A Prehistory of our time

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THE PREHISTORY OF THE NETHERLANDS

VOLUME 1

Edited by

L.P. Louwe Kooijmans

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Note on the dates used in this book

Dates before 50,000 are based on various physical dating techniques, other than radiocarbon, and expressed as 'years ago'.

Dates in the period 50,000-10,000 years ago are based on uncalibrated radiocarbon dates and expressed as 'years ago' or 'years BP' (= Before Present).

Dates in the last 10,000 years are based on calibrated radiocarbon dates and expressed as 'years BC'. Only these dates can be equated with calender or solar years.

See chapter 1, section 'periods and dates' for the principles of radiocarbon dating.

Introductory

1 A prehistory of our time

Peter van den Broeke,
Harry Fokkens and Annelou van Gijn

A NEW SURVEY

The last detailed survey of Dutch prehistory, *De voorgeschiedenis der Lage Landen* ('Prehistory of the Low Countries') by De Laet and Glasbergen, was written more than forty years ago (fig. 1.1). Since its publication, in 1959, our knowledge of the past has increased tremendously. Many sites have been excavated, excavation methods have changed and dating and analytical techniques have been drastically modified. Moreover, under the influence of changed theoretical insights, entirely novel sources of information have been tapped and new explanation models have been formulated.

Over the years, these developments have created a need for a new survey of Dutch prehistory. The large number of publications, some in poorly accessible journals, has made it very difficult for Dutch archaeologists, but certainly also for the interested public and colleagues in other countries, to see the wood for the trees. It is for the benefit of the latter group that this English translation of *Nederland in de prehistorie* has been published.

fig. 1.1
Two previous surveys that covered the prehistory of the Netherlands.

This book is essentially a handbook. In that respect it clearly differs from *Pre- en protohistorie van de Lage Landen* ('Pre- and protohistory of the Low Countries'), the textbook published by the Open University, which, besides presenting a survey of the pre- and protohistory of the Low Countries, also pays much attention to the theoretical and methodological backgrounds of the science of archaeology.[1] The latter work moreover covers not only prehistory, but also the Roman period and the Middle Ages and hence – from sheer necessity – pays fairly little detailed attention to material remains. And that is precisely one of the main aims of the present

book, and also one of the reasons why the book is restricted to prehistory. The other reason is that we already have an excellent comprehensive study focusing on the Netherlands in the Roman period, namely *De Romeinen in Nederland* ('The Romans in the Netherlands') by W.A. van Es.[2]

In this book the Netherlands is the main area of attention. But as our present-day borders have no meaning with respect to our view of the past, surrounding areas will also be considered in the discussions presented on the following pages, in particular in the chapters on the earliest occupation periods.

As our aim was to let as many researchers as possible present their views on their own, specific areas of research, we have divided the subject matter into periods and themes tied in with Dutch research traditions. A consequence of this approach is that the early prehistoric periods are discussed in chronological order, whereas the Bronze Age and the Iron Age are covered in chapters focusing on different themes. The biologists involved in this project have summarised the results of their research into subsistence activities in two chapters. We have tried to divide the span of many thousands of years covered in this book into relatively long periods, to avoid the risk of providing too much detail for the broader pattern to be discernable. Topics of particular interest are discussed in separate features of a few pages inserted between the main chapters.

The great advantage of involving a large number of authors in such a project is that the information is presented at first hand, by researchers who have moreover carefully selected their data from the great mass of information available on their particular subject. A disadvantage, however, is the unavoidable variation in emphasis and style. The editors' primary task was therefore to coordinate the individual contributions and integrate them into a sufficiently unified whole. Their second task was to write introductory and concluding chapters for the four parts of the book covering the different prehistoric periods. The concluding editorial chapters can be read as brief surveys, summarising the basic information presented on the preceding pages.

In the present, introductory, chapter we intend to discuss various methodological and theoretical developments that have taken place over the past decades,[3] highlight several factors that affect our understanding of the past, and explain the chronological framework used in this book.

NEW RESEARCH METHODS AND NEW SOURCES

One of the most important methodological developments in archaeology of the past decades has been the introduction of digging machines in excavation work (fig. 1.2). This innovation led to a shift in emphasis from research into funerary monuments and burial practices – which were until the late 1950s our main sources of information on the past – to settlement research. Together with the introduction, in the 1970s, of new survey methods, whose use was greatly boosted by the work of the RAAP Foundation[4] in the Netherlands, this resulted in a wealth of data of an entirely novel kind.

Within a relatively short time, large-scale settlement research came to be one of the trademarks of Dutch archaeology. The evidence obtained in such research in the Low Countries, combined with that from Scandinavia and northern Germany, where similar developments have taken place, formed an important basis for subsistence and settlement models for Northwest Europe. The great abundance of new evidence, in particular botanical macroremains, tiny bones and fragments of flint, is in part the consequence of the introduction of flotation techniques and

fig. 1.2
Excavations carried out in 1959 by the State *Service for Archaeological Investigations* in the Netherlands (ROB) at a Neolithic settlement site near Elsloo. This was only a few years after the first attempts had been made to use digging machines in archaeological research. They made it possible to conduct fieldwork on a larger scale.

the systematic use of sieves since the 1970s (fig. 1.3). As an aid to understanding prehistoric agriculture, pollen research (palynology) has been pushed into the background by research into macroremains, but pollen research is still often our only available instrument for reconstructing past vegetations. This is true especially where late prehistory is concerned, because for the Palaeolithic the analysis of the bones of small rodents has proven particularly important. Information derived from the bones of rodents has played a part in reconstructing Palaeolithic

fig. 1.3
Use of a sieving installation and a water nozzle for recovering small finds such as bone splinters and fish remains.

man's natural environment, but the rodents' skeletal morphology has also helped us to date deposits and very early sites. This research, too, would be inconceivable without the use of sieves.

Another important development has been the introduction of new measuring equipment, including instruments coupled to computers. The positions and measurements of finds and features are nowadays often determined by teams us-

fig. 1.4
Where thousands of finds have to be three-dimensionally recorded an infrared-theodolite is an indispensable instrument. Here such an instrument is being used at a prospective excavation in the province of North Brabant.

ing an infrared theodolite coupled to a computer (fig. 1.4), which stores the measurements and can even print them in drawings. More and more use is being made of computers in analysing field data, too. In the 1960s and '70s the data were analysed essentially with the aid of statistical techniques, but the 1980s and '90s saw the introduction of new analytical systems, in particular Geographical Information Systems (GIS).

Archaeometry and related research have also become very popular, for example in studies on the provenance of stone and flint.[5] Such studies are important for our understanding of exchange systems, and hence also the social organisation of prehistoric communities. Archaeometry is also used in the analysis of food residues in cooking pots, which can provide information on prehistoric diet. In an entirely different manner, the analysis of microwear polishes, in particular on flint but also on bone implements, likewise sheds light on prehistoric man's economic basis and subsistence activities.

THEORETICAL INNOVATIONS

No one who now reads *De voorgeschiedenis der Lage Landen* can fail to notice the great influence of the most important archaeologist of the first half of the twentieth century: Gordon Childe. It is he who first defined the archaeological term 'culture', which has remained one of the most important concepts in archaeological theory to this day. An archaeological culture differs markedly from what anthropologists understand by the term 'culture'. Childe defined it as a constantly recurring assemblage of elements, such as certain types of settlements, burials and pottery. He was moreover of the opinion that 'culture' thus defined could be equated with 'people'.

The latter view has however been superseded. The distributions of certain types of finds are no longer seen to correspond to the distributions of peoples. The 'culture' concept is however still used to distinguish assemblages in chronological and spatial terms, in particular on the basis of flint and pottery – especially decorated pottery. A constantly recurring question is whether the distribution of a particular type of artefact may indeed be seen to reflect a certain cultural identity, or whether it is associated with certain widespread economic practices, or should perhaps be seen as reflecting ideological or social aspects of a community. The answer to this question differs per category of artefacts, per region and per period, and this issue will therefore crop up in several places throughout this book.

Childe not only defined the term 'culture', he also advanced models for interpreting changes observable in time and space. In his opinion, innovations had spread from the ancient Near East to the west via diffusion. The spread of and changes in elements of material culture were to be interpreted in terms of the migration of cultures or peoples. De Laet and Glasbergen formulated this view as follows:

> *'An infiltration of new population elements will usually have involved a relatively small number of people. The host that set out on a "pan-European" migration will have dissolved en route into many groups of varying sizes that settled at favourable locations. The settlements and burials that have been found scattered across our region are the remains of only hundreds, or more likely only dozens of people. Such small numbers would have been decimated or exterminated by an epidemic or a natural disaster, while newcomers who represented a ruling class among a native population were frequently totally absorbed by the subject population within a few generations and rapidly lost their distinct culture.'*[6]

This dynamic view of culture led to a new approach, whose primary aim was to determine the earliest developments and the area of origin of a culture, after which attempts were made to trace its local developments. Childe moreover tried to use archaeological evidence as a source of information on social aspects of the cultures he studied. The latter approach however found little support among Dutch archaeologists and no social aspects are therefore to be found in *De voorgeschiedenis der Lage Landen*. To quote Glasbergen once again, this time from his preface to the Dutch translation of Childe's 'The prehistory of European society':

> *'In elaborating his themes in the works which he wrote for a wide public, Childe has supplemented his scientifically founded interpretations based on technological evolution and subsistence evidence with his interpretation of the unsound evidence relating to social conditions, religion and spiritual life. What the resultant picture has gained in terms of detail and literary qualities it has however lost in terms of scientific cogency.'*[7]

Now, more than forty years later, the interpretation of material culture in sociocultural terms is one of the most important aspects of archaeology, alongside the study of the relations between prehistoric man and his natural environment. The 1960s saw the introduction of anthropological models and concepts in archaeology, first of all in the United States. The consequence of this was that ethnographic data gradually became the main sources of inspiration for the interpretation of archaeological evidence. But the available ethnographic information often proved deficient for archaeologists and these conditions ultimately led to the birth of a new science: ethnoarchaeology, whose aim is the systematic study of material aspects of human behaviour in present-day societies.

These developments inspired entirely novel views on the interpretation of changes in the archaeological record. In Childe's opinion all changes were ultimately attributable to only two processes: migration and diffusion. Under the influence of scholars like Lewis Binford and David Clarke those same processes became the focus of intensive research. Over the years, the diffusionist and migrationist model has gradually been superseded by models of cultural continuity, in which changes in material culture are regarded as the consequences of social and ideological processes. This approach is consequently known as processual archaeology.

Processual archaeology pays great attention to the relations between man and his natural environment (fig. 1.5). Culture is regarded as an adaptive system that responds to the natural surroundings of a human group, with the surrounding human communities constituting a major influential factor. In processual models of explanation the interaction between different communities consequently receives far more attention than it ever did in the past. In that respect anthropology, in which thoughts on exchange play an important part, is a source of inspiration for new archaeological research. The aforementioned developments have influenced all branches of archaeology, in studies ranging from the Palaeolithic to the Middle Ages and from Europe to Australia.

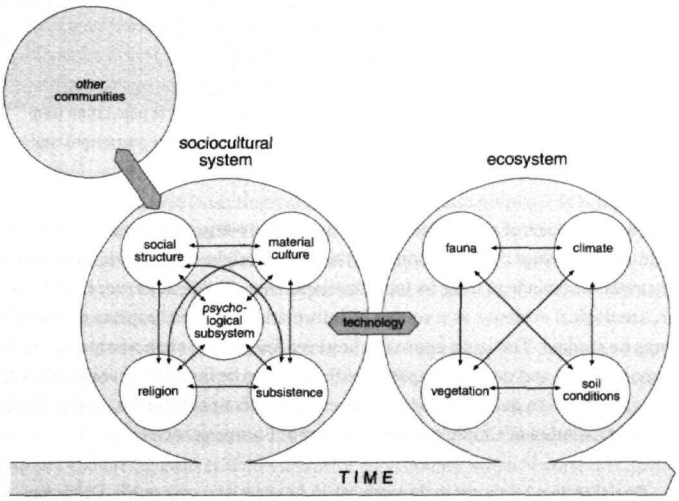

fig. 1.5
Model of the socio-cultural system of a human community showing internal subsystems and relations with the natural environment and other communities, as presented by David Clarke, one of the founders of the New Archaeology.

The past decades have seen the emergence of yet new approaches, especially in England. Some of these new approaches continue along the lines of processual archaeology, but most are reactions against that way of thinking. In the 1980s these approaches were collectively referred to as contextual archaeology. Nowadays they are known as post-processual, interpretive or post-modern archaeology. Hodder, Shanks, Tilley, Thomas and other authors of these new trends emphasise that material objects may have different meanings in different cultures, regions and contexts. They point out that it is impossible to speak of objectively observable facts, because the meanings that we attribute to our data are coloured by our Western perceptions and our scientific and social backgrounds.[8] Like most ideologies, the processual and contextual trends attracted and still continue to attract ardent and more moderate supporters.

In the Netherlands, all these developments were closely followed, but the different trends never really gave rise to a controversy and the most extreme views re-

ceived little support. The development of theoretical and methodological aspects of archaeology has never been a prime objective in the Netherlands. Instead, the emphasis has been on gathering and interpreting information in field research. Over the years, the questions raised by the results of surveys and material research have inspired a selective and creative use of models and theories. Pragmatism has prevailed over dogmatism. Generally speaking, the Dutch approach to the past can be placed in between between modest positivism and moderate relativism. The authors of this book all agree that any statement they make on the past will inevitably be influenced by their assumptions and their preconceptions. Nevertheless, their approach to the past is rather positivistic. And that is understandable: the raw archaeological data – the features and artefacts – have a tangible relation with the past. They tempt us into believing that the past is to some extent knowable. But we must bear in mind that our evidence is limited, and may moreover be distorted by various factors. The latter topic is also an important aspect of present-day Dutch archaeological research.

DISTORTED IMAGES

The pictures that we are able to present of the past are biased as a result of the excavation methods we use and our theoretical frameworks. But there are more factors that affect our understanding of the past. For example, some regions appear to have been far more densely occupied than others. Such an impression may correctly reflect the actual situation, but it may also be the consequence of comparatively more intensive research, as for example in the case of the high density of finds discovered on the Dutch island of Texel.[9] In other cases it is a scholarly preference for a particular period or class of objects that has led to a distorted image. For example, the Stone Age is well represented at the many sites that have been discovered by amateur archaeologists. That is because many amateur archaeologists tend(ed) to search primarily for flint artefacts; pot sherds attract less interest and moreover disintegrate relatively quickly at the surface.

Our understanding of early communities is also greatly influenced by aspects of prehistoric behaviour. For example, our knowledge of large numbers of showpieces of the material culture of Neolithic and later communities we owe to those communities' custom of deliberately depositing unused valuable objects in swampy depressions, valleys and watercourses. The large flint axes, heavy bronze swords, strings of beads and the like are found in their primary contexts, *i.e.* the contexts in which they were last in use, although in this case that use was probably of a special – ceremonial – nature. Finds recovered from such primary contexts offer us the best possible starting points for studying prehistoric human behaviour and the underlying ideas, unlike most domestic remains, which were usually thrown away or removed from a site as refuse and consequently ended up in secondary contexts.

Concepts like '*primary refuse*', '*secondary refuse*' and '*de facto* refuse' feature prominently in the systematic work that the American archaeologist Schiffer has been carrying out in the field of so-called archaeological formation processes since the 1970s.[10] Schiffer makes a distinction between cultural and natural processes (fig. 1.6). The most important cultural processes are the discarding and abandoning of artefacts. The human practices and customs associated with those processes greatly determine what aspects of the socio-cultural system ('system context') are represented in the archaeological record. They are hence site-formation processes.[11]

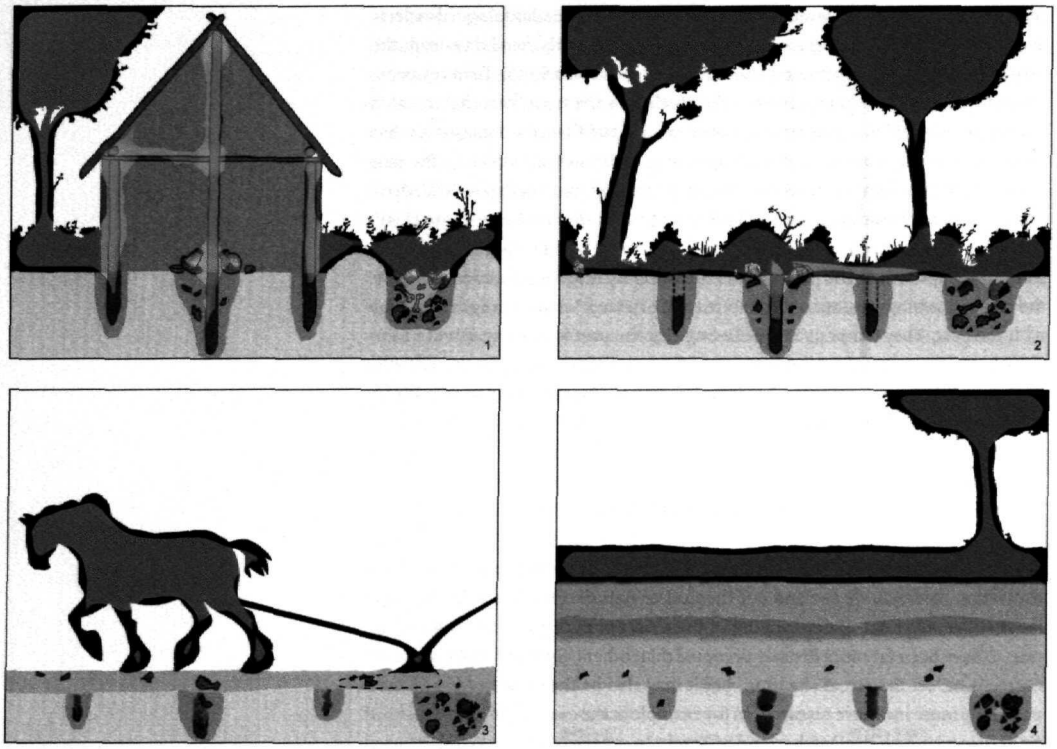

fig. 1.6
Examples of post-depositional processes that have taken place since the period of prehistoric occupation.

1 A settlement in the sandy part of the Netherlands.

2 After the settlement has been abandoned the building gradually becomes dilapidated; the top parts of the posts begin to rot; the vegetation starts to invade the area and root growth will displace structural remains.

3 The layer containing the occupation remains is disturbed by ploughing and the remains are displaced and fragmented; only those buried deeper beneath the surface will survive in part; all bones have meanwhile decayed.

4 Manuring with dung mixed with sods in the Middle Ages resulted in the formation of a *Plaggen* soil, as a result of which the site has not been disturbed further by the usual agricultural activities.

The processes to which remains are subjected before they are ultimately excavated are classed as site-deforming or *post-depositional* processes. Many of the latter are natural processes. The most important, besides burial by sediments, soil frost, the burrowing of animals and the effects of roots (bioturbation), are deterioration owing to chemical processes and bacterial action. But nature is not the only source of distortion; man, too, has affected what survives in the archaeological record. All the communities that succeeded those being studied, from prehistoric times to the present and even the future, may have disturbed or may still disturb the evidence. The search for flint at abandoned camps is an example of disturbance by human activities in the distant past. Deep-ploughing, house construction, the digging of gravel pits and trenches for pipelines are contemporary, more devastating examples of damage. Of particular influence, finally, are the archaeologists themselves. It is their research methods and their interests that largely determine where and what remains from the past are discovered.

Schiffer's ideas have won a wide acceptance in the Netherlands, as well, where they have played a predominant part in the interpretation of archaeological evidence, especially in regional studies.[12] That is the main reason why each of the following parts of this book is preceded by an introductory review of the representativeness of the evidence available for the period discussed in the part in question. A conspicuous aspect of the representativeness of the Dutch evidence is the great variation observable within this small country. For example, we know virtually nothing about the Palaeolithic and Mesolithic of the coastal region. This is entirely attributable to the melting of the northern ice cap in the final phase of the last glaciation, which started about 18,000 years ago. The Palaeolithic and Mesolithic sites in the low-lying parts of the North Sea Basin that were submerged

by the melted ice were subsequently covered by thick layers of sediments and are now practically inaccessible for archaeological research. Our understanding of these periods is based on finds recovered from higher grounds and is hence biased: in certain seasons the Upper Palaeolithic hunter-gatherers will have left the higher parts to exploit the resources of the lowlands, where their way of life will have differed. Only in rare circumstances, for example when a beach is raised with sand from the North Sea or when finds are recovered by trawl nets, do we catch a glimpse of earlier human existence on what is now the bottom of the North Sea.

The reverse of the above situation holds for the later periods. The evidence from the coastal region from the Neolithic and later periods is richer and more varied than that from the interior, comprising as it does many wooden objects, uncarbonised seeds, bones and other organic remains. These finds in fact all come from watery environments, including stream and river valleys and the raised bogs of Drenthe, which have now all been dug away. Organic remains that end up beneath groundwater level – and remain there – or that become buried beneath clay or manure relatively quickly remain virtually unaffected by bacterial action owing to the lack of oxygen in the surrounding environment. Skeletal remains, however, survive only in soils with an acidity favouring their preservation. In raised bogs bones may disappear, whereas skin may survive, preserved by a natural tanning process.

THE IMPORTANCE OF THE WETLANDS FOR OUR IMAGE OF THE PAST

The most diverse archaeological record to be found in the Netherlands is that of the wetlands (fig. 1.7). Finds from the waterlogged soils of these regions show that the Stone Age was also a Bone Age. One of the best represented categories of bone objects is that of Mesolithic points (see feature B). The rare spades, plough shares, cart wheels, vessels and wool combs of organic material offer us a more varied picture of Bronze Age and Iron Age farming practices than the more numerous – for more durable – querns, earthenware spindle whorls and loom weights.

Apart from the fact that they have yielded a wider diversity of remains of material culture than any other region in the Netherlands, the wetlands are also the only environments in this country where answers to various specific research questions

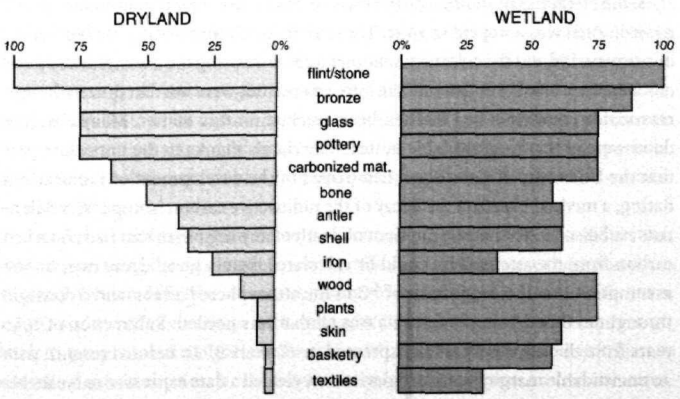

fig. 1.7
Estimates of different materials surviving after centuries of burial in dry and wet soils in Europe. At the many dry sites in the aerated Dutch sandy soils with their low calcium contents the proportion of organic remains will be much lower than indicated here.

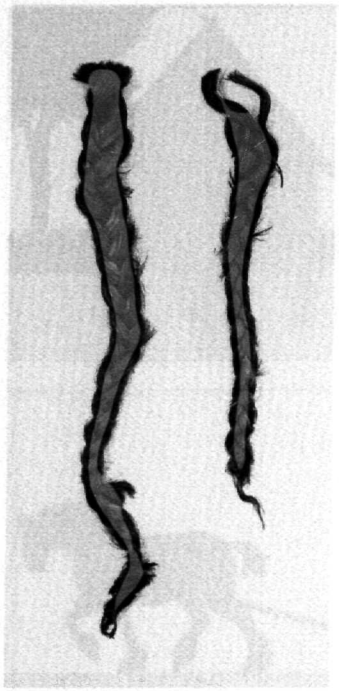

fig. 1.8
In peat with a certain acidity even hair may be preserved, as can be inferred from this pair of plaits that was found near Odoorn. The plaits were cut off and deposited here between 800 and 400 BC, presumably as votive gifts.

can be found.[13] From research on the higher grounds we already knew that sedentary life in late prehistoric times was of a dynamic nature ('unsettled settlement'), but exactly how dynamic could be estimated only there where remains of timber structures had survived. Those remains showed that the farms in the peat regions were inhabited for no more than a few dozen years (see feature O). The inhabitants of the farms on more solid ground will not have stayed put for much longer.

Bones and plant remains preserved at camps and in farmyards provide excellent information on exploitation patterns and farming strategies. It is no coincidence that the first quantitative models of prehistoric farming developed in the Netherlands are based on data obtained in the wetlands of Westfrisia.[14] The comparatively large proportion of remains of young rhinoceros at the Middle Palaeolithic camps in the Meuse valley near Maastricht even raise the fundamental question whether the earliest occupants of this region were hunters or perhaps scavengers. Wetland sites also offer us a much clearer picture of prehistoric man himself, for example in places where the remains of a fully dressed Bronze Age man come to light (see features Q and S) or where the remains of the last meal and dental plaque are found to have resisted the ravages of time for 4500 years.[15]

These relatively large differences in surviving material remains show that the factor preservation constitutes an important filter between what was once present at a site and what still remains today. It therefore goes without saying that throughout this book we will repeatedly have to 'dress' prehistoric man on the basis of incidental finds (fig. 1.8).

PERIODS AND DATES

Early divisions and chronologies

The system devised by the Danish museum curator C.J. Thomsen in the first half of the 19th century is still used to divide prehistory today. On the basis of the most characteristic types of materials employed in particular periods he distinguished a Stone Age, a Bronze Age and an Iron Age. This Three Age System proved applicable to the whole of Europe. As our knowledge of the past increased, the system was refined, while the phases that were distinguished within this general system differed from one country to another or from one cultural area to another. Only the division of the Stone Age into an Old Stone Age or Palaeolithic and a New Stone Age or Neolithic was commonly adopted at a relatively early stage; later a Middle Stone Age (Mesolithic) was distinguished too.

In the Netherlands, a first official division (from the Neolithic until the end of the Iron Age) was accepted in 1965. The criteria for distinguishing the beginning of a new period and the cultural phenomena characterising the distinguished periods were then also formulated.[16] The different periods were not dated, even though reasonable consensus had by then been reached on this matter. Many absolute dates were at that time available in the Netherlands thanks to the important part that the University of Groningen had played in the development of radiocarbon dating, a method based on the decay of the radioactive carbon isotope ^{14}C.[17] Scientists had discovered that the moment of death of any organism that had absorbed carbon from the atmosphere could be calculated from a given decay rate, on the assumption that the proportion of ^{14}C in the atmosphere had remained constant throughout time. A simple formula was all that was needed. Subtraction of 1950 years from the laboratory result expressed in ^{14}C years BP (= Before Present), with an unavoidable margin (standard deviation), yielded a date expressed in 'years be-

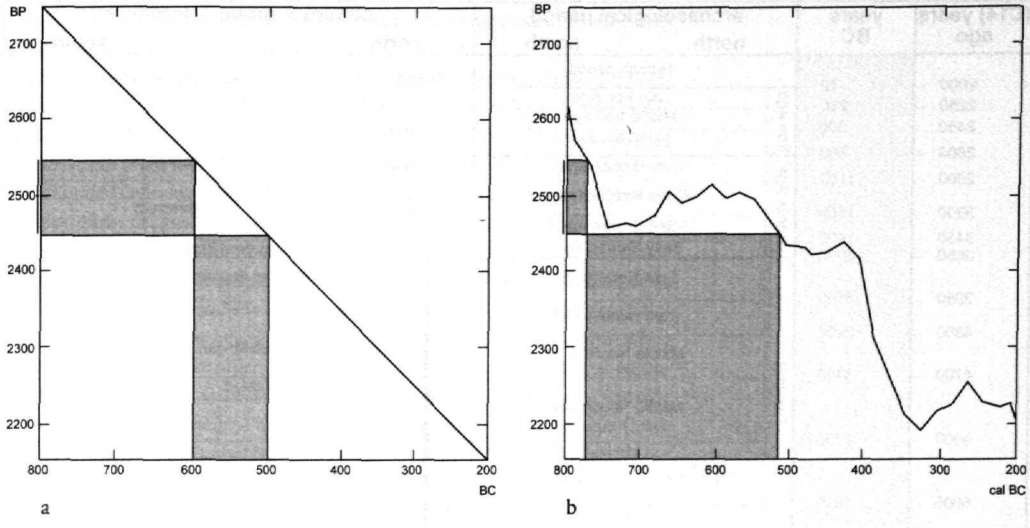

fig. 1.9
Past and present approaches to ^{14}C dating. It was originally assumed that ^{14}C values were linearly related to dates in solar years (left). A ^{14}C date of, say, 2500 ± 50 years BP (Before Present) was assumed to correspond to 600-500 BC. But when the proportion of ^{14}C in the atmosphere was found to fluctuate, the straight line was replaced by a calibration curve (right). The aforementioned ^{14}C date now corresponds to a range of solar years comprising almost three centuries.

fore/after Christ' (fig. 1.9a). A ^{14}C date of 2050 ± 40 BP hence resulted in a date around 100 BC. This method implied a tremendous advance on the dating methods available up to 1950,[18] in spite of the margins that had to be included, which ranged from a few dozen years for late prehistoric dates to many hundreds of years in the earliest part of the range covered by this dating method, around 50,000 years ago.[19] In 1977 a slightly modified chronology was developed for the Netherlands, with dates based on the results of ^{14}C research.[20]

From radiocarbon years to calendar years

The chronological framework used in this book (fig. 1.10) reflects the continuous developments in the field of absolute dating methods. ^{14}C measurements of Egyptian mummy coffins of a known age had at an early stage already shown that ^{14}C years cannot be equated with calendar years. The ^{14}C dates consequently had to be corrected. Trees were found to provide the solution to this problem. In cross-section, tree-trunks show patterns of annual growth rings of varying thicknesses. These varying thicknesses are the consequence of variations in environmental conditions, in particular fluctuations in climatological conditions. Recent and fossilised trees with partly overlapping annual ring patterns yielded master sequences of annual growth rings spanning many millennia, first of all in the United States and later also in Europe. Measurements of the ^{14}C contents of these tree rings of known ages showed that the assumption that the concentration of this isotope in the atmosphere had remained constant was not correct. The concentration was found to have fluctuated considerably in certain periods. Moreover, the dates of samples from before 2500 BP were found to be consistently too young.

The results of these measurements of annual rings were plotted in calibration curves expressing the relation between the ^{14}C dates and tree-ring or calendar years (fig. 1.9b). Nowadays, the laboratory results in years BP are converted into years cal BC and cal AD, but always with a margin.[21] The present composite curves go back to 9439 BC, but the parts before 7875 BC are still poorly founded.[22] That is why the dates in the time scale shown in figure 1.10 are given in two columns:

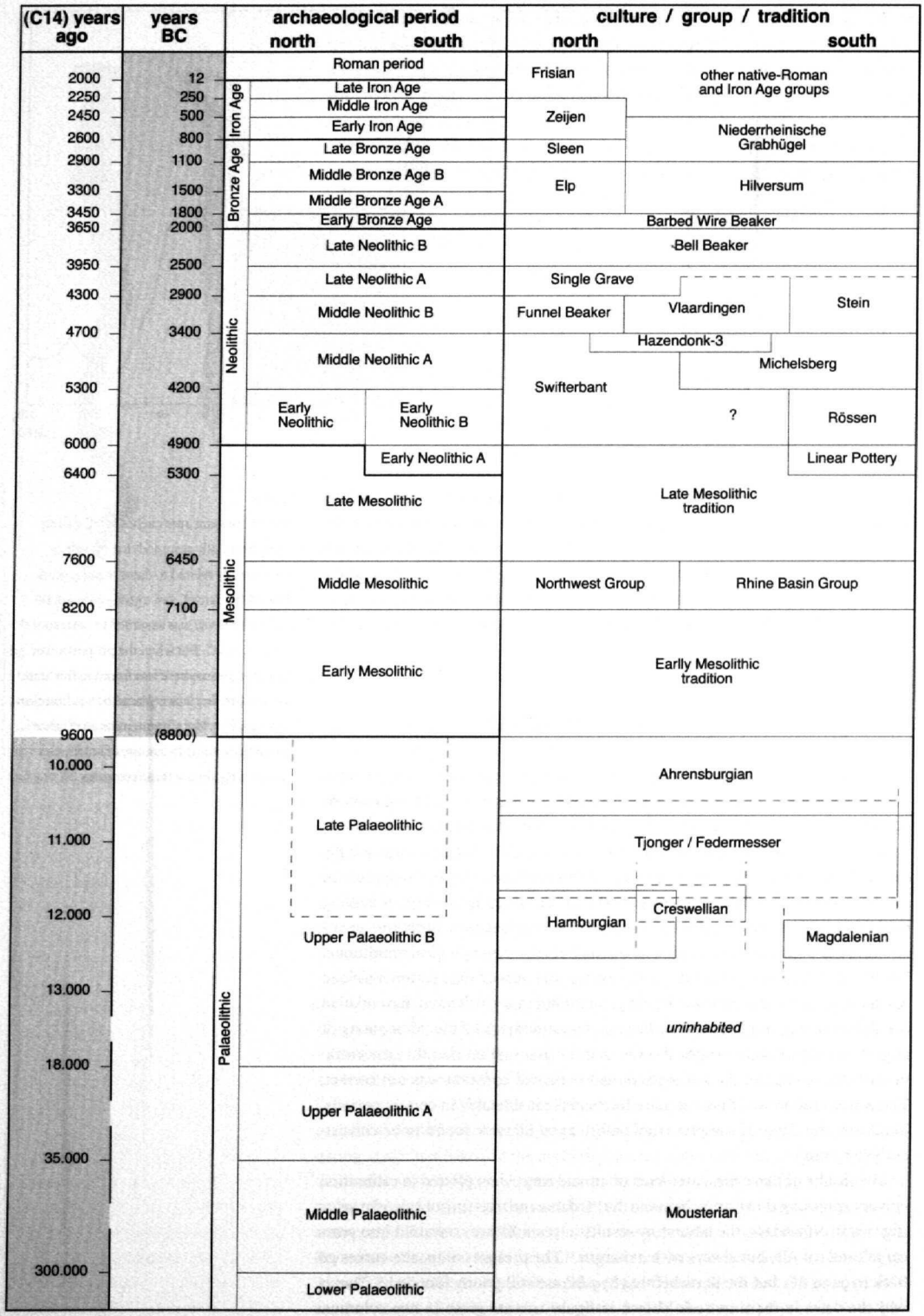

fig. 1.10

Schematic chronology of Dutch prehistory.

calibrated dates until in the Early Mesolithic and uncalibrated dates from the Early Mesolithic to the Middle Palaeolithic.[23]

It goes without saying that this use of two different dating standards also holds for the text of this book. The dates in calendar years given in the time scale and in the following chapters are not always the actual 'translations' of the conventional ^{14}C dates; many are interpreted dates. The reason for this is that the margins in the calibrated dates in some periods have been found to be much greater than the margins of the original laboratory results. This is attributable to wiggles in those particular parts of the calibration curve. Particularly notorious are dates between c. 2500 and 2400 BP, which span about four centuries (c. 800-400 BC), and dates between c. 4250 and 4050 BP (c. 2900-2600 BC). The latter range comprises dates of both the Funnel Beaker culture and the Single Grave culture. It was only when we found that the relative order of two ^{14}C dates in such time ranges has no meaning that we were able to abandon the view that these two cultures had existed side by side for three centuries.[24] The most likely conclusion is that the Single Grave culture succeeded the Funnel Beaker culture without interruption, although the exact date of the transition between the two is still unknown.

Recent developments have even tightened our grip on the time factor. In the first place, the amount of carbon needed for ^{14}C analysis has been reduced from a few grammes to a few microgrammes.[25] This allows us, for example, to date pottery on the basis of adhering food residues. Secondly, in areas with favourable conditions, especially the wetlands, we are able to take advantage of the most accurate absolute dating method: dendrochronology (*dendron* is Greek for tree). The same annual growth rings that form the basis for the calibration of ^{14}C dates have been found to be of even more direct benefit. There where a substantial piece of wood, such as a beam from a house, has survived with its bark, the date at which the tree in question was felled can be calculated in principle to within a year, sometimes even to within the season. In spite of the hiatuses that still remain in the Dutch tree-ring chronology and the highly regional annual ring patterns, coupling of the Dutch curves to reference curves obtained in Germany in particular has led to surprisingly favourable results. With two interruptions of several centuries, the Dutch tree-ring chronology now goes back to the year 2258 BC.[26]

In the past few decades new radiometric methods have become available for sites with ages that fall outside even the wide span covered by the ^{14}C method, i.e. sites from more than c. 50,000 years ago.[27] For example, the oldest archaeological remains recovered in the Netherlands, at the Middle Palaeolithic camps of Maastricht-Belvédère, have been dated largely by means of thermoluminescence. The results, which were found to lie around 250,000 years BP, we owe to the fact that the contemporary hominids knew how to make fire. They therefore produced the heated material that is required for this dating method, in this case flint flakes.

The Dutch periodisation

The increased 'chronological resolution' in the expanding body of archaeological information has enabled further refinements and modifications in the commonly accepted periodisation developed by Lanting and Mook in 1977, which has resulted in the scheme presented in figure 1.10. Nowadays, the main aim of any periodisation is to provide a coarse-meshed framework in which cultural phe-

nomena can be placed. The lines that have been drawn between the different periods distinguished in the scheme hence apply to the Netherlands as a whole, in spite of the fact that the actual times at which the elements defining the periods made their appearance differed from region to region.[28] We have made only one exception, for the beginning of the Neolithic. After farming communities had settled in the loess zone, hunter-gatherers continued to adhere to their Mesolithic way of life in regions outside that zone for many centuries. The final phase of the Late Mesolithic of the northern (and western) Netherlands consequently coincides chronologically with the Early Neolithic A of the southern part of the Netherlands.

A major problem that had to be solved in establishing a chronology that applies to the Netherlands as a whole is the fact that the cultural sequence of the northern part of the country is linked to that of Northern Europe, whereas the sequence of the southern part is linked to that of Central and Western Europe. The periods distinguished in the frameworks of those two areas, especially those within the Neolithic, differ considerably. In the Dutch periodisation the differences have been reconciled where possible.

Besides the archaeological periodisation there is also a geological division, comprising periods whose names differ from those of the archaeological periods. A final point that should be added here is that the text of the following chapters may differ in terms of periodisation and chronology from that in the original sources employed. This is the consequence of changed views on dates and on the limits of periods and the cultural contents attributed to the periods.[29]

It goes without saying that future finds and changed insights will show that the contributions in this book are also products of their time. Only the finds and observations on which they are founded will retain their value, as A.E. van Giffen, the founding father of modern Dutch archaeology, already pointed out in 1913, in his doctoral thesis, which contains the eternally valid motto: *Die Tatsachen bleiben, Die Interpretation schwankt.*[30]

NOTES

1 Bloemers/Van Dorp 1991.

2 Van Es 1981.

3 For a more detailed survey see Slofstra 1994.

4 RAAP stands for *Regionaal Archeologisch Archiverings Project* (Regional Archaeological Filing Project), an organisation that carries out archaeological surveys and assessments.

5 For a provisional survey see Kars 1988, 1990.

6 De Laet/Glasbergen 1959, XI-XII.

7 Childe 1959.

8 For surveys see *e.g.* Hodder 1986; Hodder *et al.* 1995 (in which in particular *Shanks/Hodder 1995*); *Trigger 1989*.

9 Woltering 1979, 1994.

10 A more specific term is 'site formation processes'. See in particular Schiffer 1972, 1976, 1987.

11 For a discussion of the concept 'site' see Butzer 1982 and Fokkens 1991a, 54. A 'site' is often understood to be a place where human activities took place in the past. In practice, the term 'site' is often taken to be synonymous with 'settlement', which, strictly speaking, is not correct, for some activities took place outside settlements. Neither is it correct to define a site as a place where evidence for human activities may be found, in other words, a findspot. A findspot need not necessarily coincide with a site, for example if remains from a site are recovered from sand or soil used to raise terrain elsewhere (as in the case of the Mesolithic bone points recovered from the Maasvlakte).

12 *Cf.* Bos 1985, 126 ff; Bult 1983, 81 ff; Fokkens 1991a, 53 ff.

13 For a survey see *e.g.* Coles 1991, table 6.

14 Brandt/IJzereef 1980; IJzereef 1981.

15 *Pasveer/Uytterschaut 1992*.

16 See *De periodisering van de Nederlandse prehistorie* (The periodisation of Dutch prehistory), *Berichten van de Rijksdienst voor het Oudheidkundig Bodemonderzoek* 15-16 (1965-'66), 7-12.

17 Waterbolk 1959a, 1970a.

18 For a survey of those early dating methods see *e.g.* Eggers 1959.

19 The laboratory gives these margins as figures that correspond to a single standard deviation, *i.e.* a 68% probability range. If the result

is, say, 3650 ± 40 BP, there is a 68% probability that the actual date lies between 3690 and 3610 BP. For a probability of 95% the margin has to be doubled, i.e. to 80 years.

20 Lanting/Mook 1977.

21 See especially *Radiocarbon* vol. 28, number 2B (1986), and vol. 35, number 1 (1993). For accurate results a computer program is required, for example the program developed by the *Centrum voor Isotopen Onderzoek* (Centre for Isotope Research) of the University of Groningen, which is commonly used in the Netherlands (cf. Van der Plicht 1993; Van der Plicht/Mook 1987). See Mook/Waterbolk 1985 for a concise summary of the many facets of this dating method.

22 Kromer/Becker 1993. The date of 8800 BC for the beginning of the Dutch Mesolithic is hence based on an estimate.

23 The periodisation and the indicated dates were for the greater part established jointly by P.W. van den Broeke, J. Deeben, E. Drenth, J.N. Lanting and L.P. Louwe Kooijmans. With a few minor differences this periodisation was recorded in the Archaeological Basic Records of the Dutch archaeological expertise centre ARCHIS in Amersfoort.

24 See *e.g.* Louwe Kooijmans 1976b, fig. 2. Large time margins that are attributable to wiggles in the calibration curve can to some extent be reduced via 'wiggle-matching' (cf. Van der Plicht 1993, 236), but only if series of radiocarbon dates are available.

25 Lanting/Van der Plicht 1993-'94.

26 Jansma 1995. In the past it was thought that only oak could be used for dating purposes, but it has recently been found that other types of wood, such as ash and various types of coniferous wood, are also suitable for deriving dendrochronological dates.

27 See *e.g.* Aitken 1990.

28 Some elements are represented in part of the Netherlands only; in one case (Early Mesolithic) we were forced to take the *absence* of certain phenomena as the criterion for the beginning of the period.

The criteria for the periodisation as a whole are:

Middle Palaeolithic:	first use of Levallois technique
Upper Palaeolithic A:	beginning of Aurignacian (Central Europe)
Upper Palaeolithic B:	beginning of Magdalenian (Central Europe)
Late Palaeolithic:	beginning of Tjonger/Federmesser culture
Early Mesolithic:	end of Ahrensburgian culture
Middle Mesolithic:	first surface retouch on flint tools
Late Mesolithic:	first wide trapezium-shaped flint artefacts
Early Neolithic A:	beginning of Linearbandkeramik
Early Neolithic B:	beginning of Rössen culture
Middle Neolithic A	beginning of Michelsberg culture
Middle Neolithic B:	beginning of Funnel Beaker culture
Late Neolithic A:	beginning of Single Grave culture
Late Neolithic B:	beginning of Bell Beaker culture
Early Bronze Age:	beginning of Barbed Wire Beaker culture
Middle Bronze Age A:	first ring ditches around Bronze Age barrows
Middle Bronze Age B:	first post circles around Bronze Age barrows
Late Bronze Age:	first urnfields
Early Iron Age:	beginning of Gündlingen phase (Central Europe)
Middle Iron Age:	first Marnian pottery
Late Iron Age:	beginning of La Tène C (Central Europe)

29 After this chapter was written unexpected progress was made in the field of age determination, when it was found that burned bone can also be dated with the aid of the ^{14}C method (Aerts-Bijma *et al.* 1999). This means that cremated remains will play a role in the revised Dutch ^{14}C chronologies (published: Lanting/Van der Plicht 1995-'96, 1997-'98, 1999-2000, 2001-'02).

30 'The facts remain, their interpretation varies' (Van Giffen 1913, 1).