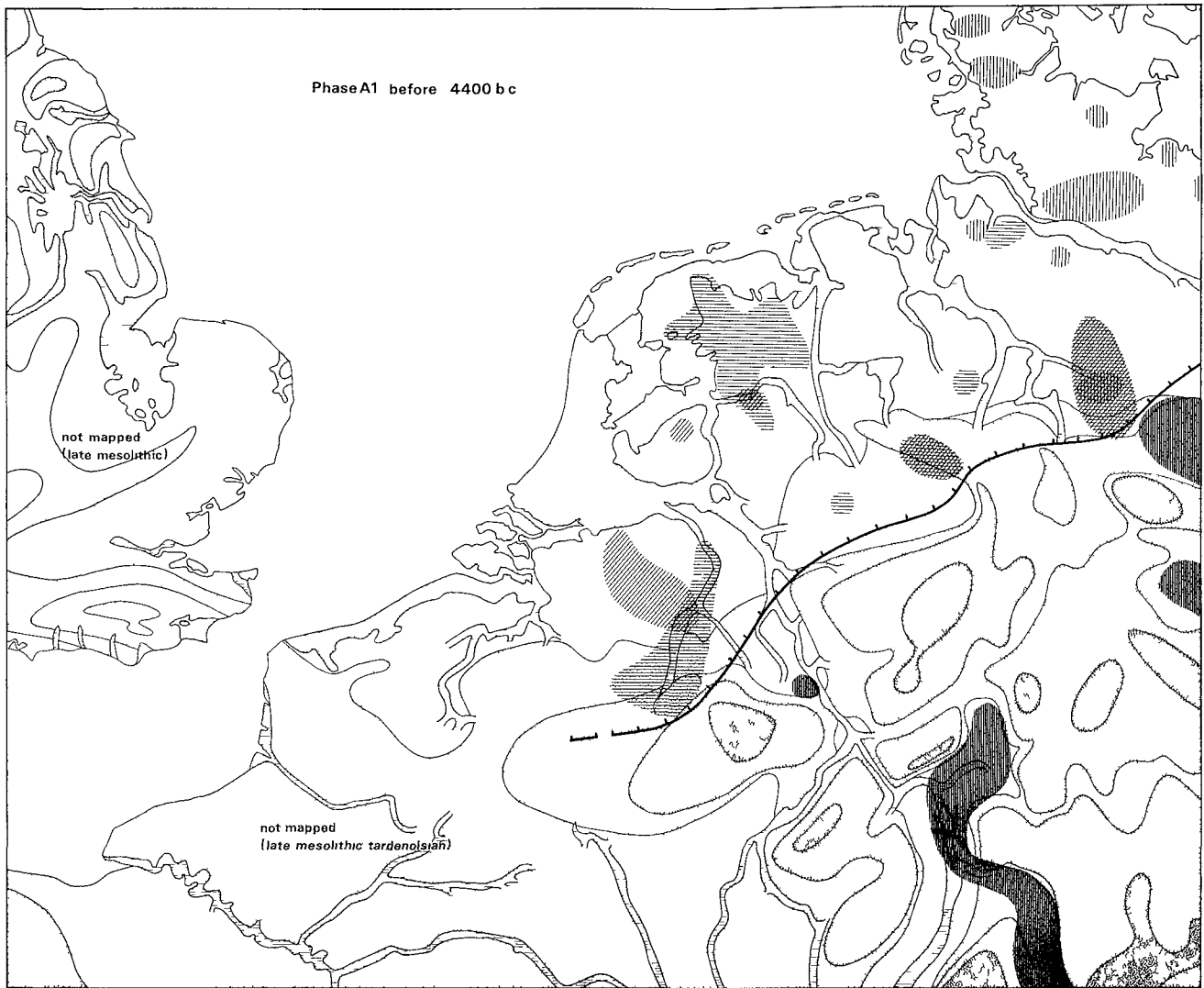







FIG 6 — Phase A1, before 4400 b c —is based on

Northern Late Mesolithic altesten LBK
 NEWELL 1973 maps VII, VIII
 QUITTA 1960, MEIFR-ARENDT 1972^b,
 SIELMANN 1972 Abb 43, 47

- | | | |
|----------|---|---|
| northern | } |  Oldesloe |
| | |  De Leien-Wartena Complex |
| | |  Late Mesolithic Survival |
| | |  presumed southern limit of northern Late Mesolithic |
| central | { |  altesten Linearbandkeramik |

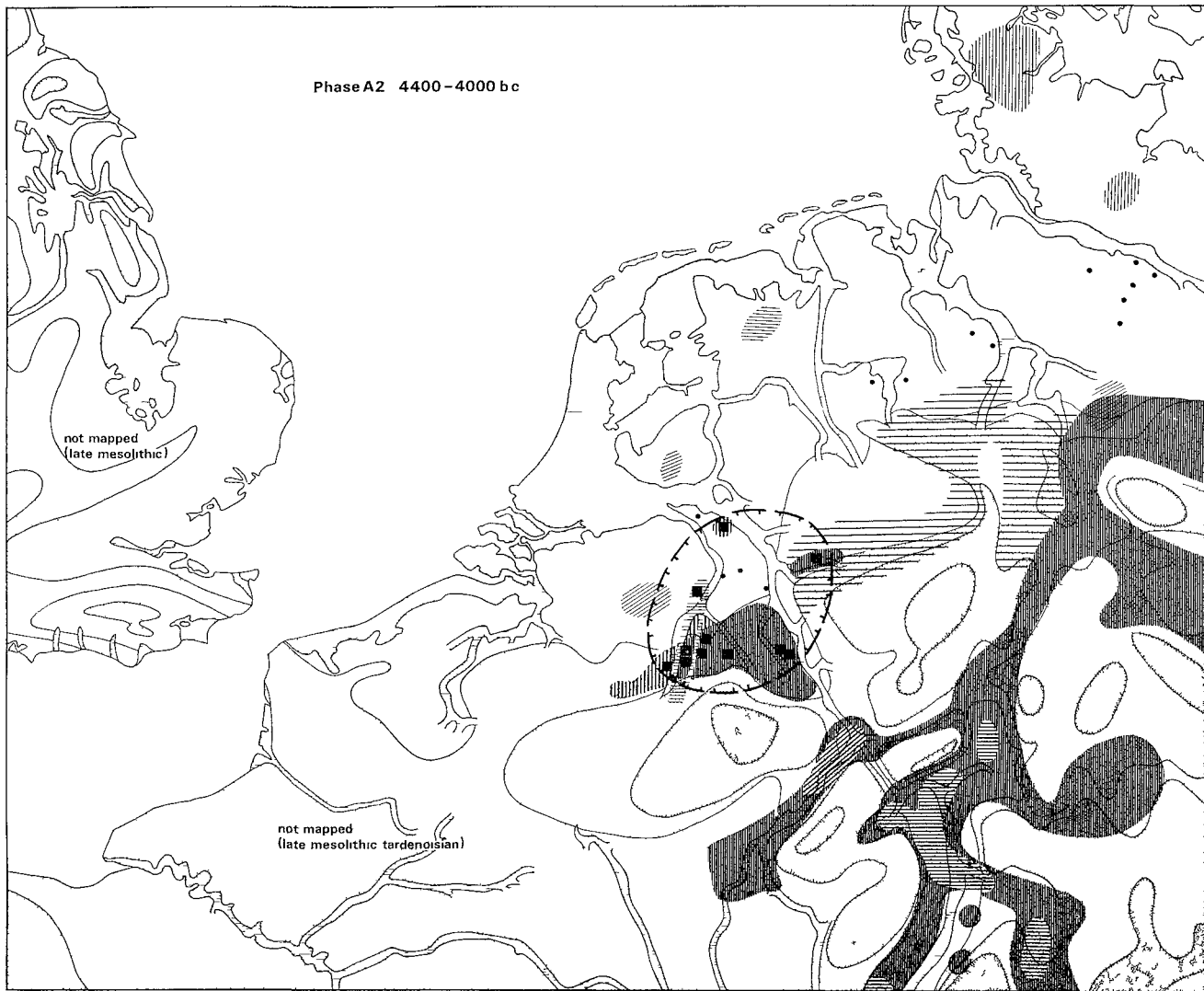


FIG 7 — Phase A2, 4400-4000 b c — is based on

Northern Late Mesolithic NEWELL 1973 map IX

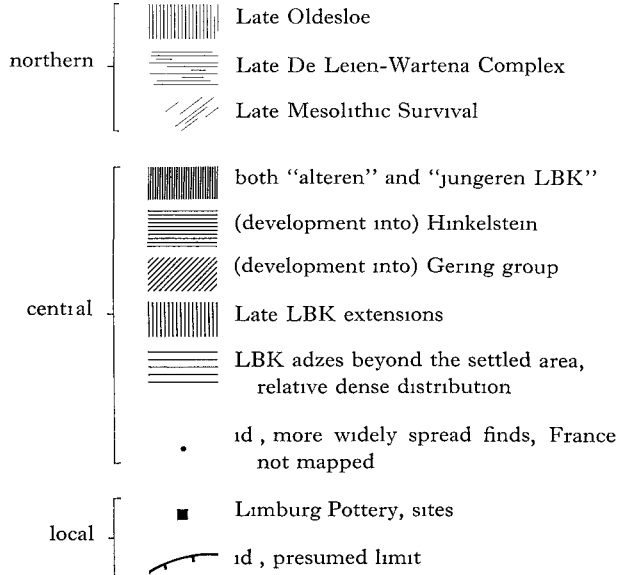
LBK MODDERMAN 1970 Taf 1, DORN-IHMIG 1973, 1974^b Bild 19, 20, SIELMANN 1972 Abb 1, 3, 4, 8, 11, MEIER-ARENDET 1972^a, DE LAET 1972 Abb 66, HINZ 1974, MEIER-ARENDET & PAX 1973, BEHRENS 1973 Karte II

Hinkelstein MEIER-ARENDET 1972^a Abb 60

Gering DORN-IHMIG 1974^a Abb 5

adzes BRANDT 1967 Karte 1, 3, 4, HOOF 1970 Karte 13, HULST 1970 p 27

Limburg Pottery MODDERMAN 1970 p 141 with references, 1974^a, MEIER-ARENDET 1969^a, 1972^c, HINZ 1974, STEHLI in FARRUGGIA *et al* 1973 p 84



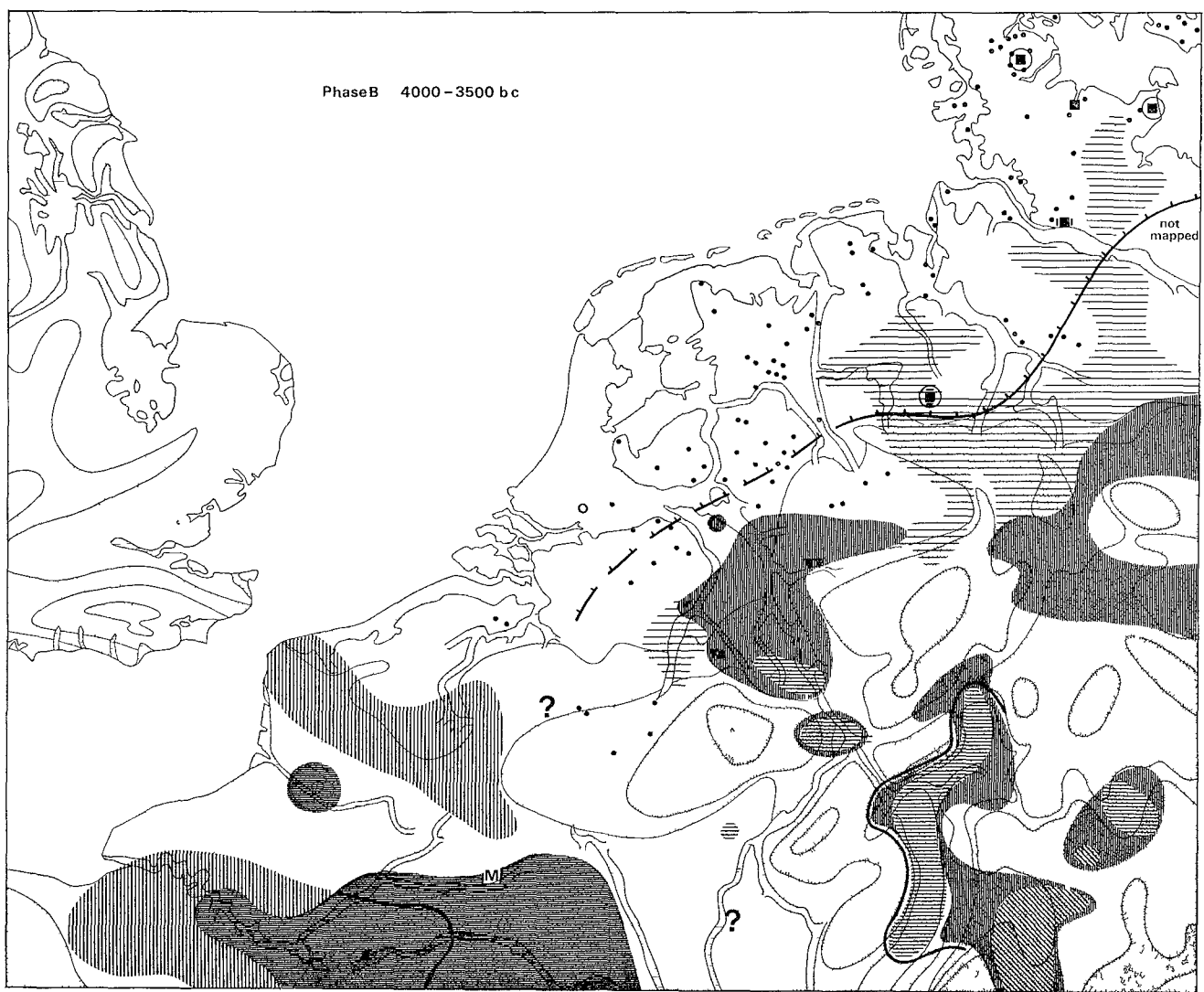


FIG 8 — Phase B, 4000-3500 b c — is based on

Grossgartach	GOLLER 1972 Abb 70, MEIER-ARENDT 1969 ^b , BRANDT 1967 ^a , GUNTHER 1973, STEHLI 1974, IHMIG <i>et al</i> 1971
Rossen	SCHWABEDISSSEN 1966 Abb 3, GOLLER 1972 Abb 71, LUNING 1969 Karte 1, 7, BLOEMERS 1972, KUPER <i>et al</i> 1974 p 39, HOOFF 1970 Karte D, BEHRENS 1973 Karte IV
Bischheim, Schwieberdingen	LUNING 1969 Karte 2, 8, SCHROTER 1971, MEIER-ARENDT 1972 ^d , GOLLER 1972 Abb 72, JORIS & MOISIN 1972
axes, adzes	BRANDT 1967 Karte 2, 5, 6, SCHWABEDISSSEN 1966 Karte 2 ^a , 2 ^b , LOMBORG 1962 Abb 17, VAN DER WAALS 1972 Abb 62, HOOFF 1970 Karte 13
LBK, Paris Basin	BAILLOUD 1964 fig 1, 1971 fig 30
Cerny, Menneville	BAILLOUD 1964 fig 13, 1971 fig 31, DE LAET 1972 Abb 67, 1974 fig 67
Ertebølle-Ellebek	SCHWABEDISSSEN 1957/'58, 1966 Abb 26, (1968), 1972, DEICHMÜLLER 1969, SCHINDLER 1953/'55, 1962
Langweiler Type	IHMIG <i>et al</i> 1971, KUPER <i>et al</i> 1974, <i>Aldenh Pl IV, 505 (1ef)</i>
pollen	LOUWE KOOIJMANS 1974 p 138 f

		northern limit of Grossgartach
		Grossgartach sites in Lower Rhine District
		Rossen s s
central		(development into) Bischheim
		(development into) Schwieberdingen
		perforated Rossen axes and adzes beyond the settled area, relative dense distribution
		id, more widely spread finds, France not mapped
western		Late Bandkeramik of Paris Basin
		Cerny (extent beyond Late Bandkeramik)
		Menneville
northern		Ertebølle-Ellebek sites a without "imported" pottery b with Rossen pottery c with Bischheim pottery d ¹⁴ C dated to phase B
		presumed southern limit of E-E complex
local		"Langweiler Type"
		pollen evidence for agriculture (?)

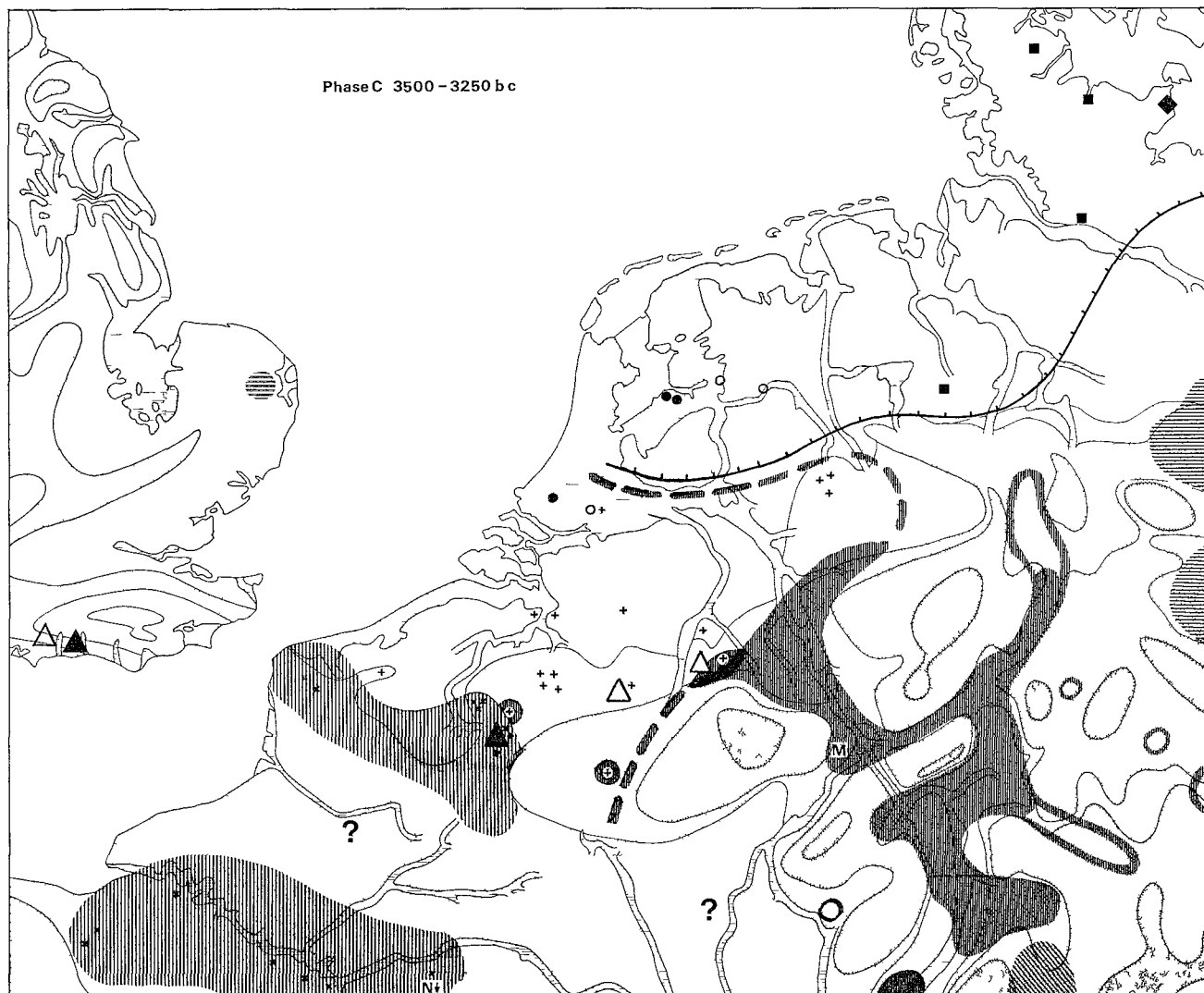







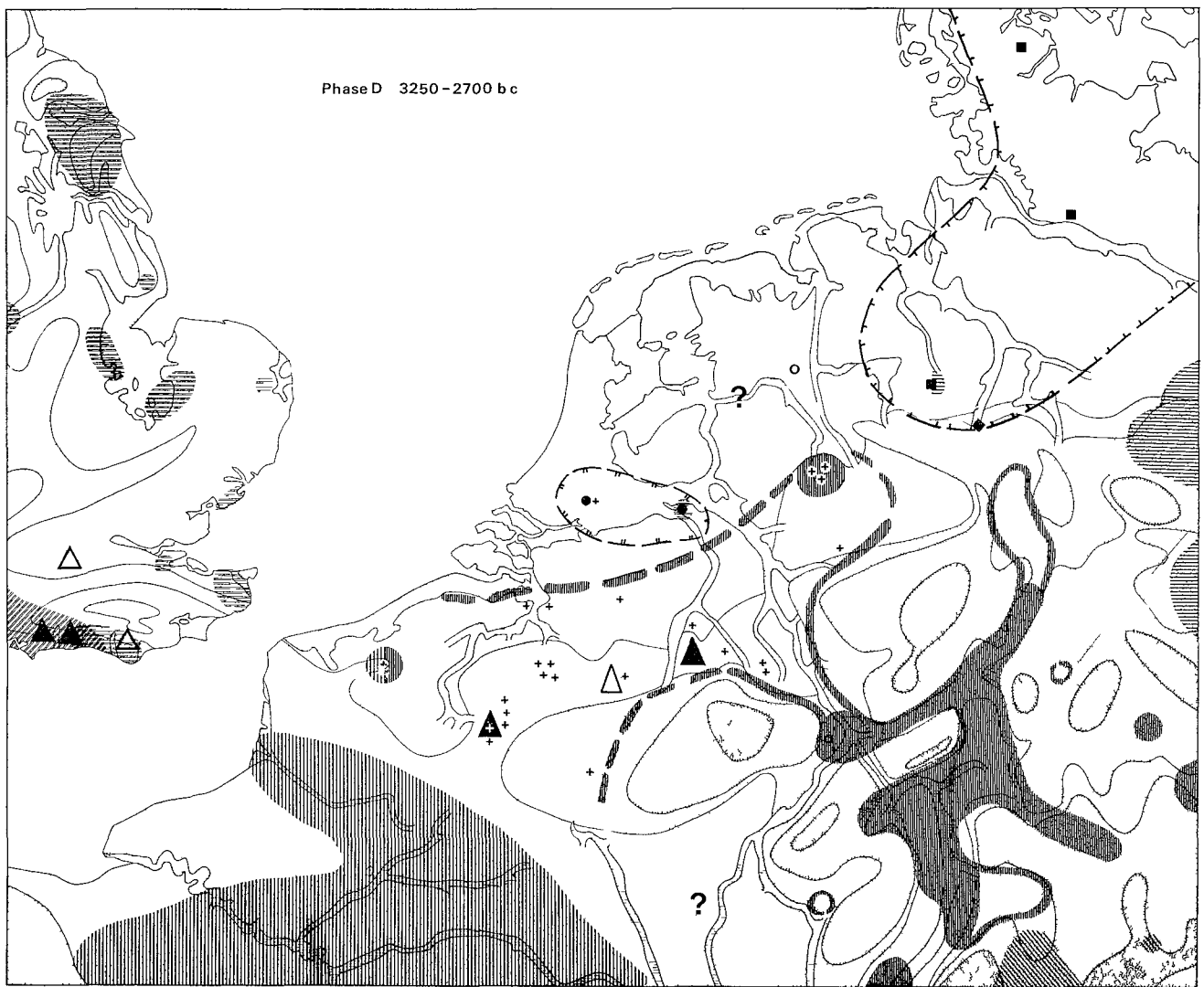


FIG 9 — Phase C, 3500-3250 bc — is based on

Michelsberg	SCOLLAR 1959 PL XI, p 120, LUNING 1967 Beilage 6, DE LAET 1972 Abb 68, 1974 fig 73 <i>Aldenh Pl II</i> Abb 1, LOUWE KOOIJMANS 1976
MK I, II	LUNING 1967 Taf 97, 1969 Karte 4, 9, <i>Aldenh Pl I</i> p 578-582
Noyen	MORDANT 1972
Mayen	LUNING 1967 no 20, ECKERT 1971
Rosenhof	SCHWABEDISSEN 1972
Baalberg	PREUSS 1961 fig 43, 1966 Karte 3, BEHRENS 1973 Karte V, DEICHMULLER 1969
Schussenried	LUNING 1969, Karte 4 9
Cerny	cf Fig 8
Grimston-Lyles Hill flint mines	WAINWRIGHT 1972 DE LAET 1972, 1974, SMITH 1972 fig 12, PIGGOTT 1954 Map I
Eitebølle-Ellebek	cf Fig 8
Swifterbant	VAN DER WAALS 1972, LOUWE KOOIJMANS 1974 p 17 f, 138 f, 162 f

central		Michelsberg I-II
		Michelsberg, all sites
	+	Michelsberg sites in Belgium and the Lower Rhine District
eastern		Earliest Baalberg (?)
		Early Schussenried
western		Cerny, generalized distribution
	x	id, sites
		Earliest Grimston-Lyles Hill
	▲ ▲	Flint mining centres
	a	a ¹⁴ C dated to phase C
	b	b presumably in exploitation in phase C
northern	■	Eitebølle-Ellebek sites
	●	Swifterbant sites
	○	id, presumed
		southern limit E-E-S-Complex

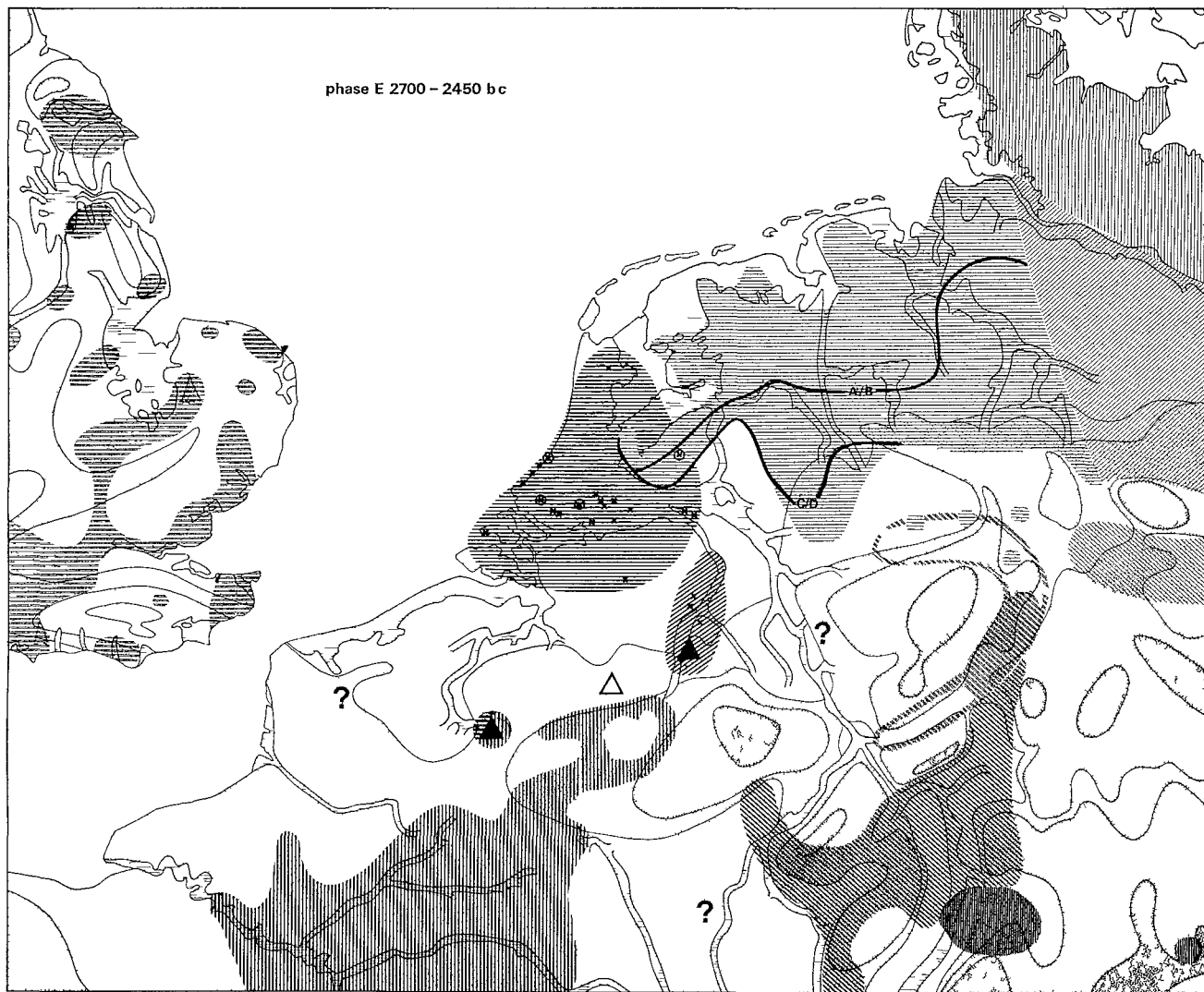


Phase D 3250-2700 bc

FIG 10 — Phase D, 3250-2700 bc — is based on

Michelsberg	cf Fig 9
MK III, IV	LUNING 1967 Taf 98, 99, 1969 Karte 5, 6, 10, 11, WILHELMI 1971, VERMEERSCH & WALTER 1975, VAN DOORSELAER <i>et al</i> 1974
Schussenried	LUNING 1969 Karte 5, 6, 10, 11
Baalberg	cf Fig 9 SCHWABEDISSEN 1966 Abb 11
Chasseen	BAILLOUD 1964 fig 17, 1971 fig 32, 33
Hembury, Grimston-Lyles Hill	SMITH 1974 fig 14, LOUWE KOOIJMANS in prep
flint mines	cf Fig 9
Early TRB	cf Fig 8 (Ertebølle-Ellerbek)
Engern-Brinkhof	ERDNISS 1941, BRANDT 1961, 1967 Taf 40, 41
Hazendonk	LOUWE KOOIJMANS 1974 p xxiii, 166, 1976
pollen	VAN ZEIST 1955

- | | | |
|----------|---|---|
| central | | Michelsberg III-IV |
| | | Michelsberg, all sites |
| | + | Michelsberg, sites in Belgium and the Lower Rhine District |
| eastern | | Late Schussenried |
| | | Baalberg |
| western | | Chasseen of the Paris Basin |
| | | Hembury |
| | | Grimston-Lyles Hill |
| northern | | Flint mining centres |
| | a | a ¹⁴ C dated to phase D, Michelsberg association |
| | b | b ¹⁴ C dated to phase D |
| local | | Early TRB (Scand FN A-C), sites |
| | | id, presumed minimum extent |
| | | Engern-Brinkhoff |
| local | | Hazendonk, sites |
| | | id, presumed minimum extent |
| | | pollen evidence for agriculture |



phase E 2700 - 2450 b c

FIG 11 — Phase E, 2700-2450 b c —, is based on

Michelsberg V	LUNING 1967 Taf 100
Wartberg	SCHRICKEL 1969, SCHWELLNUSS 1970, SCHWABEDISSEN 1966 Abb 23
menhirs, gallery graves	SCHWABEDISSEN 1966 Abb 23
S O M	BAILLOUD 1964 fig 32, DE LAET 1972 Abb 68, 1974 fig 73
Peterborough	SMITH 1974 fig 15, VERHEYLEWEGHEN 1964
flint mines	cf Fig 10, S O M -use HUBERT 1971, LOUWE KOOIJMANS 1974 p 141, note 17 ^a
TRB	BAKKER 1973 fig 1 I, I 2, 4 10-13, cf also fig 5 13, PREUSS 1961 fig 44, BAKKER <i>et al</i> 1969 fig 12, 13, BEHRENS 1973 Karte VII
Middle Limburg	MODDERMAN 1964, VAN HAAREN & MODDERMAN 1973, BLOEMERS 1973 ^a p 20, 1973 ^b p 15
Vlaardingen	VAN REGTEREN ALTENA <i>et al</i> 1962/'63 fig 35, LOUWE KOOIJMANS 1974 fig 5 with additions

		Michelsberg V
		Wartberg
central		Menhirs in Germany and Eastern France
		Gallery graves in Germany
		Seine-Oise-Marne
western		Peterborough and other decorated bowl groups
		Flint mining centres
		a certainly in exploitation in phase E
		b presumably in exploitation in phase E
		Tiefstich TRB, western facies with southern limits of A/B and C/D phases
northern, eastern		id Altmark facies
		id northern facies
		id Bernburg-Walternienburg
		Limburg Middle Neolithic, extent
	+	id, sites
local		Vlaardingen, extent
	⊙	id, sites from/with earliest phase
	×	id, all other sites

apply this phasing and Fischer's capitals in a wider geographical sense, if possible. Fischer's system has, however, the serious disadvantage of a very unequal phase length. The C-phase has especially a very long duration in comparison to the others. When the phasing has to be applied to Northern France and Scandinavia a phase-boundary at about 3250 b.c. at the start of Chasséen and TRB-A/B is inevitable. In the Lower Rhine District the succession Swifterbant-Hazendonk took place about that time. In the greater part of the discussed area there is, moreover, a marked change in pottery style around 2700 b.c., at the start of *Tiefstich* TRB, S.O.M. and Peterborough, while there is a *Forschungslücke* in the Rheinland in the centuries between 2700 and 2400 b.c.

For the division of the later Neolithic there are two main horizons: the introduction of the earliest Corded Ware (*Schnurkeramik*) and the start of the Bell Beaker Culture, preferably with the All Over Ornamented (Cord) Beakers. The first division line has only sense to the north and east of France, while the latter does not apply to Denmark and Schleswig-Holstein. In the Lower Rhine District both are feasible. The phase in between both lines (the early *Schnurkeramik*) is characterized by the continuation of the foregoing traditions (cultures), like TRB, Vlaardingen and S.O.M.

Following this line of reasoning seven phases are indicated with capitals A-G, giving the phases equal weight. The phases A and B are similar to those of Fischer. In the later phases there is a close agreement with the German division, only the capitals are different. In the earliest phases, certainly in A and B, probably in C and possibly in D, Late Mesolithic groups were still present in places within the area under discussion. The internal division of various cultures will permit the division of most phases into subphases.

It seems to be unadvisable to return to the early-middle-late division, in taking some of the phases together, as Fischer proposed. This type of subdivision is firmly rooted in local traditions, that vary widely in the discussed area. It seems impossible and not necessary to standardize these customs.

THE MAPS

To get a better insight in the (possible) inter-relationships of the cultural units of the scheme, maps of each phase are needed. Some remarks need to be made about these maps and on archaeological maps in general.

It is easier to make maps than chronological schemes, and they are always more exact, since the findspot of an assemblage is mostly known very exactly, while the true age (and then always with a considerable margin of error) can be obtained only after great effort (excavation). On the other hand the choice of which finds, assemblages or cultural units can be plotted on a map is seriously hindered by dating problems. To our opinion it is wrong to plot non-synchronous elements in one map, as for instance Michelsberg and *Tiefstich* TRB, but sometimes this cannot be avoided.

Secondly the maps are no representations of prehistoric occupation, but of prehistoric finds and sites. There might be considerable differences between both patterns. The pattern in which the objects are lost (the "loss-situation") is filtered by the find conditions or find circumstances into the find situation. The major factors of the "filter" are:

- differences in measure of recognizability. It seems, for instance, that LBK settlements are discovered easier than Rössen settlements because of the presence of large pits and, consequently, more archaeological material.
- geological agencies like weathering, erosion, covering by sediments, after the prehistoric occupation. This is a major factor for instance in the Holocene sedimentation districts (*viz.* the Rhine/Meuse delta).
- present intensity of occupation, digging activities, type of land use, intensity of archaeological research. As examples we mention the differences in find density between districts with crop farming and grassland, find concentrations around archaeological institutes and in the districts of active amateur-groups. The find concentration on the Aldenhovener Platte is a good example.

But things are not as bad as they look like. One can take these points into account. In an ideal case a *Landesaufnahme* can reveal in some degree the systematical difference between both patterns. Very instructive, too, is the distribution of easily recognizable implements. A good example is the map by Hoof (1970) of all stone and flint axes in the Rheinland, on which Eiffel and Ardennes are blank and so very probably uninhabited during the entire Neolithic. The major lesson is that it is very dangerous to work with find densities. It is not allowed to use them, without further preface as occupation densities.

Thirdly, an archaeological map needs a relevant substructure. This means often that one first has to make the map. This substructure must be adapted to the scale one works on and to the questions posed. In our case we are in an intermediate position between a very general representation as given in maps of entire Europe, and the detailed maps of restricted districts. On a European scale the major mountain belts are the most relevant substructure, the river systems the orientation lines. In the other case so much detail is given that the choice of terrain for settlement can be demonstrated for each site. Good examples are the maps by Sielmann (1972) and Modderman (1970) and the author tried to work in this way in the Rhine/Meuse delta and in more detail in the Alblasserwaard district (LOUWE KOOIJMANS 1974: part III). Very conscientious maps for the northern Netherlands are prepared by Brongers (in press). But it is still very difficult or even impossible to map all factors, one has to choose and to generalize.

As factors (presumably) governing the occupation pattern, can be named:

- the relief (measure of dissection, steepness of slopes, presence of plateaus and valley bottoms, absolute height)
- the soil conditions (thin/thick, heavy/light, stony or not, presence of loess etc.)
- the drainage conditions, presence of fresh water
- the geographical situation: valley pattern, divides, passes, natural contact routes, presence of bogs
- the type of vegetation.

Above the major factors determining the find conditions have already been mentioned.

We have made use of two maps: the National Atlas of the Netherlands, the sheets I-1 "The Netherlands and surrounding countries" (contour lines and drainage pattern) and II-1 "Geology: The Netherlands and its surroundings". The first map gives too much detail and is as such not suitable for our purpose. Having taken drainage pattern, river divides, height and geology into account, we drew a diagrammatic representation of the area, in which the mountain blocks, the major valleys and the Holocene deposits form the elements. In this stage we left other relevant elements as the loess deposits, extensive bogs, divides and passes. We consider this map, or better this diagram, as a first sketch. After making it we became aware that we factually had to

construct it more systematically. The end-result will, however, be not essentially different.

As a third point the way of representation of the archaeological data is important. On this scale we are not interested in the exact position of every site, but in the geographical extent of the various cultural units: this is given more direct by hatched or coloured areas. The factor "find-density" is not visible in this way, but we pointed out above that this is not so interesting here. The representation of the distribution patterns of subphases is easier too in this way. Isolated implements are only rarely suitable for these maps. This is only the case when they are highly characteristic and were in use for a short period as for instance the LBK adzes and Rössen *Breitkeile*, but e.g. not the pointed-butted flint axes or the *Felsoval-beile* as a whole.

WORKING WITH THE SCHEME AND MAPS

The next phase of the project must be the use of the scheme and maps to make cultural relationships, trade connections, acculturation processes and the like visible. Everything that seems relevant can be plotted:

- artifact types or their selected characteristics
- technical characteristics
- food economy, choice of terrain, ecological data
- burial ritual, anthropological data.

It now appears to be a tremendous advantage that the "balloons" are based on pottery-characteristics and nothing more. In plotting various elements, these are in such a way compared with a pottery ordering and not with a rigid total order. In the most successful case new balloon-schemes and maps, arrow-head-based, house-type-based and so on, will originate. Comparison of these schemes and maps will give a rather objective picture of the Neolithic cultural remains.

If it seems necessary to do so the balloons can be split up into smaller units. In the extreme one can work exclusively with the most important reference sites. Doing so one can use the balloon-picture as a vague ordering background. With an increasing number of such highly qualified sites the need will perhaps grow even to get rid of the "pottery balloons". But at this moment the above described way of working seems to us the only way to formulate judgements on the points of continuity and acculturation.

It would take too much space to give a description of the various phases, the cultural units and their interrelationships. We will abandon this in this context and plan to have it published elsewhere (LOUWE KOUIJMANS 1976). In such a description the new elements of the Neolithic structure will be given an accent.

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