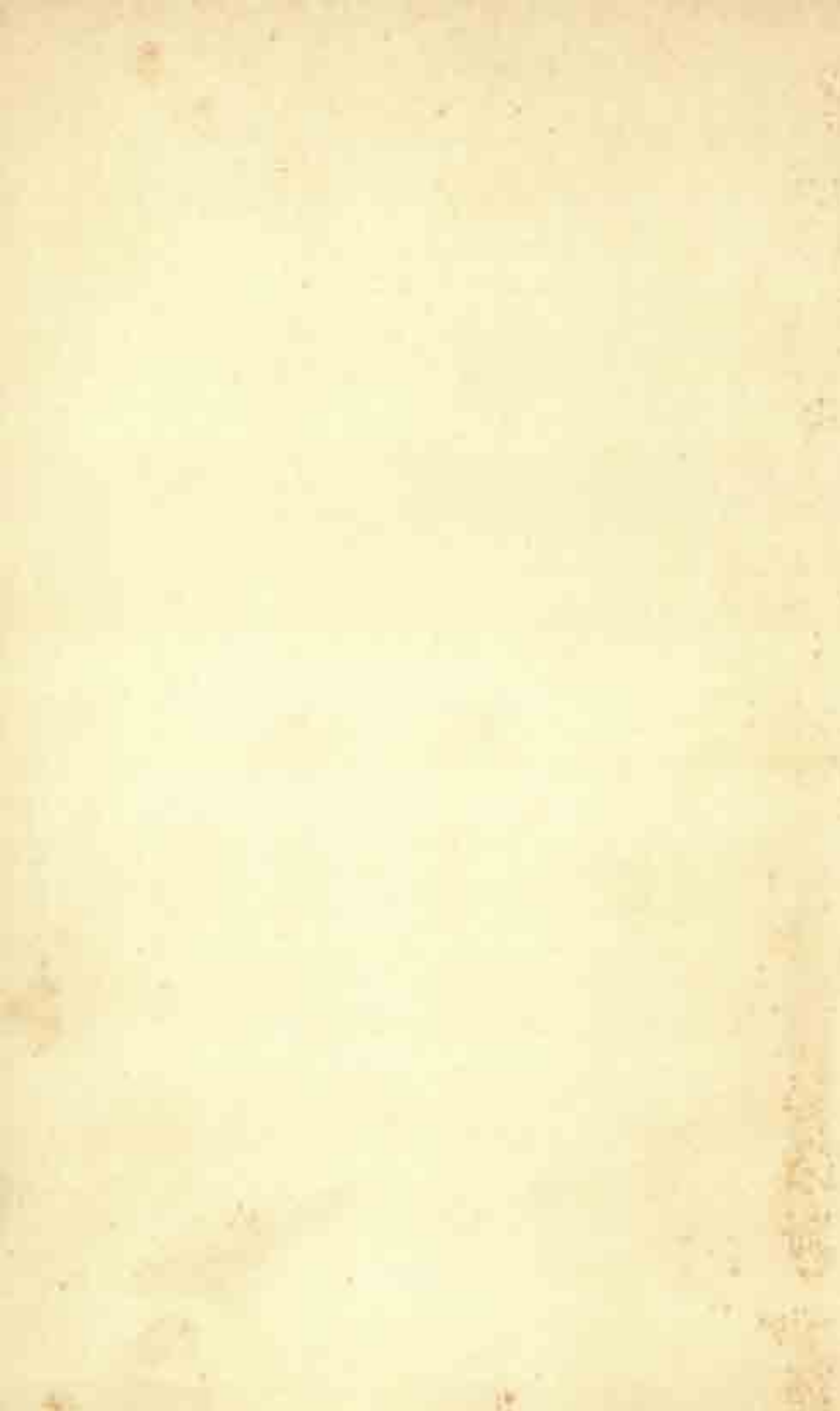


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ARCHAEOLOGY AND ITS PROBLEMS





Silhouette of a body found at Elp, in tumulus II, Westerbolk, Netherlands

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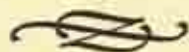
ARCHAEOLOGY

AND ITS PROBLEMS

by

Sigfried J. De Laet

Professor at Ghent University



TRANSLATED BY RUTH DANIEL

WITH A FOREWORD

BY

GLYN E. DANIEL

*Fellow of St John's College, Cambridge and
University Lecturer in Archaeology*



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FOREWORD

BY GLYN E. DANIEL

*Fellow of St John's College, Cambridge and
University Lecturer in Archaeology*

ALTHOUGH IT IS well over a hundred years since archaeology came into existence as a separate discipline, there are still very few books dealing with its techniques, methods, limitations, and aims. We are fortunate in the British Isles in that during the last quarter century some readable introductions to the methodology of archaeology have been published.

Our continental colleagues, particularly in the Latin countries, have not been so forthcoming and I know, for example, of only two introductions to archaeological technique produced in France in the last twenty years. I was therefore delighted when I read the book, here presented in English, written by the Professor of Archaeology in the University of Ghent. When reviewing the French edition in the September 1955 issue of *Antiquity* I said 'It is excellent in every way—brief but comprehensive, clearly set out and clearly thought out, authoritative and well illustrated. Professor De Laet says he originally wrote this book for his own benefit and so that he could himself get clear the problems of methodology which he had been studying and teaching for many years. What a good thing he has done so, since the book is now for the benefit of all of us—teachers and students, professionals and amateurs.' And then I added 'An enterprising English publisher should issue an English edition of it as soon as he can.'

Professor De Laet's book is not only a general introduction to archaeological methodology. It has an added value to English readers because it reflects throughout the particular problems and difficulties of Belgian archaeology. It would of course have been possible to change the book extensively for an English public, but on the whole it seemed better to leave it as it was. I wish it well in its English form not only among professional students of archaeology but among the great new British archaeological public which is coming into existence. They will

find here an honest, careful, thoughtful, and scholarly guide. This book will do a lot to make us think clearly about archaeological methods, techniques, and purposes.

December, 1955

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Preface to the English Edition

THIS BOOK HAD ITS origin in an essay on Archaeology and its problems written in Flemish and published in 1950. At the request of several friends, I produced in 1954 a French edition, augmented and rewritten to such a degree that it bears only a shadowy resemblance to the Flemish original, and it is from this latter edition that the English translation has been made. The French edition, published in the *Collection Latomus* (Brussels 1954), was intended primarily for archaeologists, both amateur and professional, in Belgium and North France. Conditions in these two countries have been especially borne in mind, and relevant examples chosen in preference to those of adjacent regions.

When an English translation of this essay was suggested, I considered rewriting it to conform to conditions prevailing in the British Isles. After mature reflection, however, this idea was rejected, for archaeology occupies a privileged position in Great Britain today, and has been able to rid itself of many of the teething troubles that it still encounters on the Continent. These are denounced in this book in an attempt, at least in part, to rectify them. The problems described have nevertheless a general application and are of interest to archaeologists of all countries. I have thought it sufficient therefore to modify those passages which would be of interest only to the Belgian or French reader. For the rest, the original text has been retained. This method will put the British reader or archaeologist on his guard against accepting continental archaeological material on equal terms with Scandinavian and British evidence.

It remains lastly for me to thank my colleagues O. G. S. Crawford and Glyn Daniel on whose initiative this English edition is produced.

Ghent, February 1955

S. J. De Laet

Preface to the French Edition

SOME YEARS AGO, at the request of the *Oostvlaams Verbond van de Kringen voor Geschiedenis*, I drew up a short survey on archaeology and its methods,* which had quite a favourable reception. I received many requests to publish a French edition for the use of all those who, in Belgium, take an interest in the remote past of their land and in its remains. This little book may then be considered as a second edition, this time in the French tongue, of my essay of 1950; it has, however, been considerably enlarged and re-shaped. Some new problems have been dealt with, others have been entirely re-cast.

I must at this point make a confession. This work was not in the first place written for the reader, but more for the benefit of its author, who was trying to clarify his thoughts upon certain problems of methodology which had been preoccupying him for a long time. He has tried to discover whether sometimes, in the past, he has been following the wrong road, whether it was not time to change course, to trace back to their roots certain fundamental questions for which he had up to then been content with traditional answers without first submitting them to a sufficiently critical examination.

Some passages are perhaps too personal in content and also, I fear, too impassioned. The *raison d'être* of the work explains but unfortunately does not excuse the polemical tone of some parts of it, for which I crave the reader's indulgence; it would not have been possible to feign an objective detachment over questions on which, quite frankly, I feel very strongly indeed. . . .

* * *

I owe the most heartfelt thanks to all those who have assisted in any way with this book. My colleagues and friends Madame G. Faider-Feytmans and Monsieur M. Renard, whose competence and learning are well-known, have had the kindness to read the manuscript, and I

* S. J. De Laet, 'Inleiding tot het Oudheidkundig Bodemonderzoek' in *Cultureel Jaarboek voor de Provincie Oostvlaanderen*, 1949, II, pp. 5-30, and 1950, II, pp. 5-32. This essay has also appeared in the form of a separate brochure in the series *Oostvlaams Verbond van de Kringen voor Geschiedenis, Voorlichtingsreeks*, No. 6, published by the *Federatie voor Toerisme in Oost Vlaanderen* (Ghent, Snoeck-Ducaju, 1951, 55 pp., 4 plates).

have benefited from their valuable comments. My colleagues R. J. C. Atkinson (Edinburgh), J. Brøndstedt (Copenhagen), R. L. S. Bruce-Mitford (London), P. Coremans (Brussels), P. V. Glob (Aarhus), D. B. Harden (Oxford), K. W. Kaiser (Speyer), M. E. Mariën (Brussels), and A. E. Van Giffen (Groningen) have very kindly put photographs at my disposal, while the publishing house of De Sikkel (Antwerp), the cultural services of the province of East Flanders, and the journals *L'Antiquité Classique* and *Phoibos* have given me permission to use their negatives. I should like here to express my heartfelt thanks to them. Finally, when he knew of my intention to write this work, M. Renard proposed that he should publish it in the *Collection Latomus*. May this modest contribution not too greatly disfigure a series in which so many important works have appeared.

August-October 1953

S. J. De Laet

Introduction

FOR MANY PEOPLE the word 'archaeologist' immediately conjures up the memory of Labiche's character, M. Poitrinas, solemn of speech, vulgar in appearance, puffed up with empty and pretentious learning; who passed for a harmless and amusing lunatic, without malice save at the expense of his colleagues. For other people, however, an archaeologist wears a romantic halo: he is the man who searches for cities lost in the jungle, or buried in the desert; who discovers at one stroke of the pick, dazzling works of art or fabulous treasures. Both these conceptions are false. Doubtless such as M. Poitrinas, who would trace a safety match back to the Romans, still exist—I shall, alas, have occasion to refer to him again. It also happens that an excavator, lighting by good fortune on some rare treasure, may find it glamorized by the Press. But just as a bone-setter is not representative of the medical profession, so the bearded and sententious dilettante has no right to be dubbed archaeologist. Sensational discoveries, such as that of the tomb of Tutankhamun, to cite only the most celebrated of them, are often but the crowning achievement of long years of research and are not, for the archaeologist, an end in themselves. The task of archaeology lies on an entirely different plane, and it is the part of this book to define it.

There are still many misconceptions as to the nature of archaeology, even among members of the profession. These may be partly explained by the origins of this discipline, in particular the assimilation of archaeology by art-history in the time of the Renaissance and of the Humanistic Movement. At that time, scholars and men of letters full of an unbounded enthusiasm for ancient Greece and Rome, confined their archaeological interests to works of art and buildings of aesthetic value. Archaeology, to their eyes, was identical with the history of ancient classical art. Other humanists regarded archaeology merely as an illustrative commentary on the texts which they were editing. This subordination of archaeology to philology, especially evident during the Renaissance, continued throughout the seventeenth and eighteenth centuries. It was not until the nineteenth century, and the birth of pre-history as a scientific discipline, that the archaeologist found at last his own sphere of research: the study and historical interpretation of *all* the material remains that vanished civilizations have left in the ground. These remains, from the magnificent Colosseum to the humble sherd

of badly-fired pottery, are studied from every aspect, as a means of reconstructing the life of past civilizations. Works of art are not, of course, excluded from the province of archaeology, if they can clarify in any way the history of former civilizations.* They remain, however, for archaeology purely historical documents and archaeology should refrain, *as should the archaeologist*, from formulating a subjective judgement on their aesthetic value. The distance which separates archaeology from art-history, moreover, increases every day. The art-historian concerns himself exclusively with works of art as expressions of the aesthetic tastes of a definite epoch. If he happens to give his attention to other remains of the past, he considers them only from their artistic aspect,† though it has been impossible for him, up to now, to exclude a certain number of subjective elements.

The archaeologist, on the contrary, takes pains to be scrupulously objective. Steady development in methods of reconnaissance and interpretation, especially notable during the last few years, has raised his profession to the level of a real scientific discipline. As an auxiliary science to history, its essential task is to reconstruct the different stages of the material civilization of mankind since earliest times. From this point of view the technological evolution of such and such a tool, however rough it may be, very often holds for the archaeologist greater significance and interest than a masterpiece of ancient sculpture. This fundamental difference between the two disciplines is not perhaps so marked for the classical archaeologist. That aristocrat of the profession recovers from the soil of Greece magnificent ruins and objects, the humblest of which often still display the artistic genius of ancient Hellas; but it is much more marked for the excavator who, in his home area, painstakingly brings to light the meagre traces which his barbarian ancestors have left in the bowels of the earth.

By tradition, Archaeology remains tied, in University teaching, to Art-History and is taught in the same institutes.‡ Nevertheless, if the

* Yet this aspect of Art History should not be exaggerated. Perhaps I might make use of the pleasant paradox set out by Aldous Huxley (*After Many a Summer*, Pt. 3, Ch. 1) on this subject: 'That's the charm of art. . . . It represents only the most amiable aspects of the most talented human beings. That's why I've never been able to believe that the art of any period threw much light on the life of that period. Take a Martian; show him a representative collection of Botticellis, Peruginos and Raphaels. Could he infer from them the conditions described by Machiavelli?'

† Certain art-historians have such a distorted idea of their profession that they go so far as to look upon every object as a work of art however little antiquity it may have. From that, to refuse to archaeology the smallest place in the sun, for the exclusive benefit of art history, is only a step.

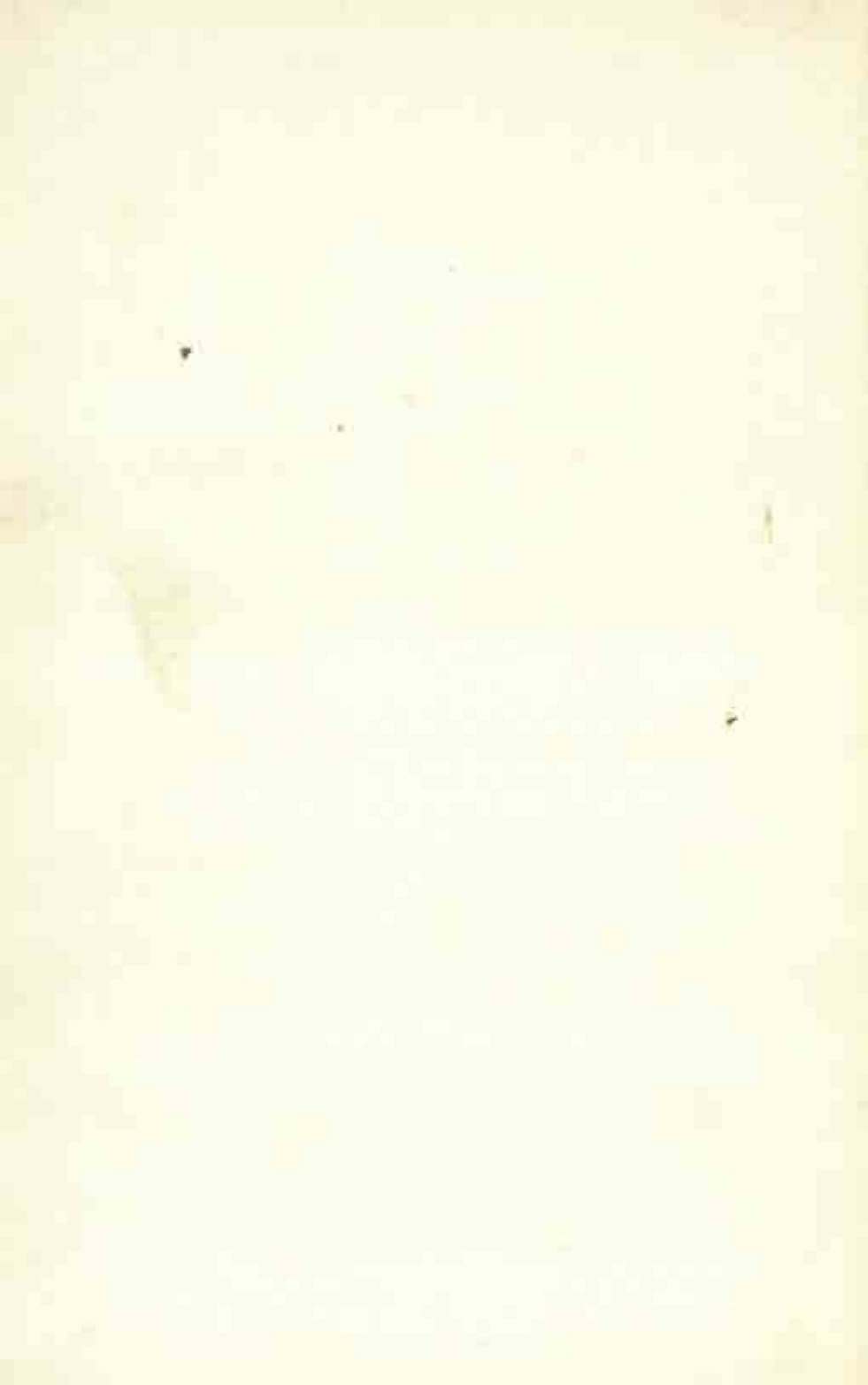
‡ At least in Belgium. In some other countries, such as England, for example, archaeology has achieved its own independence.



1. Section of the 'Berg in 't Perk', a tumulus excavated by the author at Postel, Belgium



11. Section in a gravel pit at Dorchester (Oxon.)



break between them is not officially recognized, it is no less profound. One cannot help thinking of those long-established marriages, very closely-knit to begin with, in which, as time goes on, incomparability of temperament and character become more marked from year to year, yet divorce or even separation rarely occurs, as that would mean an unwelcome acknowledgement of the situation.

Even thus delimited, the province of archaeology is still very considerable, especially when considered in terms of time and space. To appreciate this, one needs only to compare it with history *sensu stricto*. The historian confines his field of activity to the period for which there are written sources, and these allow him to study only the most recent stages of man's sojourn upon earth. The works of Caesar are the oldest written sources of Belgian national history, which thus embraces a period of about two thousand years. For other countries written sources are of greater antiquity, but even in the case of the most favoured, notably Egypt and Mesopotamia, these sources are never older than the third millennium B.C. At first sight, a period of five thousand years may be considered a very long time; but what are five thousand years when man has been wandering upon the earth for at least five or six hundred thousand years? One per cent of the whole can hardly be considered a long period.

There is the same contrast geographically between the interests of these two disciplines. History concerns itself only with selected regions, whose role and influence have been preponderant in the shaping of civilization. It can be said that all ancient classical history may be summed up in the history of Athens and Rome. Archaeology, on the other hand, concerns itself without discrimination with all areas, as much with those which have known brilliant civilizations as with those whose contribution to the enrichment of the common heritage of mankind has been less arresting; and, not content with considerably extending the horizons of history, does not limit itself in any way to prehistory. Archaeology provides also very valuable information about the most ancient periods of history *sensu stricto*. What would the history of Greece and Rome be without the contribution of archaeology? And need we recall that it is archaeological research which has revealed to us the fascinating civilizations of Egypt and of the Near East; which achieved the discovery of the hieroglyphic and cuneiform scripts whose interpretation has thrown new light on the far distant origins of civilization? As to the national history of Belgium, it can be said without fear of exaggeration that we are much better informed about the Gallo-Roman period and the early Middle Ages by archaeological excavation than by the scanty texts left by classical and Merovingian historians.

One last profound difference between history and archaeology is concerned with the varying levels of society about which we seek information. Historical sources, especially those relating to classical antiquity and the Middle Ages, tell us primarily about the most elevated classes of society, kings, the aristocracy or the land-owning classes, and furnish us with relatively few ideas about ordinary people and their mode of life. Archaeological sources on the other hand deal with all classes without social distinction: the spade of the excavator will uncover not only sumptuous Minoan palaces and rich cupola-tombs πολυχρόσια Μυκῆνης, but also the mud huts of Menapian peasants, the lowly workshops of Gallo-Roman artisans, and the poor tombs of the most backward prehistoric peoples. Within prescribed limits (to which I shall return later) the picture of the past with which archaeological evidence can furnish us is, then, more complete and less one-sided than that portrayed from written sources.

History and Archaeology, in short, seek the same end: to retrace the slow progression of man from primitive savagery towards his present state of civilization, and to unravel the fundamental causes of this development. Their researches derive, however, from different sources. Archaeology makes use of the material remains which our ancestors have left in the ground. These traces vary from the humble worked flint to magnificent Roman ruins; and embrace tools, weapons, pottery, tombs, remains of houses, kitchen middens, house foundations, fortifications, and earthworks. It follows from this that the picture of a period for which the sources are exclusively archaeological is necessarily incomplete; it differs markedly from that which can be drawn of historic periods. In the most favourable cases, nevertheless, that picture will be as rich and colourful as that of periods for which we have only very poor and fragmentary written sources. For the most ancient historic times, the two kinds of data are happily complementary, and one would take a poor view of a scholar who undertook the study of the Roman period or of Merovingian times in Belgium without being at once historian and archaeologist.

Bearing in mind this close interdependence of archaeology and history, the archaeologist ought to equip himself, before anything else, with a serious historical grounding of such a kind as will enable him to apply to his own discipline, with severity but flexibility, the rules of historical criticism. Well-known extravaganzas and fantasies have resulted from the researches of amateur historians; worse disasters still await the dilettante archaeologist, and the reason lies in the regrettable fact that for a very long time, in Belgium as in neighbouring countries, archaeology in general and archaeological excavations in particular were the almost exclusive prerogative of non-specialist amateurs, full

of the best intentions but, alas, totally incompetent.* Although there has been a marked improvement in the situation in the last few years, the danger has far from disappeared. Archaeology has, indeed, a lively attraction for minds interested in the past. This is accounted for by the spectacular side of archaeology and the easy approach to the first steps of this discipline, which is more susceptible than any other to vulgarization. But what the amateur cannot apprehend is that if the results obtained by archaeology are to be interpreted clearly to a cultivated public, the practice of that science is outside the range of the novice.

It has already been stressed that the archaeologist must be at the same time an historian. He must also—it goes without saying—have had specialized training in archaeology. The technique of excavation should become part of his professional experience, and he should be capable of dating, identifying, and interpreting his discoveries. To achieve this goal the archaeologist makes more and more call upon the services of numerous auxiliary sciences, most of which belong to that group known as the 'natural sciences': geology, anthropology, palaeontology, palaeogeography, chemistry, the study of radioactivity, etc. Each of these disciplines, to which I shall return in a later chapter, can materially assist the archaeologist: in re-establishing the physical environment in which our ancestors lived, for example: in dating or interpreting a piece of archaeological evidence by determining where a certain object was made, and recovering thus the ancient trade routes: or, again, in discerning the exact nature of the techniques employed in the making of pottery, cloth, metals, etc. Thus has archaeology become during the last quarter of a century a common meeting ground of the historical and of the natural sciences.

Clearly one cannot expect the archaeologist to be master of so many differing disciplines. Nevertheless, he should certainly possess enough basic knowledge to assess the value of the contributions made by these specialists and to be competent to draw pertinent and impartial conclusions.

Just as the expanding range of the historical sciences is today driving historians inevitably towards specialization, so the vast extent of the archaeological field compels the archaeologist to select for himself a limited sphere of research. We can distinguish ten or so of these and run through them quickly.

The study of the Palaeolithic and Mesolithic, periods of longer duration than others, but in which recognizable historical development has scarcely begun, deals with the entire world. It remains primarily the sphere of the geologist and anthropologist and, moreover, belongs,

* Some happy exceptions to this, such as Pitt-Rivers in England, serve only to show up the incompetence of the great majority of amateurs.

not so much by its excavation methods as by the auxiliary sciences which it employs, more to the domain of the natural scientist than to that of the historian. Some of those who study these two periods would reserve the term prehistory exclusively for them, calling the periods which follow protohistory.

The study of protohistory, dating from the appearance of the first agricultural communities, can be thought of either in terms of the European scene—so long, of course, as the great cultural contacts which united the West and the East even at that time are not neglected—or country by country, or one country only. It would be wrong, nevertheless, to impose upon the distant past the geographical or political limits of the present. It would be difficult, for example, to embark upon a study of the Omalian culture, which was confined to modern Belgium, and pay no attention to the fact that the Omalian is a local variation of the 'spiral-meander' ware culture, whose distribution extends almost as far as Central Europe. The study of Roman civilization, such as is met with in the different provinces of the Empire, has its own specialists. These should have a good classical education with a knowledge of classical archaeology, and a solid groundwork of regional protohistory. In fact, the study of provincial Roman civilization presents, in spite of a general unity, a number of local variations. It is for this reason that Gallo-Roman, Ibero-Roman, Romano-British, etc., studies each has its own special field of research.

Yet another domain is that of the archaeology of the Migration period and of the Merovingian period, which witnessed the progressive fusion of the autochthonous elements with the barbarian, the fusion from which sprang Western civilization as we know it. For this period archaeology adds considerably to historical knowledge. This is not so in the succeeding age, for the archaeology of the Middle Ages is at present too much confined to the study of religious and military architecture, and undoubtedly neglects a great many other remains which should be dug—town sites in particular—and disregards research projects which, if undertaken, would conduce to the better understanding of the social and economic life of those times.

Let us leave Western Europe for the Mediterranean. Here again the archaeologist may choose his subject: pre-classical archaeology, where the emphasis is upon the study of Aegean or Mycenaean civilizations; or Greek and Roman archaeology. It goes without saying that for such work a sound classical grounding and a thorough knowledge of the languages and civilizations of classical antiquity are indispensable, as they are for anyone who would study the archaeology of the Near East: Egypt, Asia Minor, Syria, Mesopotamia, and so on. Except in the case of one who wishes to specialize solely in the prehistory of

these countries, an adequate philological equipment is necessary. Not that it is essential for the archaeologist himself to decipher the hieroglyphic or cuneiform that his spade uncovers, but problems of chronology and interpretation can be resolved only in collaboration with the philologist.

This enumeration of the spheres or provinces of archaeology is far from being complete, for I have omitted to speak of the archaeology of the Steppes, of India, of China, and the East Indies, and that of the region where the archaeologist's domain is not clearly separated from that of the ethnologist: the Americas, Africa, Oceania, etc.

There could be no question, in a book of this length, of examining all the special spheres of archaeology. It will be limited primarily to the archaeology of Western Europe, and to classical archaeology. Yet, the problems of reconnaissance, digging, preservation, and interpretation which confront every archaeologist, whether he is working in India, Greece, or Norway, are fundamentally the same, and the majority of my remarks and observations concerning research in my own country could be adapted, *mutatis mutandis*, to most other areas of archaeological study.

After having examined what vestiges of the past the soil has bequeathed to us, I shall follow the archaeologist step by step in his daily work, from reconnaissance and excavation to the study of the remains which he has found, the preparation of his excavation report, the treatment of objects with a view to their preservation, and the study of problems of chronology and interpretation. By way of conclusion, I shall define briefly the possibilities and limitations of archaeology.

CHAPTER I

The Ground and its Record

IT IS HARD TO imagine a store of greater richness than the ground under our feet; for scholars of widely varied interests may find there the evidence that they need. The geologist is slowly unravelling the history of our planet (which has been estimated to be 2,000 million years old); the palaeobotanist seeks to recreate from it successive stages in the evolution of the flora; the palaeontologist examines it for the bones of extinct animal species, and thus retraces for us the evolution of the species; and finally the physical anthropologist, with the aid of human bones dug up from the ground, studies the origin of man himself. As for the archaeologist, although he is equally concerned with man as the focus of research, it is not bodily remains only that are his chief study, but rather evidence as to a manner of life. For about six hundred thousand years man has been leaving traces of his sojourn upon the earth: weapons and tools, remains of meals, hearths, traces of habitation, tombs, fortifications. The archaeologist does not concern himself only with objects which man has fashioned, but also with much more subtle legacies: one little thinks that every time a spade is driven, however gently, into the soil that it leaves an indelible mark. There have been found recently in Holland and in Denmark traces of the furrows made by a ploughshare of the Bronze Age. Of course, later modifications can confuse or efface the most ancient remains. Every reasonably careful excavator has met in the course of his work areas of ground so completely disordered and obscured by operations of relatively recent date as to make the archaeological record of his dig partially if not entirely 'unreadable' (cf. Pl. I). To distinguish, therefore, disturbed from virgin soil is one of the first lessons to be learned by every archaeologist.*

* How Glozel springs to mind! Among the scholars who let themselves be hoaxed, there were men of undeniable scientific worth, but not one among them had had practical experience of excavation. On the other hand, the International Commission, which was charged by the Institut International d'Anthropologie in 1927 with the task of examining the problem of the authenticity of the site of Glozel, was composed of experienced excavators. It was the unanimity of the conclusions of this Commission, that the objects 'found' at Glozel were forgeries of recent date, that had the final word, at least on the scientific level, on this controversy. Unfortunately it also had repercussions at the ordinary human level, and today certain wounds to self-esteem still bleed.

The 'records of the rocks' have endured for many centuries, and the action of their own environment has profoundly modified their original state. Physical and chemical forces, varying with different soils and climates, have left certain records untouched, but they have attacked, corroded, modified, and even destroyed, many others. Before undertaking an excavation, therefore, the archaeologist asks himself what influence the climate and the soil itself have exerted upon the evidence he is striving to recover. Not only the technique of the dig, but the interpretation of the uncovered remains depend, at least partly, upon the answer to that question.

Three factors must be taken into account: the material of which the objects are made, the geological circumstances in which they are found, and the climate.

It follows from this that inorganic substances are, generally speaking, much better preserved than organic. Yet the state of preservation differs from substance to substance.

Natural rock and flint are practically indestructible; nevertheless, their own environment may have given them a patina which considerably modifies their appearance. This patina may provide information about the conditions where the flint has rested: for example, long immersion in a river will produce a patina which is quite different from that produced by sojourn in a peat-bog. This is especially important with regard to tools which have not been dug up in the course of systematic excavation, but found by chance.

Weather and soil have but small effect upon buildings of baked brick. Such works have, generally speaking, been subjected to very little change from the time they were buried. If they are found in ruins, it is usually the result of man's own work: destruction by fire or pillage. Frequently, too, in the Middle Ages Roman ruins were used as 'quarries' whence was taken all material which was considered reusable. On the other hand, there are a few Roman monuments whose ruined state is due entirely to the action of the soil or of extreme climatic changes. Heat, frost, rain, and wind eat away the masonry and smooth the angularities of its sculptured ornament. This sort of destructive action, however, is in no way comparable to that of man.

In the Near East and in Republican Rome, use has been made of unbaked bricks. These have no worse enemy than humidity. In Mesopotamia, during former excavations, quantities of these unbaked bricks were destroyed without their presence even being suspected. And still today it happens that even experienced excavators can scarcely distinguish them from the earth which covers and surrounds them.*

Among metal objects those made of gold are best preserved.

* Cf. A. Parrot, *Archéologie Mésopotamienne* (1953), II, pp. 60 ff.

Certain Bronze Age cups and some torques and jewels of the Celtic or La Tène period shine with such freshness that one might think that they had only yesterday left the hands of the goldsmith. Silver objects generally preserve their shape and stability, but are very often covered with an indelible blackish patina.

The preservation of objects made of bronze is determined by the nature of the soil in which they have been buried and by the quality of the alloy; preservation is in general very good, in spite of the fact that acid soils make easy inroads into this metal. It does happen that very delicate objects have been oxidized to such an extent that they leave in the soil only a green deposit. How often has it happened in digging a Gallo-Roman cemetery that all that remains of an *obolus* for Charon is a little green stain!

Iron, by itself, oxidizes very rapidly, sometimes even to the heart of the object. Rust may not only distort such an object to the point sometimes of making it unrecognizable, but renders its preservation extremely difficult.

Potsherds are generally in a good state of preservation, though it does happen that some prehistoric pottery, inadequately fired and porous, and badly affected by humidity, will be fragile and crumbly. On being dried out, however, its original consistency may be restored. Acid soils, again, are not favourable to the good preservation of sherds.

Objects of glass, finally, are often attacked on the surface and covered with a thin whitish or iridescent film.

Among organic substances, bone, ivory, stag- or reindeer-antler, and horn offer the greatest resistance and are preserved for the longest time. Acid soils, however, may cause bones to disappear completely. It is noticeable that cremated bones are preserved much better than those which have simply been buried. Flesh disappears very rapidly, skin more slowly, but hair is resistant.

Vegetable substances are found only in exceptional cases. Wood is not normally preserved except under very damp or marshy conditions; but it is noticeable that posts and beams in certain soils, in sand for example, leave very clear marks. A careful examination of these makes it possible to reconstruct the building of a tomb or the plan of a habitation site (cf. *infra*). Lastly, when wood has been subjected to the action of fire and is partially calcined, it lasts for a very much longer time. But, more than any other, climate is the determining influence upon the state of preservation of archaeological remains. Although this book is concerned mainly with the archaeology of Western Europe, it may be useful to make a brief review of the different climates and their effect upon archaeology.

There is no worse enemy to the archaeologist's record than a hot

wet climate such as that of the tropics. Humidity and luxuriant vegetation, in a very short time, get the better of the most solid monuments. Plants soon thrust their roots into the smallest crevices, even in masonry, and give rise to fresh cracks. And the fauna, especially termites, swiftly complete the ruin of the monument.

But it is quite otherwise in countries where the climate is hot and dry. There, numerous objects of perishable material which elsewhere would have disappeared have been preserved intact over the centuries. Think, for example, of Egypt, paradise for archaeologists, where the discovery of objects of wood, of basket-work, even of grains of cereal many thousands of years old, is a common occurrence. And think of the fragile but precious papyri which have given to us not only some of the masterpieces of ancient literature, but also so much information about the government and life of the people of Ptolemaic and Roman Egypt. As for the preservation of mummies, even this is due more to the climate than to embalming: in fact, prehistoric tombs discovered in Egypt have yielded corpses which, although they had never been embalmed, were as well preserved as the mummies. Some desert regions of Asia and certain parts of America present the same ideal climatic conditions. American archaeologists, digging Indian tombs in Arizona going back to the pre-Columbian era, have discovered not only corpses mummified by desiccation, but many wooden objects, textiles, basketry, and even flies in an excellent state of preservation although they had been buried for more than a thousand years.

A climate that is very cold, such as that of the Arctic regions, also has good preservative qualities. Cold has often preserved the most perishable materials. Russian palaeontologists have on more than one occasion disinterred in Siberia the bodies of mammoths almost intact: not only the skeletons but also the greater part of the hide, and even of the flesh, have been preserved—for instance, the famous case of those disinterred in 1949 in the peninsula of Taimyr, and that found in 1901 at Beresovka. This last animal had fallen, thousands of years ago, into a deep crevasse, and had not been able to get out because of a fractured pelvis; very quickly a heavy fall of snow and ice covered it up, and for thousands of years kept it, as it were, in a deep-freeze. It is reported that the dogs which were pulling the sledges of the expedition were regaled with portions of its ancient flesh. In the stomach were found the remains, in an equally remarkable state of preservation, of the animal's last meal: pieces of pine and larch, rushes, mosses, thyme, and different kinds of grasses. In the Altai, Kozlov and Borovka excavated several Scythian tombs of the first century B.C., containing not only objects of gold, bronze, iron, jade, amber, and pottery, but also of highly perishable materials: objects of wood and of copper, lacquered

bowls, furs, textiles, silks, etc. Here again the very intense and constant cold was the cause of their remarkable state of preservation.

With its alternating seasons of cold and hot, wet and dry, the temperate climate of our own lands deals harshly with perishable materials. It is only in exceptional circumstances, when the conditions in which the archaeological remains were buried were homogeneous and there have been no great variations in humidity and temperature, that one can hope to find objects which would normally have disappeared.

The classic example of this is found in the Alpine lake villages. It is not necessary to enter here into the controversy as to whether these villages were truly built upon piles above the water, or some distance from the bank, or whether they were marsh villages raised above the boggy sides of these lakes. Whichever it may have been, the immediate proximity of the water was responsible for the fact that a number of the objects used by the inhabitants fell into the lake and became embedded in the mud at the bottom. There are being recovered today from the mud and peat bog below water-level a considerable number of perfectly preserved remains, even when they are of vegetable origin: remains of wooden houses and wooden piles, basket-work, fishing-nets, textiles, and so on. The astonishing richness and great variety of this evidence from several thousand years ago is at once apparent in the collections in Swiss museums.

The marshes and peat bogs of Northern Germany and of Denmark have likewise preserved a whole series of archaeological records of the highest order: they include fishing-nets of birch bark, canoes, wooden chariots of a primitive kind, and sleds. Among the most remarkable finds made in these peat bogs are about forty corpses entirely mummified and in a surprising state of preservation (cf. Pls. V and VI). From a recent discovery of this kind, made in May 1950 in the Tollund Bog in Jutland, the police, deceived by the condition of the corpse, thought at first that they were confronted with the victim of a recent crime. A colleague of mine, P. V. Glob, of the University of Aarhus, demonstrated that this crime—if crime it had been—had taken place more than two thousand years ago! The victim, a man, was entirely naked, except for a leather girdle and a cap of skin, and had clearly been strangled by a leather cord pulled tightly round his neck. As a number of other bodies of the same epoch had already been found in identical circumstances, it is reasonable to believe that we have here evidence of human sacrifice. The contents of the stomach of Tollund Man, carefully analysed, yielded most valuable clues to the diet of the inhabitants of Denmark in the Iron Age. This man had eaten, as his last meal, a sort of porridge which was made up not only of a series of cultivated plants of that time (barley, linseed meal, *persicaria*, *camelina*) but also wild

plants (sheep's sorrel, white goosefoot, brassica, corn spurrey) and these in such proportions that it is clear the seeds of the wild plants were still always harvested and were an integral part of the diet of the times.

Let us look now at a series of Bronze Age burials found in Northern Germany and in Denmark. The body was laid out, with a series of objects intended to accompany him beyond the grave, in a coffin fashioned from the hollowed-out trunk of an oak-tree, whose two halves fitted perfectly. This tree-trunk had first been surrounded with a thick bed of stones and then covered with a mound sometimes as much as three metres in height; the subsoil was formed of a thick bed of iron-pan. This very resistant bed has kept the interior of the tumulus at a constant degree of humidity, protecting it from heat and evaporation. If we add to this the action of the tannin exuding from the oak coffin, it is not surprising that here a number of perishable substances have been preserved. The skin and the hair remain, as do the clothing, goblets and sword-scabbards of wood, folding stools of wood with seats of hide, and leather objects (cf. Pl. VII). By this means we know not only the mode of dress but also the style of hair-dressing which was in vogue in Northern Europe three thousand years ago.

But perhaps the most exceptional case of preservation is that of a bottle of wine dating from the third century A.D. and discovered in 1867 in a Roman sarcophagus at Speyer (Palatinate). The bottle was still full almost to the neck with liquid. Analysis proves that it is indeed wine mixed with a considerable quantity of honey. To preserve the wine, it had been covered—as in Italy today—with a layer of olive oil. This was exceptionally thick and quickly became resinated, thus preserving the wine from evaporation. The alcoholic content, being very volatile, and the tartaric acid, had disappeared, but the other components of the wine were easily identifiable by the analyst. This sample of ancient wine, the oldest of those that have been preserved to the present day, now occupies a place of honour in the Museum of Wine at Speyer (Pl. III).

A few words, in conclusion, on geological conditions and their influence upon the archaeological record. The nature of the soil in which objects are buried very often explains their state of preservation or decay. Acid soils will dispose of perishable materials in a few years and attack a number of more resistant materials: bones disappear very quickly, unless they have been cremated; iron and even bronze are subjected to rapid action. Sandy soils preserve certain remains better than clayey soils: it is much easier to find in them, in the form of brownish or blackish marks, the remains of beams, posts, ditches, etc. Skeletons, even though they are not often preserved for a long time,

do, on the other hand, leave their mark in the form of dark silhouettes, which, if uncovered with all the necessary care, are sufficiently clear to allow anthropological measurements to be made (cf. frontispiece). Lastly, let us recall that the exceptional preservation of Herculaneum and of Pompeii is due to the fact that these towns have been buried respectively under lava and lapilli: even the things consumed by the fire and heat often remain preserved in a 'negative' form. Thus it is that by carefully pouring plaster into some of the cavities in the lava or lapilli, casts are made of animals and of people who perished in the catastrophe of A.D. 79 (cf. Pl. IV).

These few examples, which could be extended indefinitely, will suffice to show that every archaeologist, before undertaking an excavation, should take account of the circumstances which may have influenced the state of preservation of the remains which he is hoping to find.

CHAPTER II

Archaeological Reconnaissance

ONE OF THE questions that the archaeologist hears most often from the lips of the laymen who visit his site is this: 'How do archaeologists know the precise places to dig up in order to find remains from the past?' The reply is complex, for there are many and diverse indications that may put the excavator on the track of interesting discoveries.

These signs fall roughly into three categories. First, the chance discoveries which are revealed through a natural agent (such as erosion) or by man, and which have been the cause of systematic excavation. Secondly, evidence provided by careful observation of the surface of the ground, its relief and vegetation, and even of the behaviour of certain animals. Lastly, the treasury of information hidden away in ancient books, old maps, cadastral plans, toponymy, and even legends and folklore. In addition to this, during recent years many new methods of active reconnaissance have been developed.

Some examples will serve to illustrate these different points.

CHANCE FINDS

Among the forces of nature which come to the aid of the archaeologist, erosion deserves pride of place, whether caused by the sea, by streams and rivers, or by the wind.

More than once it has happened that the sea, in process of eroding the coastline, has revealed deeply buried archaeological evidence. The phenomenon is not uncommon where the coast is formed of steep cliffs: among the oldest traces we have of human industry are the famous Cromer beds (Norfolk) and Clacton beds (Essex), which were uncovered in this manner. On sandy coasts bordered by dunes, remains of the past uncovered by the action of the sea are no less important. In 1641 a great storm ravaged the west coast of the Isle of Walcheren and laid bare the famous shrine of the goddess Nehalennia, now once more covered by the waves. At Katwijk, it was again the waves which uncovered on the beach, in 1520, the remains of the 'Brittenburg', a Roman edifice—probably a *castellum*—which remained visible at low tide up to the middle of the eighteenth century.

On the other hand, it sometimes happens that violent seas cast back on to the beach the remains of ancient habitations which the waves had formerly engulfed: on the Belgian coast, for example, to the west of Ostend, there are occasional vestiges of the hamlets of Mariakerke and of Walravensyde, which were submerged after a great tempest in 1334. In 1936, the sea having shifted a great quantity of sand, the foundations of small houses belonging to these hamlets were visible for some time at low tide.

In prehistoric times, and later, man has chosen to settle on the banks or in the immediate vicinity of streams and rivers, because they are a source of food and a means of communication. Thus it is not surprising that archaeological enterprises are so often undertaken in the spots where rivers, ever engaged in increasing or reducing their meanders, scoop out their banks most deeply. The Neolithic habitation site of Vinča on the Middle Danube, the study of which has thrown an entirely new light on the relations between the Mediterranean world and barbarian Europe at the beginning of the Neolithic, came to light in this way.

Wind erosion has played an equally big role in archaeological discovery. In many sandy regions, in the Belgian Campine, for example, where the vegetation cover has begun to disappear—partly as the result of the pollution caused by the establishment of great chemical factories—the wind has soon changed the appearance of the countryside; in some places high, wind-borne sand-dunes are formed; in others the whole surface layer of soil is progressively removed, sometimes to a

depth of several metres. Most of the beautiful Tardenoisian microliths of the Mesolithic were laid bare in this way by the wind. But this same wind elsewhere plays an equally important role as a preserver of antiquities. If in many regions Roman ruins are buried today well below the surface of the ground that is partly due to the action of wind. Particles of soil borne by the wind have been arrested in their passage by ruins standing up above ground level, have slowly accumulated there, and have little by little shrouded the former level of habitation under a blanket of earth, to a depth sometimes of several metres.

Besides the forces of erosion, other natural phenomena can furnish the archaeologist with useful indications. The first signs of a lake village in Switzerland were discovered in 1853 after a long period of drought, which brought about an abnormally low level in the waters of Lake Zurich, and laid bare the stumps of piles hitherto unsuspected. Most chance finds, however, have been made following some human activity or another. A catalogue of all the antiquities which the ploughshare has brought to light would run into many volumes. The cutting of ditches, of trenches for the foundations of new buildings, the laying of water and gas mains, of electric or telephone cables, the construction of railways, the digging of canals and of docks, the exploitation of peat bogs for fuel, of quarries and gravel pits have been the cause of innumerable discoveries. When, between 1910 and 1925, the town council of Ghent constructed the central docks of the Port of Ghent (called 'Port Arthur') a piece of Flemish prehistory was laid bare: innumerable Mesolithic microliths and some Neolithic tools were discovered; and there was revealed the celebrated burial known as 'Port Arthur's tomb', which dates from the Late Bronze Age and which contained one of the richest collections of grave goods known from this period. Iron Age pottery and a few remains of Roman date were also found, and finally a Merovingian cremation cemetery.

It frequently happens, however, that the finds made in these circumstances are lost and that systematic excavation is impossible, because those responsible for industrial enterprises, fearing that scientific research will hinder the progress of their work, keep very quiet about such discoveries.* It would be easy to cite in this context the unjustifiable attitude of the authorities directing those public works which have, during the last few years, transformed the face of the Belgian capital. On the other hand, directors of some private enterprises give notice to the competent authorities, and even provide workmen to

* Note that in certain countries fortuitous discoveries of this kind have by law to be reported, and the competent authorities informed. But this is far from being the case in Belgium.

undertake an urgent rescue dig; they assuredly deserve our compliments and our thanks.

Dredging of streams and rivers has also contributed to our knowledge of the past. It will suffice to mention the enormous quantity of weapons, jewels, tools, and other objects, dating from the Neolithic to the Viking Age, which have been dredged up from the River Scheldt at Schoonaarde, Wichelen, and Termonde, and which are dispersed among almost all the museums and collections of the country. Though the origin of some of these pieces is suspect, many of them are correctly labelled.

Even fishing has been known to furnish clues for the archaeologist. Thus in 1931 some fishermen brought up in their nets, off the shores of Norfolk, a piece of moorlog detached from the bottom of the sea in which was found a Maglemosian harpoon of bone—further proof that in Mesolithic times Britain was still joined to the Continent.

Lastly, the two world wars have made notable contributions to archaeology, surely the least belligerent of the sciences. The digging of trenches in Eastern Prussia in 1914 and in the Somme in 1917, construction of new airfields in England in 1940, resulted in some remarkable discoveries. The Celtic temple of Heath Row, for example, which dates from the Early Iron Age, was dug as a result of the construction of a new airfield (now London Airport) outside London. A number of towns have been excavated recently—Cologne, London, Canterbury, Tournai, Bavai—purely as the result of bombing and war damage. War is responsible, too, for the rapid development of aerial photography, one of the active methods of reconnaissance of which more will be said at the end of this chapter.

SURFACE INDICATIONS ON THE GROUND

A certain number of archaeological remains have survived upon the surface of the ground down to the present day. Some ancient monuments are preserved intact or nearly so, such as the Porta Nigra of Trier, the arena of Nîmes, and the theatre of Orange. Others are in a ruined state, such as the *Kaiserthermen* at Trier and the Roman walls of Tongres, but their state of preservation should be no obstacle to their eventual excavation. This would allow a more precise estimation, for example, of the original group of buildings of which they were a part, or more accurate information on the date of their construction. Other prehistoric monuments visible to the naked eye include, for instance, the megalithic monuments, such as the *allées couvertes* of Weris, the 'marchets' of the Forest of the Ardennes, the tumuli of the Belgian Campine, the earthworks of promontory forts, and the walls of some *oppida*, such as that of Hastediton near Namur (cf. Pl. XI).

Other remains have left only feeble signs on the surface of the ground, and even the most eagle eye can scarcely pick them out. Some ancient ditches, *fonds de cabanes*, and flattened burial mounds have often left only the slightest irregularities. These are readily detected by air photography, but even without this a careful and trained observer will be able to observe them.

Archaeological remains which are entirely buried can exert an influence upon the surface vegetation and this may betray to the archaeologist possible sites for excavation. In dry seasons, for example, the site of an ancient building will conserve the humidity longer than the surrounding soil and the vegetation in consequence will be more luxuriant. Over ancient wells, ditches, or *fonds de cabanes*, the humus layer is generally deeper than elsewhere: here again their existence will be disclosed by more luxuriant vegetation (cf. Pl. II). On the other hand, the walls of buried foundations, acting as drains, will dry out the earth which covers them more quickly: in these places the grass or crops will be less sturdy and will ripen more quickly. During the excavations of Alba Fucens, in Italy, on more than one occasion the plan of buried buildings was thus clearly outlined in hillside fields of rye (Pl. VIII). When snow covers the ground, differences in level may become apparent, for the snow melts more quickly over buried foundations, so that at any given moment the plan of the buildings may appear in black outline on the white backcloth of snow.

Even the behaviour of wild animals can provide information. An English archaeologist noticed one day that on a heath abounding in rabbits a certain stretch of land had no earths in it at all, while all around the ground was riddled by warrens. Intrigued by this, he started to dig, and discovered that the place overlay some cists covered by a thick layer of stones through which the rabbits had been unable to burrow.

OTHER INDICATIONS

Happily for the archaeologist, many areas have been cleared and put under cultivation only in comparatively recent times. Observing the speed with which cultivation has spread to the detriment of the Campine heath in Belgium, an encroachment leading to the destruction of many archaeological remains, one cannot but be glad that this intensive exploitation of the ground has come about only recently. As a result, many ancient monuments have been preserved up to our own times. Quite often the positions of these have been marked on old maps, cadastral plans, and military maps. Tumuli, which today have been levelled, have sometimes been recorded in this way, and excavation made possible. This is always a useful work, for even if the upper part

of the tumulus has disappeared, there remains the likelihood that its base and lower levels (even the burial itself) may be found not far below the surface.

Cadastral plans should not be neglected. It is far from rare to find that enclosures of land have been determined by the presence of ancient ruins long since disappeared. When we were making preparations for the 'Steenberg' excavations, at Hofstade near Alost, we were struck by the fact that the boundaries of all the enclosures there were parallel, except in one place where the oldest cadastral map available (dating from Napoleonic times) showed that the field was wider in the north than in the south. The difference was slight and had disappeared from more modern cadastral plans, although it still existed on the ground. Excavation provided the key to this enigma: the two boundaries which were not parallel were found, in fact, to follow exactly the remains of Roman walls of which there was nothing but the foundations covered with about 70 cms. of soil, but which evidently, when the land was enclosed, were still visible.

Let the archaeologist be sure also to make a close study of the works of ancient historians and local antiquaries, who frequently mention discoveries made sometimes several centuries ago.

Lastly, the archaeologist fails in his duty if he neglects the contributions of folklore and the study of place-names. A host of legends are attached to barrows and other prehistoric burial places. The spots where witches kept their sabbath, the haunts of werewolves, cats, and other malevolent animals (at least if one believes the legends!) have often turned out to be fruitful sites for the archaeologist. The two twin cemeteries of the Hallstatt and La Tène periods, which I dug in collaboration with M. E. Marien at Lommel, in the Campine, were discovered at the place known as 'Kattenbos', the Wood of the Cats, a name with its own significance. Many of the country people will not venture, even today, to go by after nightfall for fear of meeting the devil, who, disguised as a cat, would quickly chase them into the nearest pond! In the Low Countries, in Germany, and in Scandinavia, megalithic monuments are generally attributed to some giant or other. As for Roman roads, which were the only ones known up to the tenth century and even later, they often bear significant names: the Road of Brunehaut, the Devil's Road, etc.

METHODS OF DELIBERATE RECONNAISSANCE

In spite of the valuable assistance of chance, and in spite of the innumerable clues that can be found in old books and in the countryside itself, it is nevertheless not an easy thing to determine with accuracy

the exact place that would repay excavation. Even if one has reached the point of circumscribing the limits of interesting ground and may have reduced it, for example, to less than five acres, the method of cutting trial trenches, costly both in time and money, may often prove deceptive, especially when ill-luck takes a hand. We know the misfortune of the archaeologist who had reached the stage of approximately locating a Roman *Castellum*. He caused a long trench to be dug running the whole length of the ground in which—he was almost sure—the remains of the camp would be found. Imagine his astonishment when he found—absolutely nothing. It was not until much later that he solved this puzzle: his trench did indeed cross the camp but it had not been dug deep enough, and to complete his discomfiture it was found that his trench followed exactly the *via principalis*, had come in through the ramparts by the *porta principalis dextra*, and had emerged from the site by the *porta principalis sinistra*!

I have dealt at some length with those methods of reconnaissance which help the archaeologist to determine the precise place to dig. But I must not overlook certain empirical systems even though they have more disadvantages than merits. The 'sonde', or probe, for example, dear to the hearts of many an amateur excavator, that thin shaft of pointed iron plunged into the ground from place to place, may be useful to follow the course of foundations already detected, but is an extremely dangerous weapon in many other circumstances. It may well come into contact with objects under the surface, but will often damage fragile material such as pottery or glass.

Fortunately, there are now sound scientific means of reconnaissance, and I will enumerate here those methods which have undoubted practical value. Among these, some are aimed towards perfecting the direct observation of existing clues, difficult to discern under normal conditions. The most important of these are aerial photography and underwater reconnaissance. Other methods, borrowed sometimes from geophysics, have been developed to recover archaeological remains when absolutely no trace is visible on the surface of the ground: the method, based on the measurement of differences of electrical resistance of the subsoil, is going to yield valuable results. Soil science and chemical analysis of soils are also valuable sources of information. The electromagnetic detector, used in wartime for mine-detecting, can be used in some cases.

Do not be surprised, at this point, to find no mention of spiritualism, automatic writing, radiesthesia, or the magician's wand: frankly, I do not believe in them!*

* Attention is drawn to the *Revue Archéologique* of 1925 (5, XXI, pp. 115-47) ('Les sciences auxiliaires de l'archéologie. Archéologie, art et métapsychique'), where W. Deonna defends the opposite point of view.

Aerial Photography

Aerial photography, which was just a curiosity before the first world war, made great strides during those four years because of its military importance. After the war some former pilots, interested in archaeology, realized that aerial photography could be of the greatest service in archaeological reconnaissance. The first attempts were those of L. Rey in Macedonia, of T. Wiegand in Palestine, and of G. Beazeley in Mesopotamia. It was, however, in Great Britain that the most systematic development of this new technique was undertaken, thanks mainly to O. G. S. Crawford and Major G. W. G. Allen. In Europe, during the years which separated the two wars, the practical application of this new method remained in fact a British prerogative; on the Continent, only very tentative efforts were made, and those mainly in Germany. On the other hand, Father Poidebard achieved useful results in the Near East: such as the exploration of the *limes* of Syria, of the port of Tyre, and of the *limes* of Chalcis.

The second world war considerably accelerated the development of aerial photography, notably by the use of photogrammetry, for the preparation of strategic bombing raids and for elaborating the detail of military maps. The armed forces of the air spent, even during the war, some spare time in the science of archaeology: thus it was that the R.A.F. reconnoitred and photographed prehistoric and Roman sites in Apulia, and the Luftwaffe made a systematic photographic survey of the great Roman road and its vicinity from Boulogne via Bavai and Tongres to Cologne.*

Since the end of hostilities, archaeological reconnaissance by means of air photography has developed with great rapidity. Although Great Britain, where Dr J. K. S. St Joseph is the moving spirit, is still the main source of this progress, other European countries have become aware of the benefits of this method and are using it more and more. Among some of the most remarkable results are the discovery and exploration by Col J. Baradez of the Roman *limes* of Numidia.

But what actually are the practical possibilities of aerial photography?

In the first place it is possible to take excellent bird's-eye views of complex archaeological regions—towns, defensive systems, communication networks, etc.—which, from ground-level, are difficult to sort out as a whole. Good photographs can be of enormous value in establishing the plans of such sites. The picture of the whole of the *oppidum* of Hastedon (Pl. XI), published here for the first time, is an example.

* Unfortunately this photographic record appears to have been lost during the German debacle of 1945.

Just as important is the picking out of slight indications on the surface of the ground, such as small variations in level, differences in vegetation cover, etc., which, often scarcely visible at ground-level, except under very favourable conditions, can be quite clearly seen from some distance up. Innumerable sites whose existence had not previously been suspected have already been brought to light by aerial photography. We might take a rapid look at the different possibilities. Slight unevennesses of ground, such as smoothed out banks of earth, tumuli which have practically been levelled out, and old ditches show up remarkably clearly in the early morning or towards evening, when they are lit by the oblique rays of the sun, low above the horizon, giving long and exaggerated shadows.

Differences in vegetation, due to the presence of ancient ditches, foundation walls, etc. (cf. *supra*) are clearly visible on air photographs. They show up particularly well in fields of ripening grain or lucerne (cf. Pl. IX) but may be quite invisible when the field is under plough or carries a different kind of crop. In certain cases, however, particularly when the subsoil is of a different character from that of the surface soil, a photograph of fields freshly ploughed may also reveal very clear signs. Such a one is the photograph of the Hallstattian cemetery of Lommel-Kattenbos published here (Pl. X) where the levelled barrows show up light (yellow, sandy subsoil) contrasting clearly with the dark background of arable soil which surrounds them.

As to the actual technique of photography, the best photographs are those taken by the pilot of the aircraft himself, who, in flying over the site, is in the best position to judge from what angle the pictures should be taken. For indications on the ground which are revealed by their shadows, oblique photographs may be preferable, while the vertical photograph is more suitable for showing up differential vegetation and for a general plan of a site as a whole. As to the height from which these pictures should be taken, that depends primarily upon what is needed: large-scale prints of clear features (low-flown photographs) or overall views of larger sites (taken from a greater height). Lastly, for each site the timing of the operation is of paramount importance. For instance, where shadows are of great significance, the early morning and late evening of a sunny day are clearly the best times.

The importance of aerial photography to the archaeologist increases daily. In Belgium attempts to employ it have so far been of a tentative nature. However, if some day the responsible authorities give up sporadic research in order to undertake systematic work upon a well-delimited area (such as the exploration of the enigmatic and hypothetical *limes Belgicus*) it will be essential for them to begin by making a complete survey, from the air as well as from the ground.

Underwater Reconnaissance

The vogue of underwater fishing, the use of ultra-light diving-suits by 'frogmen', the interest which has been aroused in 'bathyscaphes' and other apparatus designed to explore the depths of the sea, suggest that these modern diving methods will soon be used intensively for investigating archaeological remains drowned by the sea.* Indeed, the first attempts have already been made, and most interesting results are emerging off the Mediterranean coasts of France and Italy.†

Geophysical Methods

Geophysicists use exact and delicate techniques to determine the structure of the subsoil; to detect deposits of petroleum, coal, iron, etc.; and to investigate the structure of the subsoil in places where great works are to be undertaken. It is believed that these techniques may be of equal value in archaeological reconnaissance. In fact, ancient holes in the ground, filled-in ditches, buried foundations, can so break up the physical unity of the subsoil, that it will not possess the same uniform structure it had before it was disturbed. However, among geophysical methods, those which are based on magnetism and gravity, or the speed of earth-waves,‡ can scarcely be of practical use in archaeology. On the other hand the methods which register electrical anomalies in the subsoil might become very useful. I shall deal here only with the method of resistivity-survey used by my colleague R. J. C. Atkinson, as this will probably be more widely used in the near future.

The principle upon which this method is based is as follows: the power of electrical conductivity of the upper layers of soil does not depend upon the nature of the soil itself (except in the case of mineral ores), but upon the water that they contain, in which there are mineral salts in solution. So, arable land, which generally forms the surface layer of soil, contains more water than the stones of ancient buildings

* Cf. Philip Diolé, *Promenades d'archéologie sous-marine* (Paris, A. Michel, 1952; trs. Gerard Hopkins (*4,000 Years Under the Sea*, London, 1954)); N. Lamboglia et F. Benoit, *Fouilles sous-marines en Ligurie et en Provence* (Bordighera, 1953).

† These results have aroused the French Government to extend the legislation protecting archaeological sites on the sea-floor and to submit submarine researches to a strict discipline (cf. *Gallia*, VII, 1950, pp. 248 ff.). Necessary measures, for the Press reported the robbing of an Etruscan tomb at the mouth of the River Po, now submerged, by specialist thieves equipped as 'frogmen'.

‡ The empirical method of sound detection, which consists of tapping the earth with the aid of an instrument of some kind to discover hollows in the ground from the nature of the sound received, is capable of good results, but it has a restricted use.

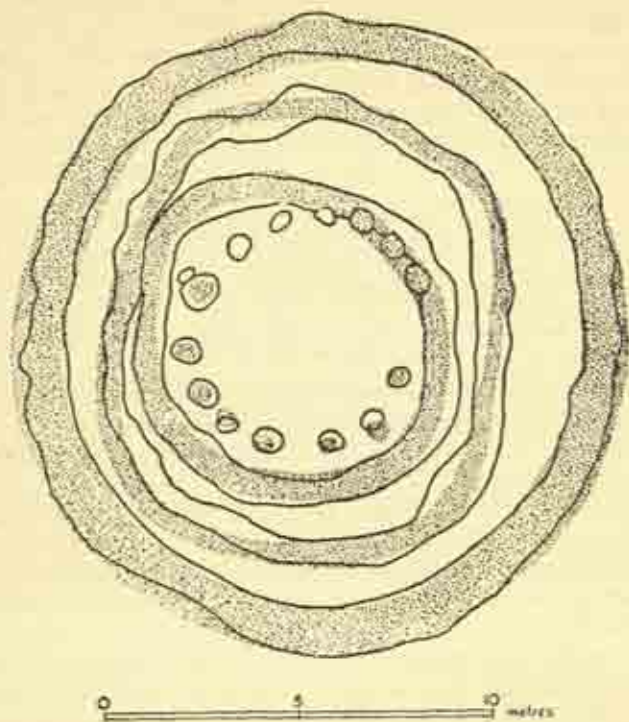


FIG. 1

Superimposed plans of a Neolithic site at Dorchester (Oxon.). The stippled plan has been made from a resistivity chart, the one with firm lines after excavations six months later.

buried beneath the soil; on the other hand, on the site of ancient ditches, there is generally more humidity. Thus, by making systematic measurements of the conductivity of the soil in a certain area, it is possible to determine the places where the subsoil conceals either the foundations of buildings, or old filled-in excavations of one kind or another. In actual fact, one is measuring not the conductivity but the electrical resistance of the soil (which varies in inverse proportion to the conductivity). Among the apparatus for this measuring, the Megger earth tester, an instrument specially designed for measuring earth-resistance, is the easiest to use, and considerable stretches of ground can be surveyed in a relatively short time. This technique has its limitations. It is useless, for example, in regions where the rock approaches

very close to the surface. But it does detect entirely buried archaeological remains, if they are not complex and if the subsoil is of a fairly homogeneous nature. Very fine results recorded in England, for example on the prehistoric site of Dorchester in Oxfordshire (Fig. 1) encourage one to predict a growing success for this new method of reconnaissance.

Soil Science

To fulfil agricultural needs, several years ago a scientific map of the soil was made in Belgium and in Holland. The upper layers of soil are demarcated according to their composition and degree of fertility. The making of this map involved a great number of soundings (very many per hectare), with the result that it is possible to find out now, in the regions where the investigation has been completed, the exact composition of the upper layers of soil to a depth of about one metre, and to find it out for each field and each enclosure. Now on the sites of ancient habitations, the soil has been profoundly disturbed and its composition quite altered. The technicians and scholars who have been making this scientific survey of the soils have marked these ancient habitation sites upon their maps. In Holland, an archaeologist is attached to the pedological service and he systematically studies these sites, determines their date, and is in the process of drawing up maps of habitation zones for the different prehistoric and historic eras. In Belgium, we have not got that far, but the few sheets of the soil survey which have been published contain a mine of precious information on which the archaeologist can draw.

Chemical Analysis of Soils

In areas which have been occupied by man over a more or less long period of time, the accumulation of detritus and rubbish of every kind has profoundly modified the chemical composition of the soil. The decomposition of organic substances has greatly increased the proportion of mineral elements. Certain among these, such as nitrates, are progressively dissolved and carried away by water, but others, notably phosphates, are preserved indefinitely. Quantitative analysis of the phosphates in soils can therefore be of value in the reconnaissance of villages or lost habitation sites. This method has been used with success in Sweden, Germany, Switzerland, Holland, and in Indo-China. It is a method which can be combined perfectly with soil science.

The Electro-Magnetic Detector

It has occurred to some archaeologists to make use of the electro-magnetic detector, such as was used during the last war for mine-disposal, for indicating the whereabouts of buried objects made of

metal. According to the power of these machines, they can detect the presence of buried metal to a depth varying from 0.5 to 1.5 metres. However, as they are sensitive to whatever metal they come across, they cannot distinguish between a nail or old tin can, and an ancient weapon or tool. They have, therefore, serious inconveniences for which their advantages scarcely compensate. It seems unlikely that they will come into common use.

CHAPTER III

Archaeological Excavation

ONCE RECONNAISSANCE HAS furnished enough information to allow a reasonably accurate determination of the site where remains from past ages lie buried, there begins the most important and most delicate part of an archaeologist's work, excavation itself.

The time is over when an archaeologist could content himself with digging a hole in the ground in the hope of retrieving some objects from antiquity which would enrich public or private collections. There remain, however, many amateurs who, without the slightest scruple, 'dig' prehistoric or Roman burials, simply to extract the grave goods, but without paying the slightest attention to the structure of the tomb; or they will acquire the stone and pottery material accumulated in a Neolithic *fond de cabane* without taking the trouble to make a plan of the *cabane* itself, or will uncover the foundations of a Roman villa without a thought for its structural development during what may have been a considerable period of occupation. However, this breed of impenitent sinner, whose ravages are often quite irreparable, seems happily to be becoming extinct.* Science demands that one takes from the soil *all* the gifts which are hidden in it, and it puts at the disposal of excavators, for this task, techniques which are becoming increasingly specialized. I cannot hope to deal here, even in outline, with the manifold excavation techniques that are employed at the present time: such

* An optimistic remark perhaps: even while this book was first in the press (in 1954) unrepentant amateurs were just engaging in fresh depredations in both Wallonia and Flanders.

an attempt would demand a book to itself. I shall be content to enumerate the main principles which should be observed by every excavator. What should not be forgotten, however, is that no manual on excavation, however good and however complete it may be, can by itself make a man into an archaeologist. It is only on the site itself that he can slowly learn his job. It is also most desirable that no one shall undertake an excavation without having taken part first, as an assistant, in several campaigns of excavation directed by a competent excavator. An excavation is not an improvisation from one day to the next. It involves serious preparation, and whoever undertakes it should be able to reduce to the minimum the instruments and specialist tools which will be indispensable to him.

The task of the excavator, in reality, is a two-fold one: he must seek for and recover all the archaeological finds which the soil holds in one form and another, and he must record them. In this matter of morphological examination he must also determine, by interpretation of the stratigraphy, the chronological succession or internal evolution of the remains he brings to light. On the field itself, morphological and stratigraphical examination take place simultaneously. For clarity in exposition I will, however, treat them in turn, passing then to the problems of recording, publication, and preservation of evidence found in the course of a dig.

MORPHOLOGICAL ANALYSIS

Morphological analysis consists of finding, collecting, and preserving remains from the past which have resisted the attacks of time in very tangible form, and in recording the traces of things that exist no longer in this form but have been reduced to the fugitive appearance of a discoloration (or colouring) of the soil. It is the task of the archaeologist to attempt a reconstruction of the shape and original appearance of these objects of which nothing exists—metaphorically speaking—but ectoplasm.

From the morphological point of view, the excavation of buildings originally constructed in durable materials does not present any major difficulty. In most cases it is sufficient to uncover the surviving masonry by removing the earth which covers it, taking great care, however, to collect all objects—tools, sherds, etc.—that this earth contains and to note their exact position, as important evidence in the dating of the buildings. Even if the superstructure of these buildings has disappeared, the soil will usually have preserved the foundations, from which a plan can be made, and some idea formed of the actual construction. In certain Gallo-Roman, and in many protohistoric structures, the founda-



iii. Glass bottle, found in
a third-century sarcophagus
at Speyer, Germany



iv. Plaster cast of a dog, buried beneath the ash of Pompeii



v. Head of an Early Iron Age man, found in a peat-bog at Grauballe, Denmark



vi. The corpse of the Grauballe man



vii. Oak-tree coffin from a tumulus at Egtved, Denmark



viii. Traces of buildings between the double line of fortifications
in the Roman colony of *Alba Fucens*



ix. Roman villa at Ditchley (Oxon.)

tions, and sometimes even the walls, were built of dry masonry (where the stones, rubble, or bricks were not cemented with mortar): in such cases digging is a very delicate matter, for it is obvious that the remains of such buildings are anything but solid and very often the stones which come from them are not lying in their original places. Mention may be made here, for example, of the encircling walls of certain Gaulish *oppida* constructed by the technique known as *murus Gallicus*, described in detail by Caesar. These walls were made of wooden beams, the spaces between the beams being filled with stones and earth, and faced with dry masonry. The wooden framework frequently disappeared in course of time, so that the holes left by the beams became full of small stones. The archaeological examination of such a work, where it is of primary importance to determine the original position of the beams in order to establish the length and thickness of the wall, is patently a very delicate task. The excavation of megalithic monuments poses similar problems: too often they have suffered in the past at the hands of occasional excavators who, in order to get into these monuments, have displaced a considerable quantity of stones, to the detriment of any subsequent attempt to determine the original structure.

In places where remains of wooden dwellings have been preserved, as in the case of the Swiss lake-dwellings, it is usually possible to deduce from the position of the piles and beams that are found the plan of the original buildings. But even in the most favourable cases, their interpretation remains very difficult. Two main theories are held upon this subject. According to the larger group of scholars, piles were sunk into the bottom of the lake, at some distance from the bank, to carry a platform supporting dwelling houses. According to the others, the villages were built on the marshy borders of these lakes and the vertical posts of the houses were sunk deep down through the marshy soil to stable earth. Later, the level of water rose, flooding the villages and forcing the inhabitants to abandon them. According to this theory the vertical supports of these houses which have survived to this day under the water were piles or stilts.

The investigation of ancient dwellings or buildings of which nothing tangible remains, save some discoloration in the soil, upon which the English have bestowed the striking name of Ghost Sites, poses very complicated problems of excavation. How often has it happened, in the course of an excavation made without care or method, that such traces have passed unnoticed and have been systematically destroyed by the pick-axes of workmen, and an invaluable record has thus been lost. The technique to be employed must be determined primarily by the nature of the ground and of the remains themselves.

Mention has already been made of the case of Pompeii, where men

and animals buried beneath burning *lapilli* have often been recovered, although their bodies have entirely disappeared; they have nevertheless left their imprint, in negative form, in the cinders. The excavators, by filling these ghost cavities with plaster, have obtained striking casts. Think, for example, of that woman overtaken in flight, who, in falling, was still in the act of holding a portion of her clothing over her face as protection against the suffocating fumes; and how moving is the picture of the little dog whom death overtook as he struggled to break the chain which prevented his escape! (Pl. IV). Here is the drama of A.D. 79 re-enacted in front of our eyes.

In one of the royal tombs of Ur of the Chaldees, Leonard Woolley recovered the remains of a harp, of which the wooden framework had entirely disappeared, but of which all the ornamentation, gold, silver, tortoiseshell, and lapis lazuli, remained exactly in place. By means of plaster, it was possible to lift the whole thing out in one piece and even to discover the number of strings the instrument had possessed. The harp could therefore be completely restored with the greatest accuracy.

In the Middle Ages it often happened that Roman ruins did duty as quarries: they were robbed, for the construction of new buildings, of all the material still usable, and sometimes even of the stones of the foundations. In such a case need an archaeologist abandon any attempt at excavation? No, for the position of the ancient walls is still clearly indicated in negative in the ground by the disturbed earth, full of rubbish of every kind, clearly contrasted in section with the untouched soil. Thus it is possible to observe and trace the course of ancient walls. Such instances are frequently encountered in Belgium: at Hofstade, for example, during my excavation of 1947, and again in La Loucherie's recent excavations at Tournai.

Yet, elsewhere, wooden constructions have entirely disappeared, posts and beams as well as wattle. In most cases, however, a very careful examination will reveal slight clues in various forms. In a place where the rocky or chalky subsoil is reached at a shallow depth, the former inhabitants dug holes in which to sink their posts or slight trenches to hold the foundations. By shifting the lightly packed soil which fills these holes or trenches, it is usually a simple matter to reconstruct the plan of these buildings. Other kinds of terrain, such as sandy regions, will preserve slight traces of wooden constructions, ancient ditches, or organic substances in the form of black, brown, or discoloured stains. To record signs of this kind, the very subtle technique of skinning the surface must be employed. By carefully removing the earth in thin layers, then keeping the surface of the soil always level, these traces will gradually stand out dark or light—whichever it may be—against the natural colour of the soil; by this method it should be

possible to reconstruct—at least in main outlines—the vanished work. This technique of *rabotage*, or planing down, developed by English, German, and Dutch archaeologists, has already been responsible for information of the highest importance about certain prehistoric civilizations. A few examples are mentioned below.

The most important excavation which has been undertaken with this technique of *rabotage* is probably that of the Neolithic site of Köln-Lindenthal (Cologne). A surface area of 35,000 square metres was systematically stripped and 'planed', layer by layer, by W. Burtler and W. Haberey. In this way they recovered the remains of a whole village of the culture known as 'spiral-meander' ware (in Belgium called 'Omalian'): banks and ditches of the surrounding wall, rectangular houses (of which nothing remained except the foundation trenches and the post-holes) and so-called *fonds de cabanes* half sunk in the ground and of very irregular shape, which were really nothing but rubbish pits and enclosures for swine. Examination of the stratigraphy led to the conclusion that the village had experienced four successive periods of occupation, each with its own buildings, and the whole site had undergone profound modification each time. For each period it was possible to produce a plan of the whole village, which provided interesting information upon the development of social life in these early peasant village communities. The same Omalian culture has been known for a long time in Belgium, where over five hundred *fonds de cabanes* have been dug. Unfortunately only stone implements and pottery have been removed and no plans made of the actual villages—some of which are considerably larger than Köln-Lindenthal. It was not until 1952 that anyone thought of making a plan of one of the rectangular houses from this culture.

Equally good results must have been forthcoming from the Netherlands, in connection with the investigation into Eneolithic and Bronze Age barrows. The Netherlands—as well as Belgium—lay beyond the great commercial routeways, and did not experience the economic awakening which characterized Denmark, for example, during the same period: her tombs generally do not contain grave goods, or only those of a very poor kind. Many excavators in the nineteenth century and the beginning of the twentieth century opened a great number of these barrows in vain: the finds were extremely poor. Nevertheless, what these gentlemen missed was that these tumuli were of so individual a construction that they have furnished us with valuable information about our ancestors' beliefs in the hereafter. In some tombs the dead were buried in a crouched position, the bodies enclosed in a light framework of plaited twigs so as to form a kind of beehive, on top of which was built a tumulus of sand or sods of turf. Other burials were

originally encircled by a ditch, a ring of stones, a ring of posts erected in a circle around the foot of the tomb, or a palisade of posts. Some tumuli combine all these features (which probably served to separate clearly the world of the dead from the world of the living and to prevent the spirit of the dead from escaping from the tomb). Nothing remains of

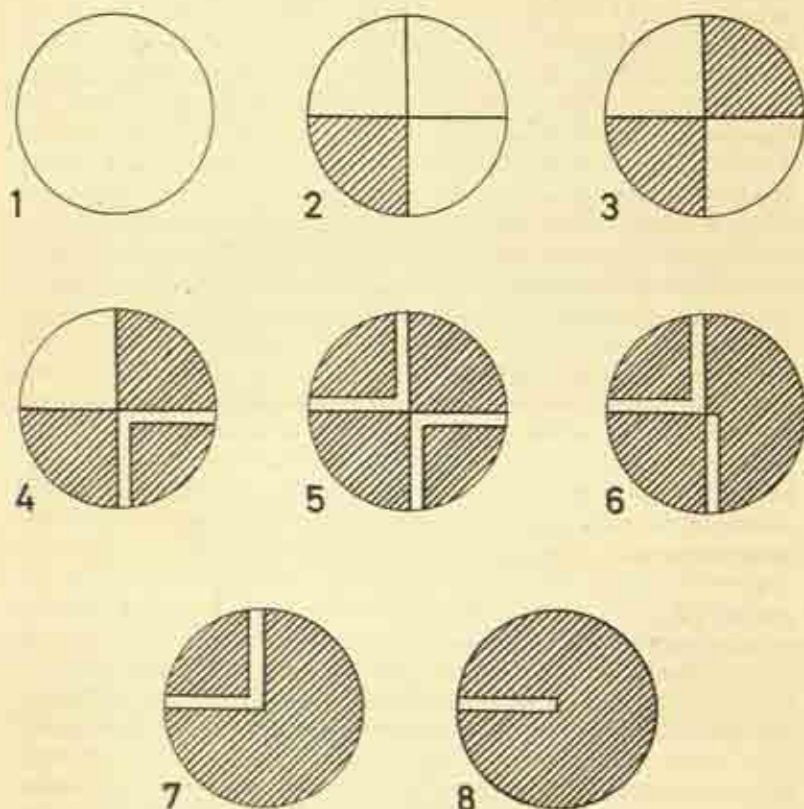


FIG. 2

Successive phases of the excavation of a tumulus by the quadrant method. The south-west and north-east quadrants are excavated first, then, leaving a small vertical bank about a metre wide each time, the south-east and north-west quadrants. By phase 5 there are two complete sections of the tumulus (north to south and east to west) and also an almost complete horizontal plan on which the various structural details of the tumulus can be seen. The excavation is finished by removing the four vertical banks in turn. (See also Frontispiece and Pls. XIII and XIV.)

these structural features except discolorations in the soil. To recover them, A. E. van Giffen of the University of Groningen has developed a method of excavation known as the 'quadrant' method. This has been adopted by many archaeologists in other countries and is suitable not only for the examination of barrows, but, with certain adaptations, for the excavation of other kinds of archaeological remains. By this refined technique, which happily combines morphology and stratigraphy, by means of plans and sections, the complete structure of the barrows and their original appearance can be recovered (Fig. 2). Two photographs (Pls. XIII and XIV) of barrows under excavation by this method will illustrate, better than a long description, what interesting facts can be discovered. The silhouette impression, the only remains of a corpse, found in one of these tombs (frontispiece) gives food for thought upon the patience and skill necessary to uncover it, when a single hasty slip of the spade would have destroyed everything.

In the examination of Early Iron Age cemeteries the technique of *rabotage* has brought to light some curious facts. In cemeteries of that period, in the Netherlands and N. Belgium, the bones of cremated dead are enclosed in an urn and buried, usually, in a flat grave. Judging only from the pottery a great number of these cemeteries belong to the same culture. Since attention has also been paid to the structure of the tombs, it has been found that there is a great variation: in the Netherlands, most of the tombs are encircled by a little ditch, sometimes square in section or even key-hole shaped (Pl. XVII); in Belgium, on the other hand—to judge at least from the three or four cemeteries excavated by this method—the graves are clearly simpler: urns buried in the ground, with no trace of a ditch (Pl. XV). This shows that the problem of relationship between these different graves is more complex than would be supposed merely from an examination of the pottery.

I have been dealing, up to now, with two extremes: the remains of the past have been either very well preserved, or else have disappeared to the extent of leaving barely decipherable traces in the soil. Something between the two, however, is more usual. Where the remains are partially preserved several techniques should be applied simultaneously (as, for example, in excavating a Gallo-Roman *fundus*, where the solid foundations of the villa, the central building, remain, but the farms and huts of the slaves, built in wood and clay, have almost entirely disappeared). A last example may be mentioned in this context. At the time of the great invasions and later in the Viking Age, it was the custom to bury pirate chiefs in their ships, which were then covered with mounds. Sometimes the wood of the bottom of the boat has been preserved in a more or less good condition but more often the wood, completely rotted, has disappeared. However, the general shape of the ship can be

deduced, thanks to the iron nails and rivets, heavily rusted it is true, but preserved *in situ* (as in the famous burial at Sutton Hoo). The importance of making a record of the precise position of each of these nails and rivets is at once obvious.

STRATIGRAPHICAL ANALYSIS

The stratigraphical study of a site is of primary importance in determining the different periods of occupation and their relative dates. Even if the site has experienced only one period of occupation, the stratigraphical position of the finds will be of the greatest assistance in fixing date-limits to that occupation.

Someone who has never visited the site of an excavation in progress can have little idea of the complexity of the layers of superimposed soil that can be met with in a single section. Some of the layers are of human origin (e.g. formed by an ancient floor or by the accumulation of rubbish on this floor); others are of natural origin (e.g. an alluvial layer produced by flooding, or a layer of wind-borne sand which has covered the ruins of a former habitation). If a place has been inhabited and then abandoned several times, a highly complicated succession of layers and structures results, which is not always easy to interpret. Wells which have been dug during one known period of occupation cut through lower layers belonging to older levels of occupation; posts sunk to some depth, ditches etc., serve, in addition, to break the regular succession of layers and make the stratigraphy even more complex. It is the excavator's task to unravel this tangled skein.

It must not be forgotten, either, that a single period of occupation may have given rise to several superimposed layers. In the section of such a site one may meet successively from the bottom upwards: virgin soil, a flattened layer (very often the ground would be levelled before any buildings were raised), a level of habitation (beaten earth or floor of durable material), a layer of debris accumulated during the occupation, a layer of ruined building material (derived from burned or ruined buildings) a layer of sand carried by the wind, or a layer of humus formed by the vegetation which will have gradually covered the ruins. It is of paramount importance for the archaeologist to be able to distinguish clearly these different levels and to decide in the case of every object and sherd of pottery found from what archaeological level it comes. A coin or datable piece of pottery found in the building level, under the floor or habitation level, would provide, for example, a *terminus post quem* for the beginning of the occupation, whereas, coming from the debris level, they would effectively date the occupation period itself. The thickness and importance of each layer is obviously subject

to variation in every case: the debris layer would be pretty considerable in a prehistoric hut, where remains of meals, broken pots, and organic rubbish quickly accumulated on the floor; whereas the mosaic floor of a Roman villa would probably have none of these things. As for the destruction level, its importance and value as a source of archaeological finds will depend most of all upon what was the reason for its formation: if it was abandoned because of a catastrophe (a fire, for example) there is an excellent chance that there will be a great many more goods—things which the occupants had no time to carry with them in their flight—than if the site were abandoned after mature reflection: in fact, in this latter case, the inhabitants would have been able to take away all their household possessions.

Thus, if the stratification of a site which has experienced one period of occupation only can appear so complicated, what of places which have been occupied several times, and spanning successive periods? There may be as many as twenty, or sometimes more, layers superimposed on one site, where it will be found that the oldest deposits have often been cut down into by the later digging of ditches, sinking of foundation posts, or the construction of wells. In this way an entanglement is produced, which makes the unravelling of these records a very complicated task. But this interpretation, if it be competently done, can reveal the whole historical sequence of the site, its whole development, in fact, since the beginning of human occupation up to the time when it was finally abandoned.

What, then, are the guiding principles to be observed in the excavation of such a site? They are simply stated, but their application calls for both skill and ingenuity. They may be summarized as follows: above all it is essential to be able to distinguish clearly the various superimposed layers, wherever they occur, to peel them away layer by layer, to establish clearly the relationships which exist between any structural elements or buildings and the different levels, and to make a careful note of the precise level to which each object or sherd of pottery belongs.

Each level or layer, in fact, can be dated only by the objects which it contains (this problem will be dealt with in a later chapter), and each find or structure can be dated only by the precise level to which it is related. Let us take an example: suppose that in a site which has known five periods of occupation the remains of a house appear under the guise of a series of vertical post holes—posts which had formerly been embedded in the ground to strengthen the foundations, and to do duty as 'uprights' for the wattle or mud walls of the building. If the occupation levels of periods 4 and 5 completely cover these remains without being disturbed by them, and if, on the other hand, levels 2 and 1 are

clearly cut into by these posts, it becomes evident that the dwelling belongs to period 3 of the occupation.

I will not deal any further with practical excavation techniques: these can be learned only on the site itself. In the same way, it is only on the site that one can learn to recognize the different levels (sometimes recognizable only by a slight change in the colour of the soil), the old and the recent ditches. Let me emphasize one point only: that is the great importance of having, on the site, the vertical sections and horizontal surfaces of an excavation very clearly cut, as though with a knife or smoothed by a plane. Only in this way can the different levels and discolorations in the soil be clearly recognized.

To emphasize these points of stratigraphical analysis, here are some examples which will illustrate both their interest and importance.

It was the Stone Age specialists who first appreciated the application of stratigraphy to archaeology. It is, in fact, in the caves and rock shelters which prehistoric man used as dwelling places that stratification may often be most clearly observed. Most of these caves and rock shelters have experienced several periods of occupation, quite often separated by long periods of abandonment, in the course of which natural deposits will have been laid down which are archaeologically sterile. Different occupation-levels are even sometimes separated by formations of stalagmite. Among archaeological levels (often very thick, for prehistoric man, ignorant of sewage-disposal, accumulated untold rubbish under his feet) the lowest levels will patently be the oldest. The excavator must be carefully on his guard, however, against the possibility of finds which appear in some upper level having been brought from a lower level by some excavating animal, such as a rabbit or fox digging its earth.

The relative chronology of the different cultures of the Palaeolithic depends primarily upon the stratigraphical analysis of archaeological deposits in caves and rock-shelters. If the importance of stratigraphy was early recognized in cave-exploration, there was scepticism for a long time about the existence of stratification on open sites. It is only a few decades since a careful examination of open sites became the practice, but from the first, sensational results were produced. Today, of course, stratigraphical analysis is a *sine qua non* for every excavation that is undertaken.

In the Near East a great number of 'tells' are encountered, which give the countryside its characteristic appearance. These are artificial mounds which have been formed slowly by the successive accumulation of the remains of several prehistoric and protohistoric occupations. Time and again such villages or small towns would be destroyed by war, by earthquake, or by fire. Before rebuilding their homes, the in-

habitants did not trouble to clear away the ruins of the previous occupation, but reduced them to a new building-level on which they raised new houses, temples, and palaces. It will be seen, then, that a succession of many archaeological layers will go to make up these 'tells', and that their stratigraphical analysis will be all-important in the chronological interpretation of the ancient history of the Near East.

The formation of 'terps' in the provinces of Frisia and Groningen in the Netherlands is reminiscent of Mesopotamian 'tell' formation. In these low-lying areas, which were constantly flooded by the sea before the construction of dykes, the inhabitants have raised up since the Early Iron Age artificial mounds on which they could build their houses and their cattle sheds for protection against the waters. With every rebuilding of the village the mound became higher, and preserved within it were the remains of the previous occupation. In the 'terp' of Ezinge, A. E. van Giffen has been able to distinguish eight successive periods of occupation, extending from the La Tène period well into the Middle Ages.

The Roman *castella* bordering the lower Rhine, such as those of Valkenburg, Vechten, and Utrecht, have also been erected on slight artificial mounds. They have been rebuilt several times. Although they are scarcely mentioned in classical writings, methodical excavation has laid bare their whole story, and has considerably enriched our knowledge of the military history of the lower Rhine frontier during the Roman Empire.

The *castellum* of Valkenburg, near Leyden, was dug by A. E. van Giffen. The stratification was excessively complicated, for more than twenty levels, some of them extremely thin, were superimposed. Van Giffen was able to recognize at least six successive periods of Roman occupation (each one showing a building level, an occupation level, and a level of destruction); and these in their turn were overlaid by a Merovingian and a medieval level. It was possible to date each one of these periods precisely. The oldest little fort was erected about A.D. 40 and was probably concerned with the expedition to England planned by Caligula and carried out by Claudius in A.D. 43. The second *castellum*, which consisted of a restoration of the first, was burnt down at the time of the raid of the *Chauci* in 47. Upon its ruins a new camp was raised which, in honour of the reigning Empress, took the name of *Praetorium Agrippinae*. This *castellum* was burned in its turn in 69, during the great revolt of the Batavians. A thick layer of burnt debris separated the 3rd and 4th occupation levels. The next encampment dates from the reigns of Vespasian and Titus and was reconstructed under Domitian (period 5). It was finally rebuilt at the time of Septimius Severus. The site was ultimately abandoned by the Romans about

A.D. 240. Construction during the first four periods was in earth, wood, and wattle-and-daub. The excavations revealed the very well-preserved remains of corduroy roads as well as portions of wattle-and-daubed walling (cf. Pl. XII). In the camp of period 5, the *Praetorium* alone was built of masonry. The defences and the chief buildings were not constructed of durable material until the 6th rebuilding.

The excavations at Utrecht and at Vechten bear out the information derived from Valkenberg on the history of the military occupation of the Lower Rhine frontier under the Roman Empire.

RECORDING OF ARCHAEOLOGICAL EVIDENCE

Every excavation necessarily involves the partial or total destruction of archaeological evidence. Even if the finds are preserved in museums, and ruins and foundations preserved *in situ*, a great many other features will be destroyed in the course of the same excavation, and among these will be what I have called intangible remains, and stratification: for obviously, on any site, to get at the lower levels, it is necessary to remove or at least disturb the upper levels. I have already compared the soil with a library of archives, but they are records which can be read, in their entirety, once and only once, by him who excavates the site. When an historian of the Middle Ages, in publishing a cartulary, makes mistakes in transcription, the damage done is serious but it is not irreparable, for it is always possible to have recourse to the original as a check on his reading. Far otherwise in archaeology, for when an excavation is badly executed, or when it is not published—or incompetently published—it is equivalent to the loss or destruction of a portion of the records, more often than not relating to the history of a particular period on which we have least information. Among the moral obligations most incumbent upon an archaeologist are first, the faithful recording of all data, however trifling, gained in the course of an excavation, and secondly, the preparation and publication of his report.

Archaeological records of an excavation are kept in many ways, mutually complementary: by draftsmanship (topography, general survey of the site, drawing of plans, and sections), by photography, and, lastly, by the written word, as in excavation notes and a catalogue of finds.

The production of contoured maps and general site-plans calls for special knowledge, and is a technique akin to geometry, cartography, and architecture. In all excavations, whatever their extent, these matters are best entrusted to professionals. Nevertheless, the excavator may find himself obliged to do these things for himself. He will then need

to equip himself with a series of instruments, such as: pantometer, level, alidade, theodolite, and of course a surveyor's chain or 100-foot measuring tape. There will be frequent recourse to geometry and trigonometry and even sometimes logarithm tables. The use of these scientific tools is indispensable, but can best be learned by practical experience, so I will not spend more time on them here.

The drawing of measured sections, and planning on a horizontal plane, also require specialized knowledge, but they should, for preference, be done by the excavator himself, who will be best qualified to pick out the stratification, discolorations, and traces of every kind that must be recorded. The drawing of such plans must be preceded by the most careful measurements. They should be drawn to a fixed scale and they should be sufficiently numerous to allow a theoretical reconstruction to be made of the whole area under excavation, level by level.

The accuracy of these drawings depends not only upon the accuracy of the measurements, but also upon the clarity of vision of the draftsman; two superimposed levels may sometimes be distinguished only by the slightest change in the colour of the soil, such as might easily escape an inexperienced eye. There remains always in the drawing of these plans a certain element of subjectivity, which needs to be reduced to the minimum. Photography is called in then, not only for views of the whole site and of uncovered remains but also to record numerous details, such as the different layers visible in a section, or an object still *in situ* or in the process of being uncovered. Practice makes perfect in the quick apprehension of what camera to use in different circumstances: thus, a plate camera is the most sensitive for the recording of multiple nuances in soil coloration, a small hand camera is very practical for taking a great many pictures of detail. Colour film can also be of considerable value.*

Lastly, the excavator must keep carefully up to date a notebook in which he will enter with the greatest accuracy, day by day, observations made in the field, the progress of work, and measurements, etc. Every object found, every fragment of pottery, every tangible piece of evidence should receive, as soon as it is found, an identification number, and should be briefly catalogued with an indication of its exact find-spot and the archaeological layer from which it comes.

Other recording methods are in less current use but may be more widely employed in the future in some well-defined cases. In the excavation of classical sites, where chances exist of recovering inscriptions in

* Excellent advice on the best techniques to employ in archaeological photography will be found in the recent book by M. B. Cookson, *Photography for Archaeologists* (London, 1954).

stone, there is a technique of using special paper to get imprints of texts which cannot be moved. For some years now this paper has been superseded by a product with a latex base which can be brushed on to the inscription (or relief) in question. When it is set, it forms a thin rubber skin which can be loosened and peeled off. A similar product, with a base of cellulose gum, exists for the recording of interesting sections: the film formed by this gum removes quite easily several millimetres of the surface of a section, with its different layers, and holds even the fragments and pebbles contained in them.

The archaeologist has, then, an impressive series of methods that it would be inexcusable not to use in the faithful recording of evidence, and in drawing up the report of his excavation. This should afterwards be deposited in whichever museum exhibits the finds from his excavation. Detailed notes, apparently of little significance, may turn out to be full of interest some years later: and it is absolutely essential that the complete record should be put at the disposal of researchers. Take, for example, the Museum at Namur. The notes made by A. Bequet, one of the best excavators of last century, are carefully preserved there. His published reports were sometimes very short, and many aspects of his researches, to which little importance was attached in his time, are of the liveliest interest to us today, but were not mentioned in them. Thanks to the written evidence preserved at the museum, however, it has been possible to refer back to details which have proved to be of the highest importance in the study of certain historical problems.*

PUBLICATION OF EXCAVATION REPORTS

With the publication of excavation reports I can deal more briefly. Concerning the publication of a piece of evidence that has been completely destroyed, the reader ought to be in a position to reconstruct the whole excavation, almost every turn of the spade, in such a way that he can scrutinize most critically the conclusions reached by the author. Such reports do exist—those, for example, from the pens of certain English, German, Scandinavian, and Dutch excavators—but they are rare, for their publication, which needs to be copiously illustrated with photographs, plans, sections, and drawings, entails considerable expense. On the other hand, many an archaeologist is obliged to be content, in spite of his own misgivings, with the publication of a summary report, where only the essential part of his researches is set out. This emphasizes once again the importance of preserving the

* See J. Nenquin, *La nécropole de Furfooz*. *Dissertationes Archaeologicae Gandenses*, I (Bruges, 1953).

whole record of an excavation and of putting it at the disposal of other research workers.

An excavation report, even if it is summary in character, must contain essential information: it ought to contain a history of previous research, indicate precisely the co-ordinates of the site or sites excavated (a piece of information missing, however strange that may seem, from many reports), describe briefly the method of research employed, then give very formally, but with all possible accuracy (measurements, depths, etc.) a description of the remains found, as well as the objects—sherds, coins, and so on—discovered, with their exact stratigraphical position, and finally fix the date of the remains under consideration. The report should be as copiously illustrated as financial considerations or editorial generosity allow, but in every case must be accompanied by essential plans and sections, photographs of the site and remains, and lastly accurate scale drawings of the pottery, glass, etc.* Well-drawn sections and accurate drawings are much more valuable in most cases than long descriptions.

Archaeologists may be obliged by circumstances to publish only summary reports, but it would be totally unjustifiable to publish nothing at all about their researches. There are, however, quite a few excavators, even among the most competent, who put off the publication of their reports from year to year, sometimes till doomsday. It cannot be over-stressed that an excavation conducted with all necessary care and skill, but whose results remain unpublished or inaccessible, achieves only one result: the destruction of a precious and unique record of our past. The most usual excuse made by these negligent and culpable excavators is that they want first to make an exhaustive study of the evidence which they have discovered in order to produce valuable conclusions. Monstrous pretext! An historian of the Middle Ages engaged in editing a cartulary is not expected, from the evidence he is bringing to light, to draw from it every conceivable historical conclusion. The publication of the report of an excavation, and the use made of it for enlarging our historical knowledge, are two totally different things.

There is nothing to prevent an archaeologist who has uncovered interesting evidence from using it as a basis for more comprehensive

* The absolute necessity of publishing exact and accurate drawings (such as are found in all modern reports) must be emphasized: in many old reports there may be found drawings of vases of a high artistic standard, but most flagrantly inaccurate. I am thinking, for example, of certain excavation reports done by Soil at Tournai and illustrated in this way. In this case most of the pottery reproduced in the reports was lost in the bombardment of the town in 1940: nothing remains except the drawings, so sketchily done as to make any re-examination of these remains for purposes of identification and dating virtually impossible.

study, but that should not constitute a pretext for keeping all knowledge of it from the rest of the world. The material records of man's past are the rightful heritage of the human race, and no one has the right to reserve them for himself. In certain Scandinavian countries the rights of the community in this matter have been clearly defined by law: the results of all excavations which have not been published within five years of completion of work become public property. Unfortunately other countries, and especially Belgium, have not got that far. That great Belgian, the late Franz Cumont, however, paved the way when he wrote *à propos* of the very rapid publication of his excavations at Dura-Europos, that he preferred 'to expose himself to the critics rather than resemble the dragon in the fable, jealously guarding a sterile treasure in his lair'. A wise choice, which many would do well to consider.

It must be admitted, however, that the majority of archaeologists are conscious of their duty and publish their results with reasonably little delay. I will mention only one example: in October 1950 at Straubing, in Bavaria, there was discovered buried in a great cauldron of bronze a unique collection of armour and horse harness of Roman date, decorated with sculptured reliefs of mythological subjects which will involve lengthy and arduous interpretation. Less than six months after this discovery, J. Keim and H. Klumbach published a report, which contained the history of the discovery and a most detailed description of all the different finds, with an impressive series of very good photographs. In this way, the learned world was made aware of the discovery in record time, and archaeologists as well as historians of art and religion could forthwith apply themselves to the study of this highly important evidence. Many archaeologists, alas, would not have shown such great professional integrity as these two Germans and (Heaven knows why!) would jealously have monopolized the study of the evidence.*

PRESERVATION OF ARCHAEOLOGICAL EVIDENCE

Although every archaeological excavation necessarily involves partial destruction of the evidence, it is the duty of the excavator to keep this destruction down to the minimum. It is imperative to preserve for future scholars, who will have at their disposal more advanced and

* The same unjustifiable egoism, alas, is characteristic of the attitude of many museum curators, who wish jealously to preserve for themselves the monopoly of any study and publication of the pieces entrusted to them. Such museums, instead of being active centres of research, have become gloomy and sterile cemeteries!

refined techniques than ours, the means to subject our present researches to controlled tests, and to make complementary excavations which will enable them to reveal aspects of man's past which our present methods of investigations do not allow. Thus it is eminently desirable to preserve, whenever it is at all possible, a portion of an archaeological site, so that future archaeologists will find it intact and will not be hindered in their researches by our depredations. A good example has already been set by E. F. Dupont, one of the founders of prehistoric archaeology in Belgium. In the course of his excavations in the caves of the Lesse valley, he was always careful to leave part of the stratified layers untouched, reserving these 'silent witnesses' for his successors. But these successors, unfortunately, have impatiently demolished these 'silent witnesses' in the course of wholly premature and unjustifiable excavations. The example of Dupont is hardly ever followed. During the last few years, however, there has been a strong move to schedule certain sites and archaeological deposits and to postpone their excavation to a time when the development of methods of archaeological investigation justify it. In the Netherlands, for example, every time a group of barrows is inspected with a view to excavation, certain of them are reserved for the spades of archaeologists of the twenty-first century or later. . . .

At the same time, during an excavation, all possible precautions should be taken to see that the objects uncovered are preserved under the best conditions. It happens, as we have seen, that certain things are found which are of perishable material and owe their preservation only to some exceptional circumstances. Once these remains are removed from the environment in which they have survived during the centuries, they will deteriorate with great rapidity. Wood, in drying out, loses its shape, cracks, and finally falls to pieces; leather loses its suppleness and splits; textiles rot. It is up to the archaeologist in charge of the work to avoid such disasters. He should know what preservative measures are necessary to transport these objects safely to a specialist laboratory where they will receive the necessary treatment to preserve and restore them. Anyone who has paid a visit to the Oslo museums will have seen there the famous Viking ship of Oseberg and the bedsteads, the chariot, and the four sledges which were found in it (Pl. XIX). It is hard to imagine how much patience the excavators must have displayed in recovering these remarkable, but infinitely fragile objects. One of the sledges alone was reconstructed from 1,068 different pieces of wood, which all had to undergo long laboratory treatment before there could be any thought of re-assembly.

It is not only objects of organic material which should be subjected to laboratory treatment: it is equally desirable that all metal objects

should be examined immediately they are brought to light. For some years the general practice of dealing with iron objects was to cover them with a thick coating of varnish under which the rust was left in peace to carry out its work of destruction. Today, thanks to the pioneer work to which E. Salin, A. France-Lanord, and others devoted themselves, the point has been reached when not only can the destructive action of oxydization be arrested, but arms, tools, and trappings of metal can be freed from their coating of rust and restored, as far as possible, to their original appearance. In Belgium, indeed, some striking results have been obtained in this field, as can be seen in the three photographs of the same Merovingian buckle, one taken at the moment of discovery, the second by X-ray photography, and the third after laboratory treatment (Pl. XVIII). Another remarkably successful case of preservation and restoration is the unique assemblage of the objects from the ship burial of Sutton Hoo, one of the treasures of the British Museum. I shall have occasion to return to laboratory methods and their assistance to archaeology when discussing the study of technological processes employed in prehistoric times.

Remains found in the course of an excavation fall into two classes: those which are movable, and those which ought to be left in place (remains of masonry, foundations, monuments, ruins, etc.). In all countries with an ancient history, historical monuments obviously will be the care of the authorities. Their restoration and protection is vested in special organizations: in Belgium, the *Commission des Monuments et Sites* is charged with this task.

In many cases, foundations and ruins laid bare in the course of excavation ought to be filled in again. It may, however, be interesting in other cases, to be able to keep them open, such as has been done with certain ruins in Italy. The remains of some of the great Gallo-Roman villas in Belgium would be just as interesting as the ruins of Horace's villa at Licenza. Some attempts have been made in this direction (there are the 'subterranean' museums, for example, of Tongres and Arlon) but these efforts ought to be increased. That the climate will allow the preservation of Roman or medieval ruins, provided they are protected with concrete, is clear at Bavai. In some circumstances, the example of certain neighbouring countries, such as the Netherlands, could be followed and the prehistoric barrows, with their ditches, and palisades, could be restored to their original state.* But in this matter,

* Such restorations pose a scientific problem. The system adopted in the Netherlands contains certain purely subjective elements: if traces in the soil allow the conjecture of a circle of stones or of a palisade, there is no means of knowing the height of this palisade, or in the case of the circle of stones, whether they were joined together, above ground level, by horizontal beams. Thus, reconstructions follow-

alas, I tremble at the vandalism of my countrymen. After the excavations which I carried out, in collaboration with the Cinquantenaire Museum of Brussels, at Mont de l'Enclus, we attempted to restore the tumulus to its original state, with its circle of large stones disposed around the base. Two months later, visitors, boy scouts, and tourists had already scattered the stones and 're-excavated' the tomb in the hope that some find would have escaped our attention. The education of the public, at least in my country, leaves much to be desired.

As to movable objects, the shortest route to a museum is the right thing for them. It is not intended here to deal with the problems of museography.* But one point must be emphasized: a museum does not exist solely for purposes of exhibition, but should be equally important as a depository of archaeological records. The time has passed when an archaeological museum resembled a dust-covered antique shop full of bric-à-brac jumbled together in its windows. In a modern museum, the curator will put on show only his most beautiful or most characteristic pieces. Nevertheless, he will keep in his reserve collections—most carefully catalogued and accessible to specialists who wish

ing the Netherland pattern are challengeable from a scientific standpoint. They are, on the other hand, very spectacular. Personally I prefer the English method, where the positions of the posts and dressed stones which have disappeared are indicated in concrete; this is the system adopted in the celebrated sites of Woodhenge and of the Sanctuary near Avebury. Picturesqueness has yielded to objectivity.

* I will content myself with recalling the admirable definition of an archaeological museum given by A. Grenier (*Revue Arch.*, 1949, pp. 53-55): 'What is the proper function of an archaeological museum? It is very different from that of an Art Museum. An archaeological museum collects the documents of human history. It has nothing in common with an art museum. Its interest is not just curiosity. An archaeological museum is not a funeral vault. What it should present is a series unfolding the spectacle of human endeavour, of man's upward progress or on the other hand his decline, and with its causes. Sequences such as these are the documents of life, a life of the past which is not dead, for it lives within us. Our national life is not limited to the present moment only. Just as it involves the future, so is the present built upon the past. It is the task of the museum to present in a succession as complete as possible, man, and his real importance, across the centuries from prehistoric times up to yesterday. In this way will be seen its educational value: a knowledge of the past is an essential ingredient of culture; it lifts the spirit above ordinary everyday occupations, to an understanding of what is, from a knowledge of what has been. Such is the fundamental purpose of an archaeological museum. The interest of its collections may draw foreign visitors from far and wide. So much the better. But that is not the goal: the museum does not exist for tourists. It is, obviously, seemly that it should be laid out attractively, but that is a subsidiary feature which depends on other circumstances. An archaeological museum should make its prime concern the needs of its own town and the province of which it is the centre; it is in fact their past which is being displayed for them.'

to work on them—the complete material from every excavation. Thus, all the evidence relating to a particular excavation—finds, drawings, photographs, notes, etc.—should be assembled together in a particular museum, which will be the proper centre of research for anyone who may wish to avail himself of data of any kind resulting from an excavation. There are, alas, few museums where such an ideal situation exists. More often—and I speak from experience—the curators themselves are ignorant of the provenance of innumerable objects crowded into old show-cases encumbering cellar or loft and pompously christened ‘storeroom’ or ‘reserve collection’. Some even of the largest museums are not innocent of this charge.

CHAPTER IV

Problems of Dating

PEOPLE WHO VISIT AN excavation site or an archaeological museum almost invariably put questions pertaining to the age of such and such an object or remains. Answers to such questions are inevitably varied, but are too often vague and ambiguous: ‘This urn? That belongs to the Late Bronze Age.’ ‘Flint typical of the last Magdalenian phase’—‘The date of that axe? Montelius IV!’ Learned terminology, doubtless, which serves to impress the visitor, especially if the reply is given with assurance, or tossed off lightly in a superior or disdainful tone of voice. . . . But sometimes along comes the strong-minded questioner who refuses to be intimidated and insists on demanding a clearer, more precise date in terms of centuries or in years. If his interest has been kindled by a Gallo-Roman or Merovingian antiquity the archaeologist may be able to satisfy his curiosity and give a fairly close dating within a quarter or half a century. But, when dealing with prehistoric remains, he has humbly to acknowledge in most cases that he can only be within centuries of the date, or even (in the case of Palaeolithic objects) within millennia.

Let us admit it: archaeology is in fact a science in its infancy and one which has not made great progress until the last few decades; it has not yet reached a stage, except in some very rare cases, in which

absolute dates can be given to prehistoric cultures. For the most part, archaeologists have to be content with relative chronology; in other words archaeology can determine the relative sequence of the different civilizations which have left their mark in the soil of one country and work out the chronological affinities between these cultures and those encountered in neighbouring lands.

Relative chronology such as this is clearly begging the question, and absolute dating remains our constant goal.

RELATIVE CHRONOLOGY

Archaeology is dependent for establishing the relative sequence of ancient cultures upon many elements such as typology, the examination of closed finds, stratigraphy, a study of prehistoric environment, of distributions, and cross-dating.* In practice, all these elements are of course used in combination but, for clarity of exposition, they will be treated separately.

Typology

The form of tools, weapons, certain toilet accessories, is hardly ever unchanging, for it will evolve and develop under the influence of many factors. Quite often it is possible for an archaeologist to establish the different stages in such evolution; when he then finds a tool of an established design, he can assign it to its proper place in the series, and give it evolutionary order. This method, however, is fraught with certain dangers.

Development in the design of a tool or weapon involves, generally speaking, a technical or functional improvement. So, the first bronze axes to be made were merely imitations of the polished stone axes which they replaced. These flat axes were succeeded in their turn by flanged axes, palstaves, winged axes, and, finally, socketed axes. It will be observed, however, that the sequence is faulty, at least in its last stage—winged axes and socketed axes were being used at the same time, but their distribution is different. Nor is it very clear how socketed axes could have evolved from a winged axe, when they are totally different in conception.

On the other hand, evolution does not necessarily correspond to improvement in design. The oldest Gaulish coins are imitations of the staters of Philip II of Macedon. On these coins can still be clearly made out the head of Apollo on the obverse side and the two-horsed

* It is worthy of note that several of these methods (for example, that of the study of distributions) were used in the first place by the natural sciences from which archaeology borrowed them.

chariot on the back. However, as Gaulish coinage develops, these representations become more and more degenerate: and finally only little lines and dots remain, so that it would be impossible to guess at their origin unless one were familiar with the intermediate stages of this degeneration.

Closed Finds

The value of typological evidence is considerably enhanced when it can be based upon the study of associated finds (or 'closed finds'). When different tools or weapons are found together, in a tomb for example, one can affirm that, in a similar situation, tools of the same design are likely to be found in association. Thus, axes of a given type will be accompanied by pins or daggers of a certain type, while in other places axes of a more developed type will be found with pins or daggers of an equally evolved type. One can thus establish parallels for a whole series of objects, and also the typological evolution of the whole series.

The relative dating of the Metal Ages in Europe rests almost entirely upon the study of such closed finds. It is an obvious conclusion that all the objects coming from such a group date roughly from the same period. For some finds, however, such as bronze founders' hoards, it is wise to be cautious, for objects of widely differing date may be found in association. Founders, or metal smiths, in fact, travelled from one place to another to sell their tools, weapons, and new ornaments and also to repair, as needed, broken and worn bronze objects—often relatively old ones. Among these objects, there are most usually some of known type which can be dated by other finds: all the other pieces, therefore, belonging to the same group may also be dated approximately. This relative dating becomes increasingly reliable, as the number of closed finds, allowing cross-checks and controls to operate, is increased.

Stratigraphy

The question of stratigraphy and its importance in establishing the relative chronology of a site has already been discussed in an earlier chapter. I need not, then, linger over it here. It remains to emphasize one point: relative chronology revealed by the study of a site can generally be utilized to establish similar chronologies over wide areas.

Let us take one example. The two oldest Neolithic cultures known in Belgium are the 'Omalian', belonging to the civilization known as spiral-meander ware, of which traces are found in Hesbaye, between the Meuse, the Méhaigne, and the Geer, and the 'Michielsberg' culture, represented chiefly in Hainaut and Brabant. The distribution of these two cultures is, in Belgium, totally different, and it may be asked

which of the two cultures is the older, or whether they were contemporaneous. The answer to this question is furnished by stratigraphical evidence observed in certain South German sites, where levels containing spiral-meander ware are succeeded by levels containing typical remains of the culture known as 'Rössen'; in other sites, the levels of Rössen culture are succeeded by Michelsberg levels (although in one case a Michelsberg level is found overlaid by a Rössen level). The logical conclusion, therefore, is that in South Germany the spiral-meander ware culture is older than the Rössen and the Michelsberg cultures; these two last, in fact, appear to have been contemporaneous. It is thus very likely that in Belgium, too, the Omalian culture is older than the Michelsberg. It is, however, necessary to be cautious in drawing over-generalized conclusions from the stratigraphy of a single site.

Study of Prehistoric Environment

Ever since the first appearance of man upon earth, the environment in which he has lived has undergone numerous and far-reaching changes: variations of climate, redevelopment of animal life, changes in vegetation. Each of these different types of variation, occurring often in close interrelation, has been studied by specialist scholars—geologists, palaeogeographers, palaeontologists, palaeobotanists—but the results which these different specialists have achieved may all be profitably used by the archaeologist, not only in extending his knowledge of the environment of prehistoric man, often the determining factor in his mode of life, but also for purely chronological ends.

The archaeologist primarily calls upon geologists when the remains which he is seeking to date are encountered in certain well-defined geological beds. It is well known that the earliest irrefutable evidence of human activity is not found in any beds before those laid down in the Quaternary period. The problem of Tertiary man, much studied by geologists, anthropologists, and archaeologists at the beginning of this century, has been more or less voted out of existence;* the question of tertiary 'eoliths' can only in each case be decided by the co-operation of archaeologists (who have first to convince themselves that these eoliths are really man-made) and geologists (who have to decide whether the formations in which these eoliths are found do go back to the Tertiary era). The Quaternary itself is divided into two great epochs, the Pleistocene and the Holocene. During the Pleistocene, the earth experienced a series of ice ages in the course of which the ice cap, which still today blankets the north polar regions, extended very much further south, covering in fact the whole of Northern Europe;

* Recent finds in the Transvaal, however, give fresh point to the problem.

at the same time the snouts of the glaciers in the Pyrenees, Alps, and so on, descended much lower over the plains than at the present time. At certain moments the glacial cap reached right to the 'great rivers' of the Netherlands, and the Alpine glaciers stretched as far as Lyons. These glacial periods were separated by periods of warmer climate, during which the ice-sheets melted, and retreated northwards or up to the mountain tops. This continuous advance and retreat of the ice, which was prolonged over hundreds of millennia, has given rise to a series of geological phenomena (moraines, marine deposits, river terraces, *loess* formation, solifluxion, etc.) whose relative age the geologists have succeeded in establishing (we shall be returning later to their attempts to fix absolute dates); when, therefore, the relationship between these divers phenomena and human remains can be established with certainty, the human element can be dated. As the geological era of the Pleistocene corresponds approximately with the archaeological period termed Palaeolithic, it will be understood why the study of man at this his earliest appearance, and also of his tools, can be undertaken with success only by those archaeologists who are deeply versed in geology, or who work in the closest collaboration with geologists.

Climatic changes during the Pleistocene evidently had a considerable influence upon the fauna and their evolution. The animals living during glacial periods are clearly not the same as those prevalent during interglacial times. In addition, a study of the bones found among kitchen refuse in Palaeolithic dwellings, while apprising us of the kind of life of the hunters at that time, also provides clues of a chronological kind: warm-or-cold-climate fauna, the presence of animals in a fossilized condition whose duration and time on earth is known, etc. Thus the Levalloisian I and II are characterized by the remains of a cold-climate fauna, mammoth, rhinoceros *tichorhinus*, reindeer, and musk-ox, while Levalloisian III and IV have a warm-climate fauna such as hippopotamus and elephant *antiquus*. This is confirmation of the geological indication which would extend this culture for the greater part of the third glaciation (Riss) and over the third interglacial period (Riss-Würm), but at the same time allows a differentiation of the successive stages as well as an approximate dating for the levels of this culture whose geological position cannot be established.

The second great period of the Quaternary, the Holocene, began scarcely more than twelve thousand years ago: we still live in it today. During this period, too, climatic conditions have also undergone important changes, less extreme certainly than those of the Pleistocene, but which have had no less influence upon vegetation. In Western and Southern Europe a series of periods, each with its characteristic features,

succeeded each other. The last glacial period was followed by an arctic period with a cold, dry climate and tundra vegetation; then followed the warmer and more humid Sub-arctic period, which saw the appearance of pine and birch, followed in its turn by the Boreal period, with hot, continental type climate. During this Boreal period, side by side with the species of its predecessor, appear the hazel, elm, lime, and oak. During the Atlantic period, more humid still, the temperature reached its height, and thenceforth gradually diminished; the vegetation is characterized primarily by mixed oak (oaks, elms, limes). The Sub-boreal period which followed was both drier and cooler than the Atlantic era; the elm faded out while the beech appeared and became widespread. Finally, the Sub-Atlantic, at the same time wetter but less hot, brings us up to historic times, and the vegetation gradually takes on its modern aspect.

This evolution of flora, sketched here only in its broad outlines, but of which the variations are much more complex and differ from place to place according to the nature of the terrain, altitude, etc., has been closely studied, thanks to the technique of pollen analysis. The pollen grains of plants are, in fact, practically indestructible, and in certain kinds of soil such as peat or sand are preserved for thousands of years. Old ground surfaces, deeply covered today by more recent geological deposits, preserve in this way millions of grains of pollen. The nature of these pollen grains differs from plant to plant. One science in its infancy, palynology, has taken as its aim the study of the evolution of the flora, based upon pollen analysis of the different geological levels. In some countries (Denmark and the Netherlands, for example) this study has made such progress that the evolution of the whole flora is known in the greatest detail century by century, or not far short of it. Priceless ally for archaeology! Take, for example, an attempt to reconstruct the internal structure of a Bronze Age tumulus, which, however, contains no grave goods, nor objects of any kind. Under this tumulus is found the old ground surface on which it has been built. Pollen analysis of this old ground surface permits one to determine at precisely what period of vegetational history the tumulus was built.

Caution must be exercised, however, against overestimating the valuable possibilities of palynology to archaeology. Results are only possible for a region whose floral evolution is already known with accuracy, and it is unwise to extend these results to include neighbouring regions with a different soil composition which may have had quite a different flora. In the Dutch Campine, for example, among tombs of the Eneolithic and Bronze Ages the oldest are characterized by a high percentage of lime pollen and a feeble percentage of beech, while in

association with more recent tombs this proportion is reversed. But, if by pure chance one of the earlier tombs was built close by a spinney of beech (perhaps the only one in the area since beech was still scanty), the ground on which the tumulus was built will show an abnormally high percentage of beech pollen sufficient to provide a misleadingly recent date for the construction of the tomb. Pollen analysis, then, is capable of producing very valuable clues, but ones in which absolute faith must not be placed if corroboration is not forthcoming from other dating evidence.

Study of Distributions

Methods of dating described so far contain weaknesses which can be partly eradicated by the study of the distribution of different archaeological phenomena. By plotting on a map all the places where are found, for example, a group of tools of the same type or pottery of a given kind, the extent of their distribution is easily demonstrated. It is still more necessary to establish the distribution of a whole culture, that is to say of a group of archaeological traits found always in association: tools of a particular model, weapons, pottery, tomb structure, type of dwelling, etc., namely the group of material remains of the inhabitants of an identifiable region at a clearly defined moment. The study of these distributions in so far as it can establish a relative chronology for certain regions, is a wholesome check upon the methods previously described. Thus, the traditional chronology of the Lower and Middle Palaeolithic, such as was still in vogue up to about 1920 (the chronology of de Mortillet and Breuil) was established almost exclusively from the evidence of French finds. It postulated the chronological succession: Ipswichian—Abbevillian—Clactonian—Acheulian—Levalloisian—Mousterian. Research into the distributions of these different cultures has shown that they are not the same everywhere and that certain of these cultures did not succeed each other but were—at least in part—contemporaneous (like Abbevillian and Clactonian, Levalloisian and Acheulian).

Synchronisms and Cross-Dating

Once success has been achieved in fixing the relative chronology of different successive cultures in a particular region, it is then necessary to discover the relationships between these cultures and those which flourished contemporaneously in neighbouring lands, how they have influenced each other, what trade relationships existed between them, and in what directions these currents moved. All these questions may be resolved only by research into cultural synchronisms, that is to say contemporaneous phenomena of allied or the same nature which have



x. Aerial view of the southern Halstatt cemetery of Lommel-Kattenbos, Belgium, one year after the excavations



xi. Aerial view of the *oppidum* of Hastodon, Belgium



xii. *Castellum* of *Praetorium Agrippinae* (Valkenburg, S. Holland)

been observed in two or more different cultures. These parallels may be of very varied character. Some are geological; for example, the progressive retreat of the ice cap at the end of the Pleistocene. (I shall return to this later on *à propos* of de Geer's chronology based upon the analysis of clay varves.) Some years ago, Claude Schaeffer, noticing that many archaeological sites in the Near and Middle East showed evidence of destruction by earthquake, attempted to use this evidence to establish parallels between certain levels of different sites, and in this way to establish a chronology which differed considerably from that which was then current. Other parallels are of a purely archaeological nature. In Bronze Age I, metallurgy made great progress in Ireland; objects of bronze or of gold made by Irish bronze-smiths and jewellers were exported to different parts of the continent. Among the most typical of these objects were the gold lunulae, of which examples have been found in England, France, Belgium, Germany, and Scandinavia. It follows from this that the different archaeological groups in which these lunulae figure are, within a few decades, contemporaneous.

It sometimes happens that two regions have experienced entirely distinct cultures, with the exception of a single feature whose distribution embraces both areas. This archaeological trait, common to both, provides evidence of cross-dating which helps to fix the relative chronology of other cultures found in the two areas.

ABSOLUTE CHRONOLOGY

The methods described up to this point sketch in outline a general scheme for the whole prehistoric period in Western Europe, and provide a framework into which may be fitted each particular culture in its proper place. However, even if one succeeds in recreating a general evolutionary picture, it none the less remains true that this general framework still leaves very much to be desired, and that in many cases the date of a culture can be given only approximately within a century or more. But we have dreamed of a series of methods which would allow archaeological events of the prehistoric period to be dated with much greater precision, and thus gradually achieve absolute dating. With the archaeology of historic times the difficulties are less, yet even there in many cases uncertainty persists over the precise dating of certain sites; as a general rule, however, archaeologists have arrived at a stage where they can date historical sites with remarkable accuracy.

Before reviewing the different methods used in arriving at an absolute chronology for prehistoric times, it will not come amiss to devote a few lines to the subject of dating archaeological sites within the historic era.

Dating of Historic Sites

The historic era may be distinguished from the prehistoric era by the existence of written (and decipherable) records. For, among the oldest of these records exist texts which may furnish bases for absolute chronology: lists of kings mentioning the length of their reigns, inscriptions to mark the lofty deeds of kings and pharaohs, and even diplomatic correspondence. It would be wrong, however, to place absolute faith in the oldest of these records. Thus, in Mesopotamia, the king-lists may record as successive dynasties those which were in fact contemporaneous. In reality, an historic chronology for the Near East does not rest upon secure foundations until the end of the ninth century B.C.; earlier centuries remain wrapped in considerable uncertainty. This is seen by the fact that during the last thirty years scholars have modified the dates of the reign of the famous Hammurabi at least five or six times. For Egypt, on the other hand, thanks to certain astronomical data (the heliacal risings of Sothis, in particular) calculable with great accuracy, the chronology rests upon more solid foundations; and one can delve back, with sufficient accuracy, to the beginning of the third millennium B.C.

Archaeologists digging sites belonging to these historic periods in the Near East or in Egypt can assign absolute dates to them if they succeed in establishing the connections between remains they uncover and certain reigns or events mentioned in historic texts. This is a task that is less arduous perhaps than it may appear at first sight, for the excavators have chosen to dig, in those regions, the great urban centres where palaces and temples are found. For, in Egypt, these monuments are usually covered with hieroglyphic inscriptions, and in the Near East, although monumental inscriptions are more rare, a large quantity of clay tablets is often found covered with cuneiform texts. By a combination of stratigraphical methods and textual evidence, not only may palaces and temples be dated, but even houses found in the same stratigraphical levels, and with all associated objects: weapons, tools, pottery, etc. These small objects, dated in this way, can become in their turn excellent comparative material for dating purposes. This is especially true of pottery, where the shape and decoration are often characteristic of a known culture and are practically identical wherever that culture occurs.

In Greece, the accuracy of historic chronology is much greater than for either Egypt or the Near East. Sites and monuments abound with exact information of their occupation or even their date of construction. Coins, although very often uninscribed, provide additional dating criteria. Pottery is abundant, and typical, and can be dated with

precision, especially from the end of the sixth century onwards. There are still, however, some obscure points which are of importance equally to historian and archaeologist. What confusion still exists, for example, in the history of Greek colonization! The sources relative to the date of the founding of different colonies are often contradictory and sometimes legendary. Proto-Corinthian and Corinthian pottery has been dated largely by evidence from the excavation of the sites of those colonies whose traditional date of foundation is accepted without critical examination. Pottery, too, dated in this way serves as dating evidence for establishing the chronology of other sites. There has recently been sufficient research into the traditional dating of Greek colonization to throw considerable doubt upon a large part of the chronology of Italian protohistory and Western protohistory, which is based partly upon parallels with that colonization and partly upon the study of the importation of Greek pottery into the West.

Roman archaeology provides much the same problem. Although there exists some uncertainty for archaic times, the chronology of the last centuries of the Republican régime and of the Imperial epoch is soundly established. Thanks to literary and historical texts, to inscriptions, and above all to coins, the chief archaeological sites may be accurately dated. Contributions to the setting up of unquestionable dating criteria have been made by excavations such as those of Pompeii and Herculaneum—where all the monuments and objects overwhelmed by lava and lapilli are prior to the disaster of A.D. 79. Coins are a valuable aid to the archaeologist. Those of the Imperial epoch are generally datable within a year or two. All Roman sites yield astonishing quantities of coins, providing sound dating evidence for the archaeological level in which they were found. A single coin will, of course, furnish only a *terminus post quem*, since it may have been long in circulation before it was lost. If, on the other hand, twenty coins are recovered from the same level, on a floor of a building, for example, there is a strong chance that the most recent of them was mislaid not very long before the laying down of this floor.

Even in Italy, too little attention has been paid to pottery as a means of dating. Yet, in the Western provinces of the Empire, pottery and its evolution have been studied with such care that sherds of certain types of pottery, *terra sigillata*, for example, are datable within a few years. Thus it is possible as a result of methodical excavations undertaken on certain sites, to gain a precise knowledge of the beginning and end of occupation. We know, for example, that the Roman camp of Haltern was occupied from 11 B.C. (conquest of Germany by Drusus) until A.D. 9 (the disaster of Varus): all the objects, weapons, pottery, glass, etc., date, then, from these twenty years. The study of a whole series

of sites datable in the same way has established an absolute time-scale for pottery, glass, jewels, fibulae, etc., so that these sites of the Roman era, throughout Western Europe, are datable with the greatest accuracy.

Far less precision is obtainable for medieval remains: it is not long since the whole accepted chronology of Merovingian cemeteries was overthrown; and as to the dating of Carolingian sites, there still remains much to be desired. One of the most urgent tasks for archaeologists specializing in that period should be the methodical excavation of sites for which is known, if not the date of the beginning of occupation, at least that of its abandonment (as a result of Norman invasion, for example). Then should follow a study of their pottery and of other objects of daily use, with the aim of dating other remains of the same era. Archaeologists in the Netherlands (the Dorestad excavations and the Frisian mounds), in Germany (the Haithabu excavations, for example) and in Scandinavia (Trelleborg, etc.) have already done excellent work on these lines.

Dating of Prehistoric Sites

In order to date prehistoric remains with a much closer approximation than the methods used in establishing relative chronology allow, archaeologists have called upon the resources not only of their own discipline (I shall come to them last) but upon a group of the natural sciences which have made startling progress during the last few years; among them geology, astronomy, and nuclear physics. There is no space here to write at length upon the theoretical basis of these methods, nor am I competent to do so. It will suffice to review the different methods of dating that archaeologists may call upon, with the simplest explanation of the principles involved.

DENDROCHRONOLOGY. It is a familiar fact that normally the growth of a tree reveals itself, in a horizontal section of its trunk, in the form of concentric growth-rings, each representing the growth of a year. Each ring is clearly distinguishable from its neighbours, because in the spring the growth cells are large and lightly coloured, while the summer growth is marked by smaller and darker cells. The distinction between the summer wood and that of the following spring is therefore extremely clear. The thickness of each growth-ring may show infinite variations, depending upon the temperature and humidity of the spring and summer during which growth has taken place. It has, in fact, been possible to establish a direct relationship between the thickness of tree-rings and the intensity of solar radiation. Thus are created a sequence of growth-rings, which are the same for all the trees of a particular

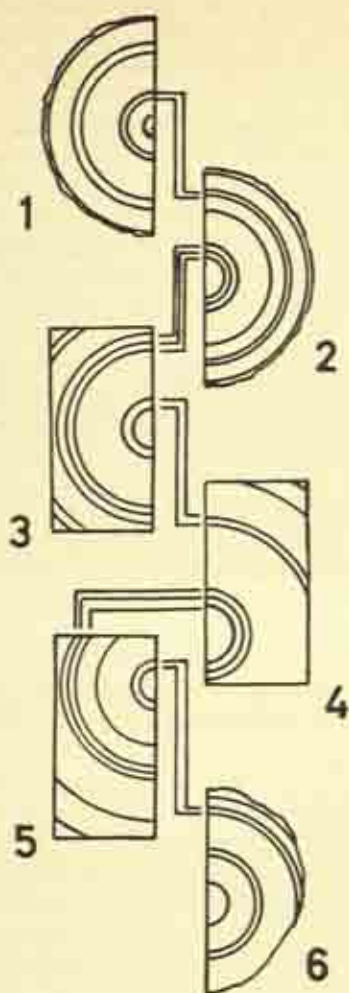


FIG. 3

Diagram to show how the age of a tree, cut down several centuries ago, may be calculated from a tree-trunk of known age.

region. Starting from a particular growth-ring of known date (the outermost growth-ring of a tree cut down during the winter of 1952-53^v represents, of course, the growth of the year 1952) it is simple to fix the age of a tree whose date of felling is known. Moreover, it is possible to

go further than that. Let us suppose that the examination of the trunk of a pine tree 300 years old allows the reconstruction of the growth-pattern from the year 1650; if a tree cut down in 1700 is found, the 50 outer growth-rings of the one should show the same sequence of growth-rings that were found for the 50 inner rings of the first tree. If the second tree was also as old as the first when it was felled, it should be possible to establish, in turn, the growth-pattern for a new period. In well-wooded countries there is no great difficulty, by studying the trunks of older and older trees, in establishing by this overlapping method the tree-ring pattern for a period of several centuries (Fig. 3). In fact, in California, a point has been reached where such a ring-sequence has been fixed for the last three thousand years. This has made it possible not only to study the variations of the climate and of solar radiation during this period, since the thickness of growth-rings is directly dependent upon these factors, but has also provided a precise method of dating the wood used in buildings constructed during this period. Remains of pre-Columbian Indian villages in the south-west of the United States have already been dated in this way. By the examination of the beams used in the construction of the dwellings in these villages a point has been reached where typical alterations of thick and thin rings may be observed for a particular period; the time pinpointed when the trees had been felled; and accurate dates assigned to the excavated remains.

Tree-ring analysis will always remain a technique limited to regions where it has been the custom to use wood extensively, and where the wood has been preserved under favourable conditions. It can hardly be expected that it can be used for periods going back more than two or three millennia. It is hoped, however, that after some years, typical cycles will be worked out for other regions (this has already been done for the last five centuries in Germany and Scandinavia). Analysis of growth-rings could then be used for medieval and Roman sites in Western Europe. Dendrochronology may also prove productive of results for the ethnology and archaeology of tropical regions, such as the dating of the Congo wood-carvings.

CLAY VARVE ANALYSIS. At the end of the last glaciation, the gradual retreat of the ice-sheets gave rise on the Baltic coasts (Sweden, Finland) to the formation of clayey deposits: in winter very fine black clays were laid down under the ice cap, while in summer, after the recession of the ice, the melt-water deposited light sand of coarser grain. The complete annual deposit may be about a centimetre thick and is called a 'varve'. The alternation of light sand and dark clay makes the distinction easy between one varve and its predecessor. The thickness of

varves, as with tree-rings, is influenced by the climate, and may show considerable variations. It is thus possible to distinguish typical sequences of clay varves. As long ago as 1878, the Swedish geologist de Geer conceived the idea of using clay varves as a means of establishing the absolute chronology of the periods of their deposition. There is no need here to enter into the difficulties he had to overcome to calculate the time separating varve 'Zero' (which served as the point of departure in his calculations) from the present day and thus to fix an absolute date for it, nor to follow him in his attempts to establish parallels (based of course on the characteristic sequences of the varves) between the different varve clay deposits. His methods have since been improved upon by Finnish and American scholars, but many problems still remain to be solved (that for instance of 'teleconnexion' between the clay-varves of regions far distant from each other). However that may be, de Geer postulated an absolute date for the different geological phases of the Holocene, which terminated with the ultimate formation of the Baltic (Yoldia Sea, Ancylus Lake, Littorina Sea), results which have been corroborated elsewhere by the study of terminal moraines. These results (which cover about the last twelve thousand years, have been of value not only to geologists, botanists (who carry out pollen-analysis for the dated deposits), and other natural scientists, but also to archaeologists, since a whole series of archaeological events in Scandinavia has been correlated with geological events dated by de Geer's method.

ASTRONOMICAL METHODS. Mention was made earlier of the alternation of glacial and interglacial periods in the Pleistocene. Scholars have naturally sought to determine the causes of these climatic variations, which appear to be subject to a certain periodicity. The logical source of explanation has been found in astronomical phenomena. Investigations have been made from the middle of the nineteenth century. One of the most interesting was J. Blanchard's theory put forward in 1942 of the displacement of the poles. This displacement, brought about by lunar and solar attractions combined with the movement of the rotation of the earth itself, was thought to be periodic and to have caused the alternation of glacial and interglacial periods. As the periodicity of the displacement of the poles can be calculated, the glacial periods could themselves be dated absolutely.

It appears, however, that fluctuations in climate are influenced by phenomena far more complex than the displacement of the poles alone, and that account must also be taken of the obliquity of the ecliptic, the eccentricity of the orbit, and the precession of the equinoxes. All the periodic fluctuations in the course of the earth around the sun have

resulted in corresponding fluctuations in the intensity of solar radiation received on a particular point of the earth's surface. Many workers have devoted themselves to calculations of the variations of solar radiation, and to dating them. Among these, the astronomer M. Milankovitch deserves special mention. In fact, the radiation curve produced by him presents a striking analogy with the alternations of glacial and interglacial periods established by the geologists, so that it does not seem too rash to postulate a direct connection between the intensity of solar radiation and these geological periods (the glacial periods themselves corresponding to those periods when solar radiation was feeble in summer and intense in winter).

As Milankovitch has put forward absolute dates for his radiation curve, this chronology can be transposed to establish an absolute time-scale for the corresponding geological periods, and for the archaeological cultures belonging to these periods. The most ancient remains of human industry, the Ipswichian, going back to the first phase of the first glacial period (Günz I) date from 590,000 years. The Abbevillian and Clactonian appear during the Günz-Mindel interglaciation, with a duration of about 60,000 years, with a *climax* (or maximum intensity) dating from 500,000 years. The *climax* of the last glaciation (Würm III) during which the late Magdalenian occurs, dates from 25,000 years. It will be noticed that the dates given in Milankovitch's geochronological table confirm, by and large, those arrived at by other methods, for example, calculations based on the rate of sedimentation during the periods of the Pleistocene, made by the geologists Penck and Brückner. These two, in fact, estimated the age of the late Magdalenian in Switzerland as about 24,000 years. On the other hand, dating by radiocarbon methods, which will be discussed shortly, and which seem to offer more assurance, gives quite different results (the occupation of the cave of Lascaux, which dates from the Upper Palaeolithic, gives a date of only around 15,500 years).

Astronomers themselves everywhere are far from unanimous in accepting the calculations of Milankovitch. But I do not wish to be involved in a discussion of this; my only concern is to draw attention to the fascination of those researches, which for the first time have put forward for the whole Pleistocene period a chronological framework with a reasonably sound basis.

RADIOCARBON DATING. Nuclear physics and research into radioactivity are happily not entirely devoted to destructive ends. Among the more peaceable applications of this branch of science belongs the method of dating archaeological materials by their radioactive carbon content (radiocarbon or C^{14}).

In the simplest possible terms, the principle of this method may be summarized as follows. While ordinary carbon is made up of 6 protons and 6 neutrons (C^{12}) and is not radioactive, there exists another variety of carbon, of atomic weight 14, which is radioactive. This carbon 14 (or radiocarbon) is present in all organic matter (men, animals, vegetation). Professor W. F. Libby has been able to calculate that the quantity of radioactive carbon remains constant in all living organic matter. The rate of disintegration of radiocarbon is, in fact, compensated for by the absorption of new atoms of C^{14} forming in the upper layers of the atmosphere. As there is a constant exchange by living organisms of carbon dioxide with air, each gramme of living carbon contains a fixed quantity of radioactive carbon. Once an organism is dead, reciprocal action ceases to take place; the carbon 14 present in a living organism gradually disintegrates and is not renewed. It has been possible to prove that half of no-matter-what quantity of radiocarbon reverts to ordinary carbon in the space of about 5,600 years. At the end of another period of the same duration only a quarter of the original quantity is left; at the end of a third period (that is after about 16,800 years) the quantity of radiocarbon is reduced to one-eighth, and so on. From these facts, it has become possible to calculate the age of any dead organic matter found in the course of excavation by measuring the amount of its radioactive carbon content.

I will not dwell upon the difficulties of this method, the possible sources of error, or the degree of accuracy that it is possible to obtain. The first experiments included dating of remains of wood of known age, as a control upon the accuracy of the method. These were conclusive. Here are two examples: a sample of wood from the tomb of Djoser at Saqqara (within 75 years of 2700 B.C.) was examined by the new method: it was found (in 1949) that the wood dated from 4750 ± 250 B.P., that is, 2801 ± 250 years B.C. A piece of funerary boat from Sesostri III and dating from 1843 (± 50) B.C. produced a date of 3700 ± 400 B.P., or 1751 ± 400 B.C. In applying this method to the prehistoric periods there are as yet few results. Notice, however, that a sample of charcoal recovered from an occupation level in the Lascaux cave was dated $15,516 \pm 900$ B.P., or $13,566 \pm 900$ B.C. This new method is pregnant with the promise of development in many directions. There is no doubt that it will become increasingly used.

ARCHAEOLOGICAL METHODS. Even archaeology itself sometimes contains elements which allow of an absolute chronology for certain prehistoric periods and cultures. Though Western Europe up to the beginning of the Christian era is shrouded in the mists of prehistory, the Near East, Egypt, Greece, and Italy had much earlier reached a high

degree of civilization. Writing was known, and there are, therefore, written records of their history and civilization. In these areas, as we have seen, chronology still holds many obscurities, but is nevertheless determinable more accurately than elsewhere at the same time. These ancient cradles of higher civilization extended their influence as far as the heart of Barbarian Europe, partly by contact with the peoples living on their own borders, who transmitted in their turn some of the elements of classical cultures to more distant tribes, and partly by direct commercial relations.

When jewels, weapons, tools, etc. found in Europe have clearly been influenced in their design and decoration by similar objects from Mediterranean regions, these imitations are obviously more recent than their classical prototypes. If the latter are dated with precision, that date will serve as a *terminus post quem* for the dating of objects found in Europe. Dating becomes more exact when objects found in Europe are not only imitations but direct importations. Many of the tombs of Celtic princes of the La Tène era have been datable owing to the Attic vases found inside them. Already, by Bronze Age times, Mediterranean products have been noted in Europe, as having been introduced there commercially. In many European countries faience beads of Egyptian manufacture have been found; they were made at the end of the fifteenth century and beginning of the fourteenth century B.C.* All archaeological contexts in which these ornaments have been found (England, the Netherlands, Hungary, etc.) may be assumed to be approximately contemporary. However, the fact must not be overlooked that these beads may have been worn for a long time before being lost or buried, and further that sufficient time must be taken into account to allow for their diffusion across Europe. It is only then, approximately, that all these faience beads can be dated to about 1400 B.C.

By combining thus the dates furnished by Egyptian, Greek, Italian, and Etruscan finds, and the *termini post quos* based on the local imitations of objects from classical countries, it has been possible to affirm for the last fourteen centuries B.C. certain fixed chronological points on which one may hang the whole framework of the relative chronology of protohistoric Western Europe. It has not, however, been possible up to the present time to be accurate within a hundred years or more in these dates. The method, besides, is open to obvious pitfalls. Too often a very uncertain date is taken as the point of departure. One of

* It is not out of the question that these necklace beads may be of Mycenaean manufacture and were exported from Greece to Egypt at the same time as to Central and Western Europe (cf. V. Gordon Childe, *Social Evolution* (London, 1931), p. 48). This does not alter their date of fabrication in any way.

the pillars of Early Bronze Age chronology is provided by the closed Byblos Hoard, which contains the prototypes of some of the first Bronze objects fashioned in Europe. Now, the date of the Byblos assemblage, once thought to be certain, is held to be open to question. Uncertainties in the protohistoric chronology of Italy have already been mentioned, based as it is upon dating for proto-Corinthian pottery, which itself rests upon flimsy foundations. Or again, many sites in Central and Southern Europe have been dated from the fact that they contain bronze objects thought to be of Italian provenance. In Italy, these objects have been dated according to the closed finds in which they appeared, and it is this date which has served as a starting point for the dating of European finds. Now, however, recent research is leaning to the view that many of these objects are not Italian, but come from Central Europe, whence they would have been exported at the same time in a northerly direction as well as towards Italy. In a word, these Central European finds should be put back in years by several decades, since they now become earlier in date than their Italian counterparts.

OTHER METHODS. In the preceding pages the principal methods used for dating archaeological remains have been briefly analysed. This review is far from being exhaustive! Hardly a year passes without fresh light being thrown upon the subject, and it is impossible to enumerate all the varying and ingenious methods commended by others. Though some of them are of great value, their field of application unfortunately is very limited.

The dating of fossil bones by the analysis of their fluorine content is applicable only to bones which have been preserved under similar conditions. This method is based upon a theory that bones absorb slowly the fluorine content from the moisture of the soil in which they are buried. When bones of a different age are recovered from the same site, analysis of their fluorine content can be used to establish their relative age. But to be successful the conditions of preservation must be identical. The method cannot provide absolute dates and is not applicable to bones coming from different sites. However, some important results have already been forthcoming. It was thus that the famous Swanscombe skull was found to be truly contemporaneous with the gravels of the Middle Pleistocene in which it was found, and with the associated Acheulian tools. This same method was instrumental recently (1953) in laying bare one of the most notorious frauds of our time: the famous Piltdown mandible belongs not to *Eoanthropus* but to a modern ape!

More limited still are the potentialities of the method based on the

measurement of magnetism in pottery. All pottery made up of iron constituents shows the terrestrial magnetism of the time of its baking. Now, this magnetic field varies from year to year. Theoretically, by studying the magnetism present in pottery of known age, it should be possible to establish the curve of magnetic variation and deduct the age of pottery from it. The practical difficulties are, however, enormous, for to begin with it is necessary to make a study of pottery whose exact age is known and also the exact position at the moment of cooling (in fact, the magnetization of the clay takes on the orientation of the magnetic field in which it is cooled). Need one add that these conditions are practically never fulfilled? Even when a prehistoric or Gallo-Roman pottery-kiln is found, still containing the last firing, and the exact orientation of each object is recorded at the moment of excavation, even then the date of these pots can be fixed only approximately. To be accurate within twenty years is quite exceptional.

* * *

Such are the principal methods which the archaeologist of today has at his disposal in order to date the archaeological records brought to light by his spade. They are varied and complex. Their results are sometimes contradictory because the technique is still imperfect. However, the very great progress made in the last few years allows one to hope that in the not too distant future prehistoric archaeology will be able to date its evidence with an accuracy almost comparable with that achieved by the archaeology of historic times. Then the data which archaeology is continuously providing can be fully used by the historian, and the qualitative difference between history and prehistory will become increasingly narrow.

CHAPTER V

Problems of Archaeological Interpretation I: Limitations

WHILE THE ESSENTIAL task of the excavator is to find new archaeological evidence, record it with the greatest accuracy, date it, and publish it,

the interpretation of this evidence is not necessarily his task. There are excellent 'field' archaeologists who limit their activities to the excavation site itself, and to the preparation of reports, and there are others—'arm-chair' archaeologists—who make a study of the past, using primarily archaeological evidence, but who have never put foot in an excavation trench. This distinction between open-air archaeology and fireside archaeology is a regrettable fact in itself, but one which, in practice, is almost unavoidable. It is indeed possible to be an excellent excavator and to be lacking in the qualities that go to make a good historian, qualities absolutely indispensable to anyone who wants to reconstruct the past from archaeological data. It is on the other hand infinitely regrettable that a great many scholars make constant use of archaeological material, with no knowledge of the latest work, and without the critical apparatus to assess the value of the material at their disposal. It is hard to imagine a medievalist capable of producing good work if he is not himself able to decipher the archives employed in his work or to check the readings of anyone else's editing of these documents; but such is the situation of many archaeologists who confine themselves to their desks.

The earlier chapters of this book have been devoted mainly to the activity of the excavator. Let us now proceed to the problems of interpretation. What are the possibilities and what are the limitations of archaeology? The following pages attempt to answer this question in critical but objective fashion.

Archaeological records dating from historical periods are obviously more 'telling' than those of prehistoric periods, since they can be interpreted in the light of texts, on which they, in their turn, may throw new light. That is why, to appreciate the 'autonomous' possibilities of archaeology, it is better to stick to evidence dating from prehistoric periods. What can we learn about the period to which they refer? Some scholars have very clear views on this subject. A. W. Byvanck, for example, in his book devoted to the prehistory of the Netherlands, wrote: 'Thanks to antiquities found in the ground, a very real idea of the people who lived in these remote times, and of their culture, can be formed, even though no written information is available about them. Such an idea is, in a number of cases, only a little less clear than the picture we can get of an historical period.*' We may ask ourselves if the learned professor from Leyden is not advancing an over-optimistic view, and if, in many cases, the wish has been father to thoughts that are not so clearly provided by archaeological data and information. This problem presents itself not only to the archaeologist himself, who strives to interpret the evidence which he has wrested from the ground,

* A. W. Byvanck, *De Voorgeschiedenis van Nederland* (4th ed., 1946), p. 1.

but also to the historian, the linguist, and the philologist who frequently have recourse to archaeological data in their attempts to resolve certain problems peculiar to their own disciplines.

The question has been debated for a long time, and will probably continue to be for many years yet. I am not here making any claim to solve it; I am merely making certain critical comments, certain observations springing from personal experience as both archaeologist and historian. Many of the mistakes I am warning the reader against I have committed myself more than once.

One final remark. The majority of examples I shall use are borrowed from the realm of prehistoric and provincial Roman archaeology; there would be no difficulty, however, in drawing examples, perhaps even more telling, from the realms of classical or oriental archaeology.

ACTUAL VALUE OF ARCHAEOLOGICAL EVIDENCE

It is of the first importance, if archaeological sources are to be usable, that they should be reliable. Such a remark may seem so obvious that one may be taxed with naïvety in pronouncing so elementary an axiom. Nevertheless, it is by no means a superfluous remark. I do not hesitate to say that at least 50 per cent of all archaeological material assembled in the last hundred years in nearly all countries of the Old World is actually of doubtful value, although a great many historians and archaeologists, having recourse to it daily in support of all kinds of theories, haughtily disdain the most elementary principles of historical criticism.

What are the underlying causes of this state of affairs? Let me try to describe the most important of them.

The blame must fall first upon out-of-date methods of excavation, which, devoid of scientific value, many archaeologists still respect. It may be objected that excavation technique has made real progress only during the last fifty years. That is only partly true, for the great fundamental principles which should be observed in every piece of research into the soil (stratigraphy, etc.) were established nearly a century ago. But it was only very exceptionally that an excavator exerted himself to make use of them until fairly recently.

It is not so long ago that a manual of excavation (!) written in German began with these somewhat perplexing words: *Man grabe ein Loch . . .* (Dig a hole . . .).

How often has it happened that even the best excavators of the nineteenth century (and of the twentieth!), when examining a cemetery, have not taken the pains to record which objects were found in which

particular tomb. Too often they have been content to recover the finds pell-mell, in such a way that it is impossible now to reconstruct the funerary functions of each tomb, in which lie the essential data for determining the chronology of a cemetery which may have been in use for several centuries. And today again, even though the technique of excavation has become so refined, so complicated, that only an archaeological specialist is in a position to read the information hidden in the earth, *the greater part* of the excavations in Belgium (doubtless it is the same in France and many other countries) are undertaken by unqualified dilettanti, or by surreptitious excavators who often have no other aim than to enrich their collections with a sherd of pottery or a worked flint. After having deliberately destroyed in this way a piece of evidence relating to our ancient past, they do not trouble to make known the products of their theft, which, in time, become scattered all over the place and irrevocably lost.

The records of a large number of excavations of former days have never been published. If by chance a report was published, it was often done so incompetently and was so incomplete that it is scarcely usable. This, it must be repeated, is all the more deplorable with archaeological evidence from the ground because, compared with written evidence, it can be 'read' as a whole only once, and that by the excavator himself, since, in the course of each excavation, he is forced to destroy a series of clues which, if they are not immediately recorded, are lost for ever. A single example will suffice to illustrate this. The late Roman cemetery of Furfooz was dug about 1876 and the report published in 1877. Taking into account the times in which it was produced this report may be judged to be competent; but it lacks certain essential data, for example a detailed catalogue of the contents of each tomb.* A few years ago, a colleague in Munich, J. Werner, published a very important study on the origins of the Merovingian civilization. In this article, Werner drew a series of conclusions from data furnished by some cemeteries from the late fourth century and, among them, that of Furfooz. Part of his theory concerning the funerary rites of the Merovingian period was based upon the fact that all the tombs of this cemetery were orientated from north to south. Now, in this report one may search in vain for any mention of this orientation. Nevertheless, the plan of the cemetery which is published in the report has been printed, in order to fit on to the page, in such a way that all the tombs are drawn at right angles to the text. In truth, all the tombs, with a single exception, are orientated 'from sunrise to sunset', as is expressly

* Thanks to the precious archives in the Namur Museum, a completely new study of the cemetery has been possible. Cf. the work by J. Nenquin, mentioned earlier, p. 32, n.

mentioned in the excavation notebook which fortunately has been preserved in the museum at Namur. J. Werner, in accepting without checking that the published plan was orientated with north at the top of the page, which it was not, allowed himself to fall into error, and this, though understandable, falsifies the premises of part of his theory.

A third way in which archaeological evidence loses its value lies in the unhelpful conditions in which antiquities are preserved in many museums. I personally know some Belgian museums where every time a spring-cleaning takes place the labels are shuffled about with incredible carelessness. One vase of Hallstatt date has, in this way, changed its provenance four times in ten years! Clearly the curator does not believe in monotony.

Many private collectors also deserve condemnation. The antiquities are often kept in the most deplorable conditions,* but some are worse than others: the mania for collecting that was at its height in the nineteenth century and the beginning of the twentieth century gave rise to a positive trade in antiquities. As wealthy collectors were always on the look-out for a rare piece, it is no cause for surprise that astute traders have often offered for sale pieces whose authenticity, or at least provenance, is very much in doubt. Some years ago one of these wealthy amateurs bequeathed his very fine collection of antiquities to one of the Belgian museums. This collection included some unique pieces; among others were swords and arrow heads of a most unusual type, which were said to come from an urnfield in the Campine. It was quite by chance, some years later, that the key to the mystery was discovered. They were in reality Chinese weapons of the Chou dynasty (twelfth to third century B.C.)! It was not surprising, in view of this, that none of this type had ever been found in Belgium or in the neighbouring countries. Consequently, faith in the other objects belonging to this collection is somewhat undermined, although it contains pieces of incontestable authenticity and great value. And what can be said of the objects that have been dragged from the River Scheldt, near Termonde, at the beginning of the century, and which crowd the cases of most of the museums of Belgium and as many again in private collections? Their number is so considerable as to arouse justifiable doubts. It is certain that many prehistoric and Merovingian objects have been dragged up in this region. But which are they?

As well as objects with doubtful provenance, there are those which have been 'improved' and faked: bone objects doctored with a false patina, Roman coins sliced in two horizontally and the obverse stuck to the reverse of another in such a way as to make a new species. . . . The

* Happily there are exceptions and some private collectors exercise a care which should be an example to many museums.



xiii. Tumulus 19 of the Toterfout-Halve Mijl Bronze Age cemetery



xiv. Tumulus I at Wessinghuizen, Netherlands



xv. Section through tomb 23 of the Aalter-Oostergem cemetery, Belgium



xvi. Iron belt-hook found in tomb 4 (La Tène I) in the northern cemetery of Lommel-Kattenbos

astuteness of these merchants knows no limits. And then what about the innumerable deceptions? Glozel is well-known, so is Saitaphernes and the statuettes and vases from the chalk of Spiennes, and more recently the positive industry that has grown up in the 'Merovingian' bird-shaped fibulae of Munich. But for one faker who is unmasked, how many are there who have been successful in deceiving inexperienced collectors, and have sold at a high price that rare piece, the 'hapax', which takes pride of place in their show cases?

The outlook, it must be admitted, is not very rosy. In this respect there is nothing to choose between Belgium, France, Italy, Greece, and the East. Excavations badly carried out, reports inaccurate and incomplete, museum junkshops, abundance of doubtful and faked objects—nothing is lacking from the picture. Do we have to be reminded of the excavation, or rather the pillage, of that Greek temple in the course of which the recording of the spot where the statues from the pediments were found was omitted, so that it is no longer known if a particular statue formed part of the east or west frontal? And for those interested in the problems of Celtic *têtes coupées*, the only solution is to examine the pieces in the museum where they are preserved, for the excavation reports nowhere contain any clear information on the subject of *têtes coupées*, that is to say of complete sculptures representing the human head, or simply heads from mutilated statues.

In so confused a state of affairs, it is hard not to feel that historians and philologists have been overhasty in their attempts to make use of archaeological data for the solution of historical and philological problems. Archaeological records of unquestionable value, in which every confidence can be placed, are still too few and far between—at least in Belgium—for them to be used as bases for research of this kind. Also, is not the archaeologist's most urgent task the actual research into the ground for new evidence, carried out with all necessary precautions and the most modern techniques, so that no data escape his scrutiny? It is an equally important task to re-evaluate, in highly critical mood, the results of the most notable excavations made in the past. This is the only short route towards providing a larger number of archaeological records of dependable value.

I have already stressed this point in earlier publications.* My words produced the honour of a courteous reply from my admirable colleague J. H. Jongkees, of the University of Utrecht. In his inaugural lecture,† he says something like this: 'The soil has for the archaeologist the same significance that a collection of archives holds for an historian of

* *Inleiding tot het ontheidskundig bodemonderzoek*, p. 18.

† J. H. Jongkees, 'Beschouwingen over de archaeologie' (Utrecht, 1952),

medieval or later periods: it is, in fact, a precious storehouse of historical data. An excavation may be compared with the perusal of documentary fragments, the publication of an excavation report with the publication of his sources by an historian. In short, the excavation is no more than the discovery of new data, and the publication of a report no more than the editing of these data with a view to their future study. But, as no historian considers the publication of documents as the end in itself of historical studies, so the archaeologist should not conceive as the essential task incumbent upon him the excavation of sites and publication of reports. On the contrary, it is only after an excavation report has been published that the real scientific work begins. The work of the excavator is useful, indeed indispensable, but it is only one of the auxiliary tasks of archaeology. The essential work of the archaeologist is not done upon the site, but in the study. . . .'

Need I say that *theoretically* I am entirely in agreement with my distinguished colleague from Utrecht? But can the historian deliver himself of good work if he has but little confidence in the evidence at his disposal, if its interpretation has been garbled or faulty, if the editions of texts he is employing are worthless? Such, however, is the predicament in which the archaeologist finds himself, at the moment, when he wants to incarcerate himself in his library. So, let it be said once more, that the essential task of the archaeologist of today lies in excavation.

On the other hand, I must record that I can scarcely understand the criticism formulated by F. Mayence, excavator of Apamea, when reviewing the report upon the recent American excavations at Hissarlik, the supposed site of Troy—a methodical excavation if ever there was one. He describes it as 'an example of more and more encroachment in the field of archaeology, as is the case no doubt in other disciplines, of technique upon thought'.* Will we soon be reproaching medievalists with using ultra-violet rays to decipher palimpsests or old parchments from which the writing has disappeared?

In practice every archaeologist will try to raise his sphere of activity above the drudgery of excavation, and will strive, after being tied down to the minute description of post-holes, sherds of pottery, and old stones, to interpret these records and through them to re-create the appearance and way of life of the people who have left behind these humble traces. But it must never be lost sight of today that the archaeologist needs, above all, the salutary corrective of self-criticism. Only thus will his work prosper.

* *Bulletin de l'Académie Royale de Belgique, classe des Lettres* (1952), pp. 260 et seq.

CULTURE, RACE, LANGUAGE, ETHNIC ENTITY

There will obviously come a time, and it is to be hoped soon, when there will be available in Belgium, as is already the case in certain fortunate countries—notably England—a sufficient quantity of archaeological evidence of unimpeachable quality. What results are possible, then, from studies based upon archaeological data?

The answer to this question depends to a great extent upon geographical and chronological circumstance. In the case, for example, of the interpretation of archaeological remains dating from a period for which there is also a considerable quantity of written sources, this archaeological evidence will be, in the light of textual records, much more vivid than the remains of a prehistoric culture for which no documentary evidence exists.

To make his material usable, the archaeologist must endeavour first and foremost to arrange it as precisely as possible in time and space, thus to establish a series of cultures and cultural areas. It follows that for delimitation of this kind, one object by itself has little significance. In the same way care must be exercised not to fix the limits of a cultural area upon the basis of a single characteristic, be it tool, weapon, or ornament of a certain type, a special structure of tomb, etc. It is, on the contrary, the grouping together of all these individual aspects in regular association in the same archaeological contexts which serves as a basis for the establishing of different archaeological cultures* and of their distribution. How can one define such a cultural area? This is what A. W. Byvanck thinks:† The characteristics of a particular cultural area are so striking, so arresting, that the men who were a part of that culture ought necessarily to have a particular nature, and each cultural area ought to correspond to a well-determined ethnic unity, to a people or a tribe. It would then be possible to assert that each cultural area represented a particular people.† Byvanck expresses in this passage an opinion which is held by the large majority of archaeologists and

* The archaeological significance of the word 'culture', and the positive content of this concept, will be discussed later. It is enough here to remind the reader that one cannot properly speak of a culture unless there are a considerable quantity of remains, of a varied nature, of a people and a particular time (tools, weapons, pottery, houses, tombs, dress, etc.). These remains form an organic whole from which it is not possible to isolate at random a single element, as the type fossil whose presence is sufficient to prove the existence of a particular culture in a given place. The finding of a single sherd of Schnurkeramik (corded-ware) is wholly insufficient evidence upon which to locate the spread of the culture known as the corded-beaker culture.

† A. W. Byvanck, *De Voorgeschiedenis van Nederland*, (4th ed., 1946) p. 11.

historians: some scholars wish to go even further and do not hesitate to identify a cultural area with a linguistic region; others even think that the differences between several contemporary archaeological cultures ought of necessity to correspond to a racial distinction between the representatives of these civilizations. Which of these equations are justifiable? Can it be logically allowed that a cultural distinction corresponds *ipso facto* to a racial distinction? Had all men who spoke a particular language the same civilization (in the archaeological sense of the word)? Vice versa, did all men who belonged to the same culture speak the same language? Is it possible to attach an ethnic significance to a cultural area? I am most strongly of the opinion that a negative answer must be given to all these questions, even to the last.

The study of the human race—the word race being taken in the sense accorded to it by all anthropologists of the present day: ‘a group of men with the same heritable physical characteristics (form and structure of body, function of the various organs, etc.) in common’*—makes up the subject of anthropology. One of the branches of this discipline, that is to say prehistoric anthropology, which studies races existing in prehistoric periods and their connections with the races of today, has much in common with prehistoric archaeology: the same methods of reconnaissance, of excavation and dating, the one science serving as an auxiliary discipline to the other, and vice versa. Archaeological material found in the same levels as fossilized human bones serves in effect to date these and provide information about the degree of civilization of the men to whom the bones belonged. The anthropologist, then, ought certainly to have a thorough grounding in archaeology; the archaeologist, for his part, should not neglect the study of human remains which he lights upon in the course of his excavations. Constant comparison of the results obtained by the two disciplines should be made, and of course the hypothesis of the identity of a particular human race with the representatives of a given archaeological culture should be verified. The more the two sciences advance the more evident does it become that such an equation does not in reality stand up to scrutiny.

It must not be forgotten that the most competent anthropologists assert that extremely little is known about the prehistoric races and their affinities with living peoples. Of our distant ancestors only a few bones remain, only a few skulls, often in a sorry state of preservation. These venerable remains are the source of much information about the stature, the cephalic index, the facial and nasal indices, and several other morphological characteristics, but they leave us, nevertheless, in

* Definition borrowed from Henri V. Vallois, *Anthropologie de la population française* (1943), p. 119.

ignorance of a number of factors of the first importance which are an integral part of the anthropological classification of living races: pigmentation of the skin, colour of the hair and eyes, shape of the eyes (presence of an epicanthic fold), form of the hair, muscles, blood grouping, form of certain organs, etc. The determination of prehistoric races is, then, in a far more rudimentary state than that of living races. For, although it may be possible to fix the chronological and geographical distribution of prehistoric races, it may be firmly stated that this does not correspond in any way to the distribution of archaeological cultures. One might perhaps admit that, in the Palaeolithic, on an average the representation of Mousterian culture could be identified with Neanderthal men (a statement based on a very limited amount of evidence and upon an argument *a silentio* that runs the risk of invalidation with every new find). On the other hand from the Upper Palaeolithic and the appearance of *homo sapiens*, it can be asserted that men with very different somatic characteristics belong to the same archaeological culture and that the representatives of the same race, contemporary with each other, are to be found spread among various cultural areas. Thus, the negroids of the cave of Grimaldi and Cro-Magnon man with his 'Nordic' characteristics belong archaeologically to the same culture. And the closer we get to historic times, the more evident do continual mixtures of population become, the more cross-breeding and hybridization. With every war, with every invasion, the blood of conquerors and vanquished has become mingled, for, so Zarathustra affirms (according to Nietzsche), 'woman was made for the relaxation of the warrior. . . .'

Although some German prehistorians of the school of Kossina, in order to provide a pseudo-scientific basis for a National Socialist ideology and Hitlerian racism, have systematically created confusion among the concepts of race, language, archaeological culture, people and nation, it has been recognized for a long time what is unanimously admitted today: namely that characteristics of civilization or of language have nothing to do with race.

The problem of the identification of linguistic distributions with a culture area or group of archaeological areas is more complex, and demands a much more considered answer. In the first place, it is a question that must be put precisely. It is not a question of knowing whether in certain cases such an identification is possible, but rather if it should be made automatically. In other words, did all people who spoke the same language necessarily belong to the same culture? And, vice versa, did all representatives of the same culture necessarily speak the same language?

Since the nineteenth century, influenced by awakening nationalism,

the tendency to give an affirmative answer to these questions has been too apparent. Starting from the principle 'one language', 'one people', and conceding that every archaeological culture must of necessity have an ethnic significance, ethnic or linguistic concepts have been transferred somewhat casually into the archaeological domain. Although words like 'Celts' and 'Germans' can only have an ethnic or linguistic significance, there is a tendency to speak of 'Celtic archaeology' and 'Germanic archaeology'. Obviously archaeological remains may be studied from regions where Celtic or Germanic tribes lived or whose inhabitants spoke a Celtic or German tongue, but are there culture areas whose limits coincide exactly with these political or linguistic boundaries?

To bring much needed clarity to the resolution of the problem, it is necessary to compare the distribution areas of languages spoken during a particular period with the distribution map of the contemporary archaeological culture areas. This, however, presents great difficulties to the prehistorian, because very little is known of the languages spoken in those times or of their distribution. Of the languages spoken during the protohistoric period, such as Celtic, Germanic, Illyrian, linguists sometimes know a few words, can identify and sometimes interpret some roots, prefixes, and suffixes, and attempt a reconstruction of other elements, often at the cost of much dubious mental agility.

One example will suffice to illustrate the poverty and unreliability of the linguistic evidence for a prehistoric period relatively little removed from us: what language was spoken in Belgium immediately before the Roman conquest? We are limited by possessing only the most trifling amount of information: a few facts from ancient historians, a few place names, personal names, and names of gods. Thus, most of the data are of little value in solving the problem. Personal names, it seems, formerly as still today, were subject to fashion. What explanation, if this is not so, is there for the fact that the chiefs of the Cimbri and the Teutones (Germanic peoples if ever there were any) from the time of the invasion at the end of the second century B.C., bore purely Celtic names: Boiorix, Caesorix? Place-names of the pre-Roman epoch on the other hand were not necessarily bestowed at that time: it is almost certain that some of them, at least, had their origin in a far more distant past. The gods themselves are not necessarily national deities: religious proselytes were not unknown even in prehistoric times, and we know by the Roman example that barbarian peoples did not hesitate, in certain cases, to adopt foreign deities.

The few words, or elements of words finally, that remain to us from that time, are insufficient to allow us to say with any confidence what

language was spoken in Belgium at the time of Caesar. Moreover, the linguists themselves have never been unanimous in their solutions to this problem. Up to about 1914, the supporters of a Germanic language were in the majority; but that theory has now been generally abandoned in favour of a Celtic language. Meanwhile, the Illyrian language has had its courageous protagonists, though quickly suppressed, and now we have a 'Belgian' theory. If most of the ancient writers seemed to avow that Celtic was spoken as far as the north of Gaul, Caesar for his part, in one of the first sentences of his *de bello Gallico*, says expressly that the Aquitanae, Celtae, and Belgae spoke different languages.

M. Gysseling has just set out his case for what he calls 'Belgian':* the study of the place-names indicates, according to him, that the language spoken in Belgium in the La Tène period emerged from a non-Indo-European substratum and from an Indo-European superstratum; the latter would probably be a form of proto-Celtic which would explain at the same time certain analogies between this language and the one of which Dauzat has found traces in the Auvergne and which he calls pre-Celtic, and also the relationship between the 'Belgian' and Celtic vocabularies. The vocalism, consonantism, frequent use of suffixes, and almost total absence of compound names, however, contrast strongly with Celtic. I do not possess the necessary equipment to pronounce upon this new theory. I merely record that according to M. Gysseling the distribution area of this language includes Belgium, the Netherlands (with the exception of the Provinces of Frisia and Groningen), the North of France (though the Somme region already becomes a zone of transition), Hesse, the Rhinlands, and the region of the Ruhr; but this zone does not then correspond with the territory which Caesar assigned to the Belgic tribes (bounded by the Seine, Marne, Rhine, and the sea), nor with the culture area, studied by Hawkes and Dunning,† which stretches from the Ardennes to the Marne-Seine region, and which was the territory of the Belgae of history. It is impossible also to identify the distribution area of the La Tène civilization (Celtic *par excellence*) with the zone of Celtic speakers; it seems that some regions where Celtic was certainly spoken scarcely belonged to the La Tène civilization, or experienced only a pale reflection of it; on the other hand, it is by no means certain that the south-eastern part of the La Tène area was inhabited by Celtic-speaking peoples.

* M. Gysseling, 'Inleiding tot de studie van het oude Belgisch', in *Mededelingen Verenig. Naamkunde Leuven* (1952), XXVIII, pp. 69 et seq.

† C. F. C. Hawkes and G. C. Dunning, 'The Belgae of Gaul and Britain', in *The Archaeological Journal* (1930), LXXXVII, pp. 150 ff.

All the ancient writers who mention Belgian territories in the pre-Roman epoch are agreed in affirming that the Rhine formed, in the first century B.C., the boundary between Celts and Germans. Nevertheless, as U. Kahrsstedt* has again remarked recently, to the south of a line joining Aachen, Juliers, and Euskirchen, and continuing eastwards of the Rhine, extends the distribution area of a very characteristic culture dating from the first century B.C., which is the direct heir of the Hunsrück-Eifel culture of the previous period. This culture survived without interruption up to the time of Augustus. Now the part of that region situated to the west of the Rhine formed part of the territory, at the time of the conquest, of the Eburones, and that to the east of the river the territory of the Sugambri; on the other hand, it does not embrace with certainty either the whole of Eburan territory or the whole of the land of the Sugambri. This is not the place to attempt a solution of the enigma: it is enough to draw attention to the differences between data from archaeological, linguistic, and textual sources.

One other example. A little while ago H. Schönberger published an admirable and comprehensive study of the protohistory of the Wetterau, that fertile plain that extends from the north of the Lower Main to the Vogelsberg and Taunus.† According to Caesar, that region was inhabited at the time of the Conquest of Gaul by Germanic tribes. Now, archaeology shows that there was an uninterrupted occupation of the region, up to the beginning of the first century, by descendants of the Celts, who were certainly installed there since the fourth century B.C. It is only with difficulty that there can be found, in Caesarian times, slight traces of Germanic infiltration. Had the region perhaps really been conquered by the Germans a little earlier than Caesar's campaigns? It is not impossible that the Celtic aristocracy had given way to a ruling class of Germans. Archaeology shows, however, that the majority of the population remained unchanged. It was not until the second century A.D. that the region became truly Germanized.

The information furnished by ethnology also enjoins a cautious approach. Among primitive peoples there is often observed an extraordinary breaking down of language. At the time of the discovery of Australia, the total indigenous population was not more than 200,000, but they spoke more than 500 languages and different dialects. Among the American Indians, several thousands of different dialects have been noted, belonging to more than 120 linguistic families. In California alone, there were spoken at the time of the Conquest 31 different

* U. Kahrsstedt, 'Methodisches zur Geschichte des Mittel- und Niederrheins zwischen Caesar und Vespasian', in *Bonner Jahrbücher* (1950), 150, pp. 63 ff.

† H. Schönberger, 'Die Spätlatènezeit in der Wetterau', in *Saalb. Jahrbuch* (1952), XI, pp. 21 ff.

languages, divided up into 135 dialects. It has been noticed that tribes with more or less identical cultures speak totally different languages; *per contra* some languages, such as *hoka*, were spoken by peoples with very different cultures and belonging to different physical types. These few examples, chosen at random, show at what point caution should intervene before any identification is made between a culture area and a linguistic territory. Above all, let it be remembered that a people may change their language without any modification of their material culture. Between the time of the Conquest of Normandy by the Vikings of Rollo, at the beginning of the tenth century, and the conquest of England by William the Conqueror in 1066, there was an interval of less than a hundred years. From the archaeological point of view, there was in the Norman culture no interruption between these two dates, but only a gradual and normal evolution. If archaeological sources only were at our disposal none of us would have any suspicion that, between the two dates, the Norman aristocracy had abandoned their own language and had so far assimilated the French language that it was this latter tongue that they introduced into England, imposing it upon the English as the language of administration for several centuries.

Since we see how we deceive ourselves by seeking an answer to linguistic problems among archaeological data for the periods for which we have relatively rich linguistic evidence, we must have the gravest doubts as to whether it will ever be possible to find by archaeological means the answers to questions even more difficult; those of prehistoric linguistics, of which the foremost is that of the origin of Indo-European speakers and of their distribution from Scandinavia to India. Is the Indo-European language that which was spoken by the Palaeolithic peoples of the Eastern Gravettian, and is its distribution the work of peasants of the spiral-meander ware civilization or of warriors of the corded-ware people? We shall probably never know.* As for the correlation of peoples speaking Indo-European languages with a hypothetic 'Aryan race', we have already seen earlier that the anthropologists disown any connection between race and language.†

* In the realm of classical antiquity, it is a quite disheartening task to try to unravel by archaeological means the times of successive waves of Indo-European invaders (Greeks) in Greece and the Aegean world. There are far too many unknown elements among even the linguistic data, and it is not at all certain that simple dialect differences necessarily find an explanation in successive invasions, nor in distinctions in the cultural sequence.

† All these reservations are not intended to belittle the value of research into linguistics, toponymy, anthroponomy, etc., towards a knowledge of the languages spoken during prehistoric times and their evolution. They are merely intended to urge caution upon linguists who would make use of archaeological data for the solution of problems proper to their own discipline, and upon archaeologists who would attempt to use linguistics to resolve strictly archaeological problems.

It remains to discuss the possibility of correlation between a cultural area and an ethnic unity, with the territory, that is, occupied by a tribe or group of tribes. Let us see if we can be more positive about this. For the oldest periods in prehistory, when the population was still sparse and when there were few contacts or commercial relations between the different human communities, there is a strong temptation to consider as a cultural province, especially if it possesses clearly marked characteristics, the territory occupied by one and the same community. This very vague word is used intentionally. Archaeology hardly permits of anything more precise. The technological and economic unity shown by each culture, the uniform nature of its burial customs, etc., indicate that the people who belonged to that culture had identical social traditions and reacted in the same way to an identical environment. Although it is evident that such ties did unite the various villages of the spiral-meander ware people (the Belgian 'Omalian') of Hesbaye, Dutch Limburg, of the Rhineland, Central Germany, Alsace, and Bohemia, it is another, and more difficult matter to know whether there were between these villages bonds of another kind: linguistic or political. Again we shall probably never know the answer.

With regard to more recent periods, the Metal Ages in particular, the problem becomes still more complicated. The population had increased, there were contacts and continual trade between the various peoples, and commerce played an ever-increasing part in the cultural and economic life of the time. In the various civilizations are found, therefore, an ever-growing number of elements common to several cultures which may be explained either by commercial relations, or by the diffusion of a culture which has reached a higher stage of development than its neighbours. Thus greater importance must be attached, in defining a culture and delimiting its distribution area, to the elements which seem the least subject to outside influences and in which are best preserved the traditional genius of the primitive people: on the one hand their pottery, on the other their religious customs, particularly the burial of their dead. But even these elements are less certain than is generally admitted. Prehistory, in fact, has had its religious proselytes, almost as much as the historic centuries: the spread of megalithic tombs is ample proof of this. Many people have, moreover, experienced several different burial customs at the same time: the Celts of Bohemia in the La Tène period practised cremation and inhumation simultaneously. The same phenomenon occurred at Rome where—in spite of written sources—historians have not reached an agreed explanation of the co-existence of these two rites.

Pottery has been accorded a dominant role in the establishment of different cultures, for its form and decoration, susceptible to infinite

variation, often display in the same human groups an astonishing unity. Prehistoric pottery, badly fired and fragile, is just that kind of product least likely to be spread by commercial routes:* its manufacture locally of an essentially traditional nature, protects it from foreign influences, although cases are known where the potter has tried to copy in clay metal vases which were imported. Nevertheless, if pottery-making among prehistoric peoples, as among primitive peoples of our own times, was, as is generally admitted, the work of women, one can no longer, in many cases, accord to pottery the character of an ethnic criterion bestowed upon it by many prehistorians. How many invasions, in fact, have been the work of bands of warriors who have exterminated the male element of the vanquished, but appropriated their women?† These women did not modify the form and decoration of the pottery that they made for their new masters.

What, finally, is one to think about the cultural influence of certain comparatively advanced civilizations? It is extremely difficult to define clearly on the map the distribution area of the culture known as Unetice (Aunjetitz) at the beginning of the Bronze Age, or of that of La Tène in the Late Iron Age (Second Iron Age), because the influence of these civilizations has so spread over the neighbouring territories that it has become well nigh impossible to distinguish the limits between the territories belonging to these or to neighbouring cultures. They were separated, in fact, by large transition zones where the passage from one cultural sphere to another occurred imperceptibly. One can very probably recognize, in the heart of these culture areas with a large dispersal, the influence of a well-defined people; but it is not possible, in the same case, to correlate the territory of these people with the dispersal of the culture, for the latter will certainly be the more widespread of the two.

On the other hand, it is important not to forget the profound influence that natural environment has exerted upon the cultures of early peoples. In Denmark the culture of Mesolithic peoples settled upon the banks of lakes and rivers, and along the coast, is totally different from that of people who lived in the forests. It seems likely, however, that the two groups spring from a common ancestry, and it is by no means improbable that various bonds continued to unite them (language, religion?): it was their different response to their environment that gave rise to differences in culture. Differences in social structure have been influential, too, in causing major cultural divergences. In

* Cases are known, however, where prehistoric pottery has been transported considerable distances from its place of manufacture (cf. *infra*, p. 109).

† Attested custom among a number of primitive peoples of today. The Patagonians, for example, exterminate the males of a conquered people and reduce the women and children to the status of slaves.

Mesopotamia, during the Bronze Age, the differences observed between the remains of urban peoples and those of rural populations are very marked, although, as written sources affirm, ethnic and political bonds united the towns and the flat surrounding country.

Even for historical periods, it is by no means an easy task to attribute an ethnic significance to the greater number of archaeological finds. Just think, for example, how extremely hard it is to distinguish among the late fourth-century tombs in Belgium, those of the Gallo-Roman from those of German *foederati* or *coloni*. Up to the present no absolute conclusion has been reached. The same thing is met with in dealing with Merovingian tombs; twenty years ago one still spoke of Frankish cemeteries, and attributed them to the Germanic conquerors. Since then it has been proved that the oldest of these cemeteries dated only from the end of the fifth century and that the majority were sixth and seventh century. The culture to which they belong is essentially a synthetic civilization containing a number of Gallo-Roman elements (glass and pottery technique, etc.), resurgent Celtic elements (notably in the decoration of pottery), elements borrowed from the Russian steppe peoples (jewellery and ornamentation) and, lastly, some Germanic elements. Nothing up to the present enables a clear distinction to be made between the tombs belonging to the descendants of Gallo-Roman peoples and those of the Franks. There is no longer any clear difference between the tombs situated to the north or to the south of the linguistic frontier, then in process of formation.

To summarize. Archaeology bears witness to the 'culture' (the definite meaning of this word used in its archaeological sense will be analysed in the following chapter) of the inhabitants of a region belonging to a particular period, and informs us about the evolution of that civilization. There is nothing, on the contrary, that permits us to bestow upon these cultures and their distribution any racial or linguistic significance. The study of prehistoric races lies in the realm of anthropology, that of the origin and development of languages in the linguistic domain. The results obtained by these two disciplines do not necessarily accord with archaeological results, and, in practice, hardly ever do. It is in no way paradoxical to affirm that this is a perfectly normal state of affairs. Finally, concerning the ethnic interpretation of archaeological phenomena, even if it is possible in certain well-defined cases (I shall return later to the problem of immigrations and invasions), extreme caution in this matter is *de rigueur*, for the foundations on which such interpretations are based are often suspect.

CHAPTER VI

Problems of Archaeological Interpretation II: Possibilities

THE RESERVATIONS EXPRESSED in the preceding chapter concerning certain aspects of the interpretation of archaeological data in no way diminish the importance of this discipline as an auxiliary science to history and as a source of information for the most ancient past of man and the progress of the human race during the long millennia of its existence. The primary goal of archaeology is the provision of as complete a picture as is possible for the periods for which the written sources are non-existent or relatively meagre. More than once in this book attention has been drawn to the insufficiencies of purely archaeological evidence when there is no written source to help interpret the information derived from excavation. In addition it must be admitted that archaeology can provide us with only very limited information about peoples of the far distant past. At first sight it might be thought that archaeology is capable of furnishing us with data about only the purely material culture of our ancestors, about their tools and their equipment; although even these data are circumscribed and falsified by the action of nature. Has not a great part of this material culture disappeared for evermore? Of a great deal of organic matter there is nothing left at all. Other remains are found in such a state of decay that their interpretation is a more or less impossible task. But in spite of all these obstacles, archaeology often enables reconstruction of the past to be made on a wider plane than would at first sight seem possible. The very careful analysis of the remains of the past, however humble they may be, not infrequently conjures up, after patient and ingenious endeavour, a fairly complete picture of prehistoric cultures, from which even certain aspects of the spiritual life are not entirely absent.*

* It follows from this that for the periods for which we possess written sources, archaeology ought not to neglect any information which they can provide: these facts serve to fill, in agreeable fashion, the lacunae in the archaeological sources and greatly enhance the possibilities of interpretation. That is why in order best to appraise the value of archaeological sources by themselves, in the reconstruction of the past, this chapter has been limited to the problems of interpretation of the prehistoric period for which the archaeologist is unable to draw upon any written sources.

To achieve these ends, the archaeologist often has to call upon the services—as in the first place he had to do in dealing with reconnaissance, excavation, and dating problems—of a series of auxiliary disciplines. Nevertheless, I want to draw particular attention to certain of these sciences, especially ethnology and folklore, to put my readers on their guard against the dangers of abusing the possibilities of these disciplines, and to point out the limitations of the assistance that they can render to archaeology.

When one has learned to know them, many primitive peoples of today have not in some ways progressed further, technologically, than prehistoric peoples; the Australian aborigines are still living in the Stone Age, and some American or African tribes are still living in the Bronze or Early Iron Ages.

That ethnology, in this respect, has done very valuable service is incontestable, and no one would wish to belittle it. But, often the most elementary caution has been thrown to the winds. Technological similarity does not necessarily imply identical social or religious institutions. In fact, it is not possible to draw parallels between prehistoric and primitive peoples unless they have reached the same technological stage and have, moreover, lived under identical conditions. Thus useful parallels can be drawn between the Eskimos living on the borders of the ice cap, and the Magdalenian people of the Upper Palaeolithic. Even so, it is dangerous to push this comparison too far, for there is nothing to support the assertion that the two peoples had the same mental powers, the same social institutions, or the same beliefs. Further, it is patently wrong to attempt to explain certain aspects of the culture of the Swiss lake-dwellers by comparing them with the cultures of the indigenes of New Guinea, simply because the latter also built lake-dwellings. Not only did the two communities live in a totally different environment, but the only characteristic common to both cultures was a response to entirely different needs: the Neolithic inhabitants of Switzerland, in ranging themselves around a belt of water or marshland, did so primarily as a defensive measure against marauding enemy tribes, while the primitive inhabitants of the Malay archipelago and of New Guinea erected their buildings upon piles to protect them against the tidal bores and tornadoes which are such a constant feature of those parts.*

* The same tendency is encountered elsewhere, in the realm of history *sensu stricto*: starting from the premise—probably false and in all cases incapable of proof—that 'primitive' mind is the same at every age and in all latitudes, some scholars such as H. J. Rose, H. Wagenvoort, and G. Dumézil have attempted to interpret the primitive institutions of Indo-European peoples by recourse to concepts borrowed from the Polynesians or the Red Indians, such as 'mana', 'erenda', 'taboo', etc.

Concerning folklore, it is beyond doubt that certain customs of the present day, motifs and traditions in folk art, details of dress, beliefs, etc., have their origins in the distant past, probably the prehistoric past. It is, however, very unwise to try to base reconstructions of certain aspects of prehistoric life upon the evidence of folklore,* for folk customs have never remained static, and they have in the course of the centuries undergone such modifications that it is well-nigh impossible to recreate them in their original form. Although it is true, for example, that Christianity has taken over many pagan customs and festivals and 'Christianized' them, it is often extremely difficult to establish what was the purely pagan manifestation of these beliefs, legends, and customs.

The greatest caution, then, is obligatory whenever ethnology or folklore is called upon in the interpretation of archaeological data.†

NATURAL ENVIRONMENT

The more primitive human communities are, the more their way of life is influenced by their natural environment. Every culture is to a great extent the result of the adaptation of a group of people to the environment in which it functions; a group for its part will influence its natural environment, and such influence will increase in proportion to its emergence from the primitive state. A community of hunters will play a considerable role in the biological equilibrium of the region which makes up its hunting area, but its influence will in no way be comparable to that of a community of agricultural and pastoral people whose occupations thoroughly change even the appearance of the regions where they are established. Every modification of their natural environment will tend to upset the equilibrium established between human communities and their environment: from this conflict will be born a fresh adaptation of the community to its modified environment and the birth of a new culture. Thus, the retreat of the ice-sheets brought an end to the Magdalenian culture of reindeer hunters, and caused its gradual transformation into the Azilian culture. The contrasts between the Maglemosian civilization and that of its contemporary, the Forest-People of Northern Europe, in the Mesolithic, are due to the fact that representatives of the Maglemosian were established along waterways and coasts, while the latter lived, as their name implies,

* A tendency pushed to the extreme in A. Varagnac's theory of 'archaeo-civilization'.

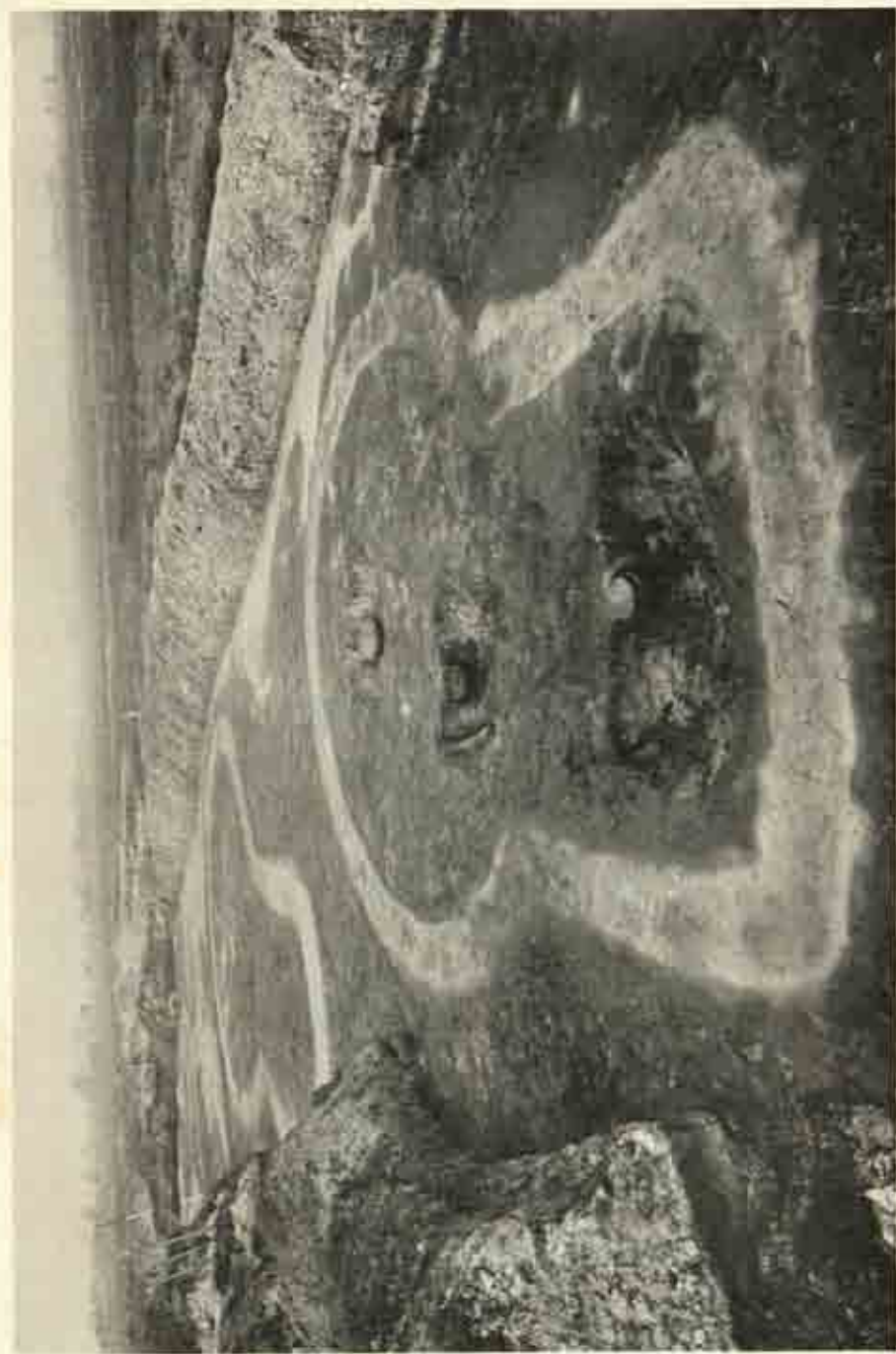
† See the admirable article by Grahame Clark, 'Folk-culture and the Study of European Prehistory' in *Aspects of Archaeology in Britain and Beyond. Essays presented to O. G. S. Crawford* (London, 1951), pp. 49-65.

in the forests. The appearance of the first axes (of the Lynghby type in the Mesolithic) was the result of the replacement of the glacial tundra vegetation by the forests of the postglacial epoch. Although the discovery of the wheel and the use of the chariot took place more than a thousand years earlier in the Near East than in Egypt, this is not an indication that the Near East had reached a more advanced stage of civilization than the Nile Valley, but is explained by the fact that in Egypt, the Nile, an incomparable means of communication, was never more than a few miles away from any village and the boat was the most obvious form of transport; while in the Syrian steppe lands, devoid of a waterway of any importance, the chariot answered an imperative need. As V. G. Childe has justly observed,* the state of progress of a culture cannot be measured in an abstract way according to absolute values, but rather by its degree of adaptation to its natural environment and by the realization of the necessities which that environment imposes upon it. A reindeer hunter has no use for a motor-car that will go at sixty miles an hour or more, and Roman roads make no sense except against the 'world' economic background of the Roman Empire.

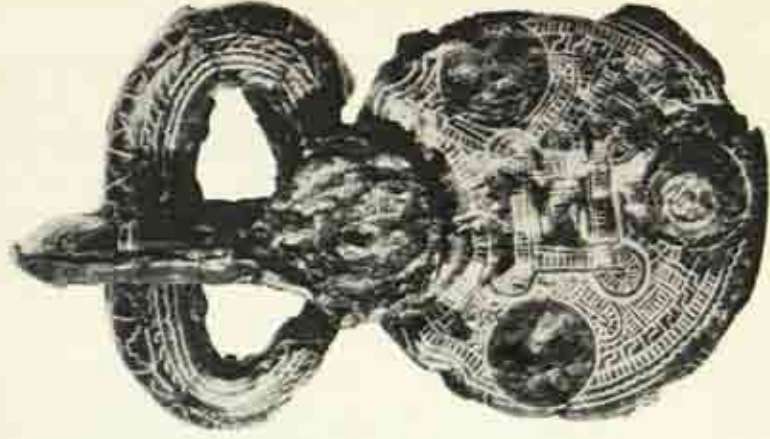
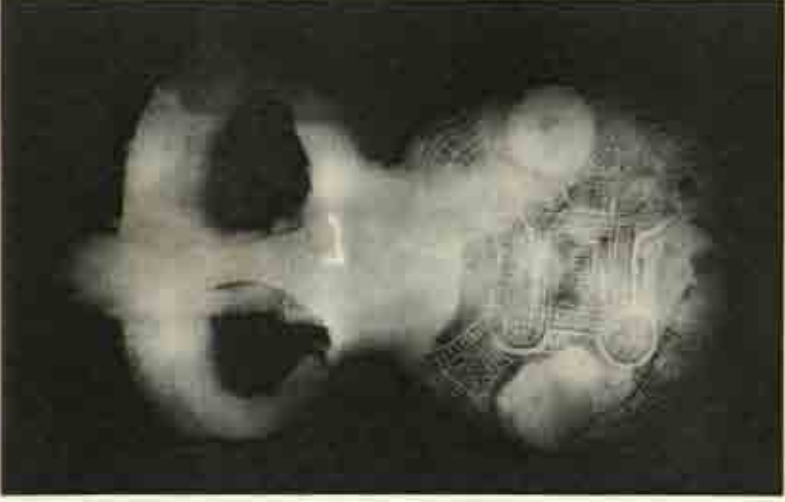
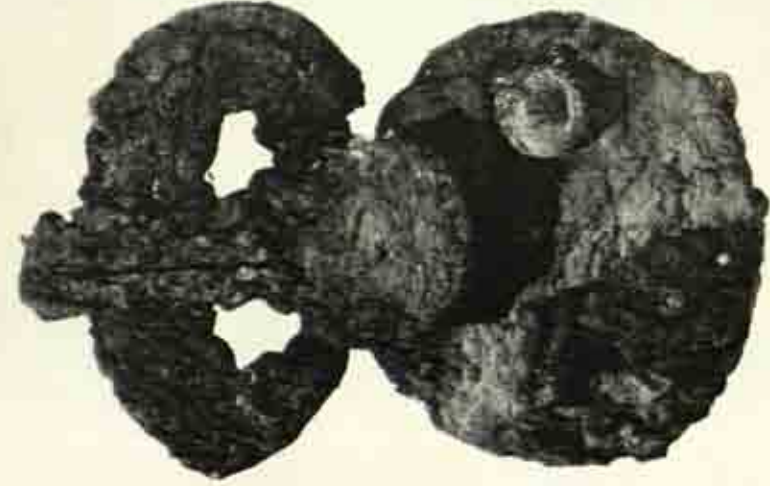
Thus, to be able to make objective judgements of the progress achieved by mankind, and at the same time to interpret correctly the archaeological data, the definition of the natural environment where the different cultures developed is of primary importance: geological and climatological circumstances, flora, fauna, etc. In a previous chapter, auxiliary disciplines to which application may be made for the reconstruction of environment have already been mentioned—geology, palaeontology, pollen analysis, etc.—and their importance for the establishment of chronology was stressed. It follows that their role is no less important when it is a matter of establishing an exact knowledge of the environment in which man lived, and of estimating the reciprocal actions of the one upon the other. A few examples will suffice to illustrate this.

It is a noticeable fact that the distribution of peasant communities of the 'Danubian' (spiral-meander ware) culture and cultures derived from it coincides exactly with the occurrence of the fertile loess lands which stretch from Hesbaye to the Ukraine: the very primitive methods of clearing and exploiting the land employed by these communities did not make it possible for them to tackle less fertile or heavier soils. By contrast, at the same time, the descendants of the Tardenoisians of the Mesolithic supported themselves on sandy soils covered sparsely with brushwood, and continued to live there by hunting the small game with which it abounded. They had scarcely any contact with the agriculturists living sometimes close to their hunting grounds, and they

* V. Gordon Childe, *Social Evolution* (London, 1951), pp. 14 ff.



xvii. Urn-field at Wessinghuizen, Netherlands



xviii. A belt-buckle from the Merovingian cemetery of Luttomel, Belgium

The buckle as it was found

An X-ray photograph

After laboratory treatment

maintained their traditional way of life well into the Bronze Age. In this way is explained how the nature of the soil can determine why certain areas experienced a high degree of civilization much sooner than other regions however close to them geographically. The presence or absence of certain raw materials may also account for the progress or stagnation of certain cultures. The presence of rich deposits of copper was the direct cause of the rapid development of the culture of Almeria, in the south-east of Spain: these mineral deposits very quickly attracted prospectors and traders from the Aegean, who have left a deep mark upon the culture. The great upsurge of Denmark in the Bronze Age would seem to be due, first and foremost, to the presence of amber on its coasts. On the other hand, if the Low Countries were at the same time in a backward state, this may be attributed to the total absence of raw materials in demand at that time: copper, tin, gold, and amber. For this reason the Low Countries remained untouched by any of the great commercial routeways which crossed Europe, and remained aloof from the chief cultural currents of the times.

FOOD

The quest for food was certainly one of the predominating—if not the predominant—occupations of primitive man. At the risk of being accused of rigid determinism, it must be stressed that the quest for food has been the main motivating factor conditioning a great number of other culture traits, and, in the last resort, the whole structure of society. Thus, when studying a culture, it is a *sine qua non* of any study of its remains to discover in what way the people obtained their food.

Palaeolithic and Mesolithic peoples had not yet reached the stage of food-producers. They lived exclusively by hunting, fishing, and gathering wild fruits and plants. The detailed examination of animal bones found in the archaeological levels of caves and rock shelters is of importance, not only in forming a picture of the contemporary fauna of the culture under review, but also in establishing what animals were sought after for food. Further information, often quite precise, is also forthcoming from the analysis of certain prehistoric customs (for example their butchering methods, and their way of extracting the marrow) and even of some forms of social organization. Big-game hunting, for mammoth for example, presupposes the existence of a certain amount of social organization, however rudimentary: in fact, such hunting expeditions, even if carried out with the aid of traps, could be undertaken only by a fairly sizable group of hunters, considerably larger than could be provided by one family, and one is given

an imperfect glimpse of the beginnings of a larger social organization (on which is bestowed the intentionally vague name of 'clan').

The transition to the Neolithic epoch was marked by a full-scale revolution: from that moment man had learned to produce his own food by applying himself to agriculture and pastoralism. Hunting and fishing peoples, even in exceptionally favourable cases where they had discovered the art of preservation by salting part of the product of the hunt or catch, were never certain of the morrow, and lived from day to day in unceasing pursuit of game. Agriculturists and pastoralists were no longer tormented by this constant preoccupation: harvests could be conserved for a very long time, and the keeping of beasts made a large contribution to the diet. A bad harvest, or an outbreak of murrain, would inevitably still give rise to famine, but the situation would have been in no way comparable with that of peoples who depended exclusively upon hunting or fishing.

The introduction of crops and domesticated animals had a widespread effect upon the social structure. Agricultural communities obviously left nomadism to the hunters, and established permanent settlements: villages where a social life sprang up became progressively more developed; the population increased considerably; new technological processes were evolved in response to new needs. Finally, with an assured food supply, man discovered the leisure to occupy himself with things other than his immediate needs; philosophical speculation, soon to be scientific, came to the fore and led mankind on towards our present state of civilization at an ever-increasing pace.

It is evident that the agricultural methods of the first peasant communities were still of a very primitive kind; hunting did not cease overnight to make an appreciable contribution to the food supply. It has been estimated, for example, that in the Swiss Neolithic lake villages about 50 per cent of the animal bones found among the kitchen middens were those of wild animals. However, pastoral and agricultural methods gradually improved, and with this improvement the role of the hunter in the society proportionately diminished; in the village of Glastonbury (in England) which is of Early Iron Age date, in a count of animal bones, 3,355 were found to be of domestic animals against only 71 of wild animals.*

One would like also to know what kinds of cereals were cultivated by the different prehistoric peoples. It is only in quite exceptional circumstances that the grain itself has been preserved, but it happens not infrequently that on the outer side of a piece of pottery is found the impression of a grain of wheat on which the vessel has stood by pure chance before it was fired. In Denmark statistics have been compiled

* Cf. Grahame Clark, *Archaeology and Society* (London, 1939), p. 154.

of these negative impressions and some remarkable results have emerged. For the Neolithic and Eneolithic, about 400 impressions of this kind are known: 87% are made by grains of wheat, and the remaining 13% by barley. For the Iron Age (which, in Denmark, comprises roughly 400 B.C. to A.D. 500) more than 500 imprints have been found: 80% barley, 8% oats, 8% rye, and only 3% wheat. The very clear contrast between these two periods is due principally to climatic changes (the maximum heat occurred in the Bronze Age, and from that time the climate gradually cooled).

The means adopted by prehistoric man to feed himself is also reflected in his weapons and tools: among hunting peoples the proportion of weapons per head of population will obviously be higher than among an agricultural people; the presence of harpoons and of fish-hooks points to the importance of fishing in the life of the people; lastly, among the remains of agricultural peoples are found hoes, ploughshares, and sickles. Frequently it is only the stone and metal components of these implements that have survived, while the wooden parts have vanished. However, some finds in the lake villages of Switzerland and in the peat bogs of North-Western Europe, and reproductions of ploughs on rock-engravings, fill in the gaps in our knowledge of this subject, while ethnology also provides useful comparative information: primitive peoples of today, quite often, are equipped with tools which approximate very closely to those used by prehistoric man. Some exhaustive studies* of these agricultural implements have made it possible to retrace the progress of agriculture through the ages. The Neolithic peasants used only the hoe in working the soil and thus made use of the superficial layer of soil only. As they knew nothing of the rotation of crops, their fields quickly became barren, which forced them after a few years to find fresh ground for clearance; they thus lived in what might be called a semi-nomadic state, which explains the widespread distribution of their cultures.

The Bronze Age heralded the scratch-plough, a very simple and primitive form of which many types are known and which is still in use today in several Mediterranean regions. Propelled by men or by beasts of burden, it opened up shallow furrows in light soils, but neither turned over nor buried the clods.

The plough proper with wheels, equipped with a plough-share and a mould-board, and drawn by four or eight oxen, was an innovation of the Iron Age. This cut deep furrows and turned over the heaviest soils, thus rendering productive hitherto unclearable land. It seems to have been invented in Western Europe, either by the Germans or the Belgae;

* Particularly the work of P. V. Glob on the plough and its evolution: *Ard og Plov i Nordens Oldtid* (*Ard and Plough in Prehistoric Scandinavia*) (Aarhus, 1951).

the latter brought it with them to Great Britain at the beginning of the first century B.C. The invention of this new kind of plough seems to have had important social consequences: agricultural production was clearly stepped up, giving rise in turn to an increase in population.

Among barbarian peoples, every increase in the population was followed by territorial expansion. Some scholars, of whom V. Gordon Childe is one, have no hesitation in attributing the expansion of Germanic peoples since the middle of the second century A.C., checked temporarily by the Roman conquest, directly to the replacement of the scratch-plough by the plough proper.*

In the course of the last few years, reconnaissance by air-photography has brought to light many traces of prehistoric fields, separated by irrigation channels or by small banks of earth (the 'Celtic field system' in English terminology). There is no doubt that the systematic study of these vestiges, which is only in an early stage, will make an important contribution to our knowledge of the agricultural economy of the protohistoric peasant.

Lastly, we come to the cooking processes of these foodstuffs, and on these we are very badly informed. Nevertheless, in certain exceptional circumstances, it has been possible to discover some cooking recipes of past ages. Earlier in this book, the contents of the stomach of Tollund Man were mentioned. In the Swiss lake villages, remains of bread were found in which the dough had been kneaded with honey. Finally, in the famous Danish Bronze Age grave of Stortiden there was discovered in the oak-tree coffin a small cask of birch-bark, which had contained a kind of wine with a basis of bay and an admixture of honey and myrtle. More frequent recourse to biochemical analysis for the examination of certain remains would give us still more information about prehistoric cooking.

This section on food must include a brief word on cannibalism. Among the remains of different cultures, in Palaeolithic, Neolithic, and the Metal Ages, human bones have been found for which the only explanation can be the practice of cannibalism: the long bones, for example, have been carefully split lengthwise with a sharp instrument, with the clear object of extracting the marrow. It may well be that among the first human beings cannibalism was merely one particular aspect of the quest for food; in more advanced communities, on the other hand, anthropophagy probably had a magical or ritual significance of which the inner meaning escapes us.

* V. Gordon Childe, *What Happened in History* (Harmondsworth, 1942), pp. 216 ff.

HOUSES AND SETTLEMENT SITES

Another branch of archaeological interpretation deals with the dwellings and settlement patterns of the past. Such remains shed light not only upon the way of life of our ancestors, but also upon their social organization and upon the density of population (cf. *infra*).

For Palaeolithic times our knowledge is mainly derived from habitation sites at the entrances of caves and rock shelters. It would be wrong, however, to assume that this kind of habitation site was characteristic of that period only: caves were inhabited during several other epochs, and, moreover, it would appear that Palaeolithic Man occupied them only during the winter months; in summer, these hunting peoples would follow game in its seasonal migrations, and lived very probably in tents made of skin (reindeer?). In Germany, A. Rust has recently found remains of tents of this type: in the middle of ground strewn with all kinds of débris a circle of large stones, which served to secure the base of the tent and prevent the wind from blowing away the flimsy structure, was still in position. Traces in the ground indicated places where the ends of large branches had been embedded to support the skins. On the steppes of South Russia, traces of Palaeolithic dwellings in a more advanced stage have been found. These are huts half sunk in the ground and covered with a roof of branches or skins (Gagarino, Timonovka, Kostienki).

From the Neolithic onwards, in the majority of cultures, dwellings consisted of huts of stone, wood, or wattle-and-daub, round, oval, or rectangular in shape. Usually only slight traces remain in the form of marks in the ground (post-holes, discolorations clearly distinguishable from the surrounding soil, etc.). Only the most patient and careful excavation can reveal and record them; so that it is scarcely surprising that good results have been forthcoming for only a few decades. Previously, archaeologists were usually content to deal with the stone and pottery remains from the *fonds de cabanes* without even attempting to recover the plan. Stress has already been laid in this volume upon the immense possibilities of modern excavation technique. By detailed examination of the slightest traces, it is often possible to recover the plan of such dwellings, and even to reconstruct the whole; the positions of the post-holes are a guide not only to the exterior shape of the building, but also the positioning of the transverse walls, and provide useful clues to the shape of the roof. Very often fragments of clay survive because they have been toughened by fire, and still retain the imprint of the wattling which served as walls.

The cinerary urns in the shape of houses found in Germany and

Italy, dating from the Early Iron Age, also provide useful data for the reconstruction of dwellings in use at the same time in these regions.

In some cases, lucky excavation has come upon whole villages with their dwelling houses, farms, rubbish-pits, and the fortifications which sometimes encircled them for defence against robbers or the attacks of hostile neighbours. The excavation of the Köln-Lindenthal complex (spiral-meander ware culture) is a typical example. Remember, too, the lakeside villages of the Alps to which reference has several times been made. In certain regions, where wood was scarce, buildings from the Neolithic onwards were of dry masonry, made by piling large flat stones on top of each other: at Skara Brae, in the Orkneys, V. Gordon Childe excavated a small village composed of half a dozen dwellings each of one single room; not only were the walls built of stone, but the scarcity of timber—there are hardly any trees in the whole island—resulted in the beds and cupboards also being built of flat stones. Each room probably housed one family; each contained two large beds, one for men and the other for women (if one may draw upon the parallel of a similar custom which still obtains today in the Hebrides). Covered passages connected the different houses, which were probably united under a single roof. Tools and rubbish show that the inhabitants lived a pastoral life, but were ignorant of agriculture and did no fishing in spite of their proximity to the sea. The excavation of such a site obviously gives us a very firm picture of the daily life of its people, and of their customs and social organization.

In excavating habitation sites, an attempt should always be made to distinguish those which have been dwelling houses proper from more specialized buildings such as farms and workshops. When a whole village is dug, it is always of interest to discover whether some buildings are larger than others and might have served as a 'palace' for a chief, or if some buildings were used as temples or centres of a cult. At Köln-Lindenthal, for example, no building appears to have had any special use as the home of a chief or a god. Elsewhere, as in some of the Bronze Age villages in Germany, that of Buch (Brandenburg) for example, there is certainly one building which is more extensive and grand than the others (chief's house, council chamber for heads of families?). Differences such as these point to quite different social organizations.

I shall not enlarge here upon the houses and habitation sites of classical times. It would take us too far to analyse all the data that systematic excavations of Mesopotamian, Greek, Hellenistic, and Roman towns have provided upon the way of life and social organization of their inhabitants, and upon the economic, administrative, religious, and military roles in these urban centres. A single example is sufficient to

show the interest inherent in some kinds of dwellings belonging to these cultures, from an historical and not only from an archaeological point of view. The Gallo-Roman 'villas' in Belgium have become objects of study, well-excavated but with certain serious weaknesses. Thus, under the very vague term 'villa' have been grouped together all buildings of durable material situated away from the main centres of population. Now the economic role of these 'villas' differed greatly. Among them were very small ones which probably belonged to independent smallholders; others were enormous (the Basse-Wavre villa has more than fifty rooms on the ground floor) and in all probability were the centres of a great *fundus*, worked by a large slave-labour force. Other 'villas', again, were probably industrial establishments. Finally, there are also villas in the modern sense of the word, country houses belonging to well-off city dwellers. By merging all these different categories together indistinguishably, it is inevitable that false conclusions will be reached; and that is what has happened. The distribution of these villas poses several problems of equal interest: the great majority of them are situated, in fact, to the south of the present-day linguistic frontier. From this has been inferred a clearly marked difference in the density of population to the north and south of this line, and some scholars have even gone so far as to deduce from this fact a very ancient origin for the modern linguistic frontier which ought to be paralleled in this difference of population density. But another hypothesis, not incompatible with the first, may be advanced. Was there not a difference in the mode of construction of these houses in the two regions? The villas are found chiefly in the fertile zones, where the peasants were then richer and had the material resources to build their houses in 'Roman' fashion, while in the less fertile zones (such as the Flanders of those times), the people remained faithful to their traditional wooden and wattle-and-daub huts, of which, up to the present, hardly a trace has been found. That poverty of soil would have been the cause of a noticeable difference in the population density. A similar complexity of problem is evident elsewhere, in the study of habitats in other countries and for other periods.

MATERIAL EQUIPMENT

TOOLS, ARMS, DRESS, ORNAMENT, ETC.

It has been mentioned several times already that in normal circumstances our information about the tools, weapons, dress, etc., of our early ancestors is very incomplete, since all the objects or parts of objects made of wood, textile, or other organic matter have usually disappeared, and only stone, bone, and metal equipment have reached

us. Some exceptional finds, however, serve partly to fill the lacuna in our evidence. This aspect has already been dealt with in an earlier chapter. One should be on one's guard, however, against using the information furnished by finds in lakes, peat-bogs, or oak-tree coffins for the interpretation or reconstruction of objects belonging to totally different cultures. In the same way reconstructions based upon analogies with the material equipment of primitive tribes of today do not inspire absolute confidence, however tempting or probable some of them seem to be. In fact, let it be repeated, it is only when contemporary primitive peoples live in a natural environment almost identical with that of the prehistoric peoples, and have attained a very similar degree of civilization, that comparisons are justified, and that recourse to ethnology can yield fairly reliable results.

Obviously attempts will be made to draw upon all information from all other sources at our disposal. Not infrequently the archaeologist, in the manner of the sleuths so dear to the admirers of detective fiction, has to make use of the smallest clue to piece together the jig-saw of the past. The presence of arrow-heads in the armament of a particular culture presupposes the use of the bow; spindle-whorls or loom-weights permit one to deduce the making of textiles, even if no part of them is preserved. If the representatives of a particular culture used fibulae, while those of a neighbouring culture used buttons, it may be justly assumed that different forms of dress were worn in the two different cultural provinces. Rock engravings, statuettes, designs on pottery are alike all valuable additions to the evidence of the material equipment of the people who made them.

Lastly, a few remarks to draw attention to the danger of faulty interpretation. It has already been pointed out how important it is to speak of an archaeological 'culture' only when sufficiently varied remains exist of the inhabitants of a particular region for a particular epoch. When we are in possession of information about the habitation-sites, houses, material equipment, and burial places of the representatives of a particular culture, it is relatively easy to form a fairly concrete picture of the daily life of these peoples, of their customs, and of their degree of civilization. Other so-called 'cultures', on the other hand, are known to us from only one aspect, which is inevitably a one-sided view; in the case of many communities the only remains that reach us are their tombs. It is, moreover, a fact that usually only the tombs of rich people contain grave goods of any importance; from the tombs of poor people very few objects appear, or often none at all. Our knowledge of the material equipment and degree of civilization of these people is therefore incomplete because only one kind of archaeological remains (grave goods) survive and by these only one social class (the

rich) is represented. It would be wrong to conclude from the exceptionally rich grave goods from the Bronze Age in Denmark that the entire population of that region was enjoying a state of general prosperity, and that beautifully wrought weapons, rich ornaments, and luxurious clothes were part of the equipment of the ordinary man. One can go no further than to assert that the leisured classes at this time seemed to be fairly numerous.

TECHNOLOGICAL PROCESSES OF PREHISTORIC AND EARLY HISTORIC TIMES

A close study of the remains of man's industrial activity not only informs us about the material equipment of the different cultures, but also makes it possible to reconstruct the technological processes employed in the making of this equipment. This is an occasion when the archaeologist has recourse at once to the laboratory, and listens to the scientific experts, leaving himself free to draw conclusions of a general kind from the results of the investigation. There is no space here, in a short popular book, to enter into the detail of these studies, and it will be enough to notice the principal problems and the most remarkable results.

Scarcely any questions arise with objects worked in flint, stone, deer or reindeer antler, bone, or ivory. They need skill of hand, and the results are often very fine (such as the extremely elegant Solutrean spearheads or the superb flint daggers of the Danish Eneolithic). By ethnographical comparisons they provide useful information upon the manner in which the prehistoric craftsmen got their results. Of greater interest is the problem of how these prehistoric peoples procured the enormous quantities of flint which they used. The excavations of Spiennes in Belgium, and of Grimes Graves and other sites in England, have brought to light the bold mining techniques of the Neolithic peoples. We may remember how at Spiennes, in order to extract the flint nodules from the chalk beds, the miners dug, with deer or flint picks, narrow chimneys scarcely a metre broad and often 10 metres deep, at the bottom of which radiated long and very low horizontal galleries where it was possible for a miner to work only in a crouched position. To guard against the danger of collapse, piles were driven into the chalky mass. The enormous quantities of picks recovered from these galleries and the impressive masses of flint chippings which still litter the surface of the 'Camp-à-Cayaux' of Spiennes are sufficient indication of the importance of this mining centre, one of the oldest known in the world. The existence of such a specialized centre poses important problems of social and economic organization, which are still far from being solved.

Although the working of stone, bone, and wood did not involve any process of change in the nature of the raw material, the same does not apply in metallurgy, textiles, pottery, and glass. Here the raw materials—crude metals, animal fibres, clay, and sand—undergo such changes in the course of fabrication that they are hardly recognizable in the finished product. In such achievements it is possible to see at least the embryonic beginnings of scientific thought in prehistoric man. Chance may well have played a part in the invention of the earliest metallurgical, textile, and other processes. But man's realization that by heating certain kinds of stone (the copper ores) to a high temperature they became liquid, and changed when cool into 'another sort of stone' which could be worked into numberless shapes and was more durable than the parent stone, denotes that his mind had attained a degree of development unknown in the Palaeolithic or Mesolithic. These transformation processes (and *a fortiori* those of the alloying of copper and tin to produce bronze) must have seemed 'magic' to prehistoric man, and it is very likely that the blacksmith in prehistoric communities—as among many primitive tribes today—combined his function with that of magician.

Many scholars have become interested in these technological processes of prehistoric and early historic times. W. Witter and A. Oldeberg have produced some admirable results on prehistoric metallurgy, E. Vogt on Neolithic textiles, A. France-Lanord on the metallurgical processes of the early Middle Ages and especially on the damascening of swords. I cannot attempt to analyse or even to enumerate all the laboratory methods used, among them macroscopic and microscopic examination, analyses by spectrographical, metallographical, microchemical, radiographical, and other means. These studies are in their infancy only, and every fresh examination may produce surprises. Here is a single example, if I may be excused for drawing on my personal experience, although all the credit belongs to my colleague and friend P. Coremans, Director of the Central Laboratory of Belgian Museums, and to his collaborators. I sent to him for restoration and preservation a little iron clasp (probably a belt buckle) found in one of the La Tène (I?) tombs of the Lommel-Kattenbos Cemetery. The laboratory examination showed that the clasp was made up of three superimposed layers of iron (the two outer layers are the thinnest) held together by some resinous substance (cf. Pl. XVIII). Such a process, intended probably to give pliancy and strength to the buckle and to make it more solid, was entirely unknown till then.

It is much to be desired that archaeologists should call increasingly upon the resources of laboratories, even in the study of objects derived from 'classical' periods. Many problems still await solution in this field.

Take one simple example. In spite of innumerable theses, the nature of the glaze upon *terra sigillata* of the Roman period has only recently yielded up its secret, and that is only one example among a thousand. All these technological and industrial processes cannot but have had an effect upon the social life of the times, and certainly merit attention from the historian.

TRADE AND TRADE ROUTES

The study of prehistoric trade is one of the most fascinating aspects of archaeological interpretation. It opens up, almost every day, new perspectives of the relations which existed not only among the various prehistoric civilizations but also among the regions of Europe still in a state of barbarism and those of the Mediterranean which had already reached a high degree of civilization. It also throws light upon the spread not only of commercial products but of techniques and ideas.

Two different problems face those who would reconstruct the commercial activity of prehistoric times. The first is to discover exactly what objects were bought and sold, and the second their place of origin or manufacture. The production of distribution-maps of different categories of objects will indicate the bulk of the trade, and its extent, and might also give clues to the trade routes used at different times.

The discovery of the provenance of objects is not easy, although great strides have been made during the last few years, mainly in the sphere of the origin of the raw materials used in their fabrication. Recent developments are facilitating the task of identification. Among these may be cited the petrographic analysis of stone implements which has recently made enormous progress in England under the influence of Dr J. F. S. Stone, but had already been used with some success earlier: for was it not found as early as 1923 that some of the stones at Stonehenge came from Wales, about 150 miles away? The study of the distribution of the implements of flint from Spiennes, of quartzite from Wommersom, of flint from Grand Pressigny, etc., would benefit enormously from systematic recourse to petrographic analysis. Spectrographical analysis of bronzes, which involves only a minute piece of the metal (and therefore allows this analysis of bronze objects without fear of damage) has produced results of such precision that it is reasonable to hope soon, by its systematic use, to arrive at the provenance of the ores which have been used in the manufacture of these objects. There is, however, a major obstacle which may take some surmounting: this is the habit of prehistoric bronze smiths of recovering used or broken pieces and melting them down again to make new objects: thus, one single bronze axe might have been made from copper derived

from several ores of totally different provenance. (Only analysis of objects which have not been melted down and re-used would really be profitable.) Chemical analysis is equally useful for other material, notably amber. Although amber is found in the Mediterranean, analysis has proved that amber used in the manufacture of prehistoric and protohistoric objects found in the Mediterranean basin came from the shores of the Baltic. In the case of pottery, analysis by the method of taking thin slices can yield useful clues to the provenance of the clay, and of the little grains of quartz or arkose which were incorporated in the paste as degreasing. The spectrographical analysis of faience beads, whose importance as dating material has already been underlined in a series of cultures of the second millennium B.C., has had equally happy results.

It follows from this that the typology (general shape and decoration) of a series of objects will yield equally valuable information upon provenance, although it is always necessary to take into account local imitations of imported products. Very often only the slightest differences are apparent between the original products and their imitations; and only chemical analysis contains—once research in this field has become wider and more advanced—the decisive answers.

Finally, once it is established that a series of objects have a common provenance, the production of a distribution map for them may even contain information about the place of origin itself, upon the volume of trade, and upon the trade-routes which were employed.

It is not possible to do more than sketch in outline here the history of prehistoric commerce. A few examples will suffice to indicate the great possibilities of studies in this field.

Although it might be thought that with Palaeolithic and Mesolithic peoples, hunters and fishers living from hand to mouth in a state of permanent nomadism, trade would be non-existent, some finds show that there was a very primitive form of barter, concerned mainly with articles of adornment. Have there not been found among the Upper Palaeolithic peoples of the Central Massif in France necklaces made of mollusc shells coming from the Mediterranean about 180 miles away? And again, has not the cave of Remouchamps near Liège yielded a Mesolithic necklace of fossil mollusc shells (*dentalium*, *melania lactea*, and *naica parisiensis*) which came from Eocene sites in the Paris region? In the first peasant communities which spread out over the loess lands of Central Europe in the third millennium, there was still a brisk trade in objects of adornment. Finds are very numerous throughout this domain of Eastern-derived Neolithic culture of shell ornaments of *Spondylus gaederopus* coming from the Black Sea and the Aegean: they have been found throughout the Danube basin, in the Rhineland,

and as far as the mouth of the River Oder. In the same cultural provinces the practice soon began of trading in raw materials and even in finished products. Hungarian obsidian has been found in several habitation sites of the spiral-meander ware culture in the Rhineland, and some pottery vases were transported for considerable distances: one 'Omalian' sherd from Jeneffe seems to have been imported from the Eifel region, as indicated by the presence of a considerable quantity of augite in the paste. In a hut-site of the same culture at Stein (Dutch Limburg) was found a vase belonging to the Rössen culture. A little later, in the territory of the Western Neolithic cultures, the mining activities of Spiennes and southern England revealed the existence of a trade in flint (sometimes in half-finished, sometimes in finished products) whose volume is only just becoming evident.

The beginning of the Metal Ages in the basin of the Eastern Mediterranean marks the birth of a more widespread commercial movement on a scale that might be termed 'international'. Prospectors searching for mineral deposits (copper, tin, gold) left the Aegean basin, called at the Central Mediterranean Islands, and arrived in Spain. Thus were established relations of a maritime nature with the South of France and Portugal, and thence with Brittany and the British Isles. This movement finally reached the Danish peninsula, where the precious amber came from. This great commercial movement among the Eneolithic peoples went hand in hand with the propagation of new ideas, largely religious. The 'Megalithic religion'—to borrow a striking expression invented by V. Gordon Childe—which probably has its origin in Crete or even in the Near East, spread to all the regions affected by this trade. The Bronze Age witnessed a continuation of the trade on a large scale, but the trade-routes changed: although certain seaways retained their importance (the diffusion of bronze tools and ornaments of Irish gold in Western Europe are proof of this), the overland trade, facilitated by the excellent climatic conditions of the times, took on an importance previously unknown. The 'amber route' which united the mouths of Elbe and Po and which crossed the Alps by the Brenner Pass, became the vital commercial artery between the Mediterranean world and Central and Western Europe. The distribution of faience beads of Egyptian or Mycenaean origin shows the volume of exchange between the regions.

Another product became, from the end of the Bronze Age, of considerable importance in the economic life of protohistoric Europe. It was salt. Do not the presence of salt mines in the neighbourhood of Salzburg explain the birth and rise of the Hallstatt culture?

Finally, with the Iron Age the volume of trade increased once again. Greek, Italian, and Etruscan pottery on the one hand, Central

European bronzes on the other, were the most important of a number of articles. The sensational discovery of the 'treasure' of Vix as recently as October 1952 is fresh confirmation of the extent of these commercial relationships about 500 years B.C.

The study of trade and trade routes throughout prehistoric times has hardly begun, but it has already become clear at what point it could be fruitful. Just as important are the results that have been produced by the archaeologist in the realm of the economic history of the ancient classical world, on which very little information can be gleaned from written sources. It may be recalled that the whole history of the *terra sigillata* industry, now known in the greatest detail, rests entirely upon archaeological data, and that not a year passes without some discovery adding to our knowledge of this subject. The excavations at Arikamedu, near Pondicherry for example, show the unsuspected extent of the trade in Arretine pottery at the time of Augustus; those of Begram (Afghanistan) are witness to the importance of commercial exchanges in Central Asia with China on the one hand and the Mediterranean world on the other. In the same way the history of metallurgy and of glass in the Roman Empire is only truly known by means of archaeological data. It is the same with the history of trade between the Roman world and Germany and Scandinavia. The contribution of archaeology to the economic history of the prehistoric and early historic world may be considered as one of the great triumphs achieved by this discipline.

TRAVEL AND TRANSPORT BY LAND AND SEA

In discussing trade relations, a few words must be said about means of transport by land and sea. Different means of transport were developed in accordance with needs and environment. It was mentioned previously that it is logical to find the chariot appearing earlier in the Syrian Steppes than in Egypt, where the boat was the most obvious means of communication. In the same way the oldest skis, skates, and sledges known have been found in Northern Europe.

Specialists have studied the development of boats and ships during prehistoric and early historic times. To work on they have had not only some astonishing archaeological remains (Mesolithic oars, canoes hollowed out of tree-trunks—such as that of Malines-Neckerspoel—Etruscan ships from Spina, galleys from Lake Nemi, the transport-ship from Utrecht, ships of the migration period found in graves such as Sutton Hoo, to quote only a few), but also numerous reproductions, for example the well-known Scandinavian rock-engravings, and even small-scale models (like the little votive ships in gold from Nors, in

Denmark, and the votive ship found at the sources of the Seine). The history of navigation since its origins up to the beginning of the Middle Ages is relatively well-known.

Turning to land transport, attention has mainly been directed towards the question of draught and pack animals. Commandant Lefebvre des Noëttes has made a remarkable study on this subject in which he has attempted to show that our ancestors, in using the horse as a draught animal, did not know how to use the pulling power of the shoulders, with the aid of an inflexible collar, (as we know it nowadays), but that they used only the pulling power of the neck. This, coupled with the absence of ironwork,* would allow horses to draw only lightly loaded chariots. Might this poor utilization of animal strength have been one of the causes of the persistence of slavery in antiquity?

The study of roads brings us to the last of the transport problems. Although some corduroy roads have been located and excavated in marshy regions, the study of prehistoric roads is still in its infancy. This is not so for classical lands or times. Roman roads have been the subject of exhaustive research. The question of trunk roads has been considered from an economic as well as an archaeological angle. Roads such as these would have been inconceivable if the commercial stimulus of the first centuries A.D. in the sphere of the *pax romana* had not made them a necessity. Although no written source deals with this subject, a simple understanding of the Roman road pattern and of the methods of construction of these great roadways points to the existence, at the time of their construction, of a strong centralized power and of very intense commercial activity.

ART

In my introductory chapter the relationship between archaeology and art history was briefly discussed. Although great divergences separate the two disciplines, archaeology must not neglect ancient works of art: these works are not only material remains of the past—and from this point of view fall within the realm of archaeology in the wider sense of the word—but art, and particularly folk art, forms an essential element in any appreciation of the cultural stage of a human community.

One thing is at once striking: the archaeologist has recovered traces of practically nothing but the visual arts. In the realm of prehistoric music some instruments (such as Palaeolithic flutes, harps found at Ur, or the impressive Nordic 'lurs', those Danish Bronze Age trumpets

* At least in classical lands. It seems that the Gauls invented iron horse trappings at the beginning of the Roman period.

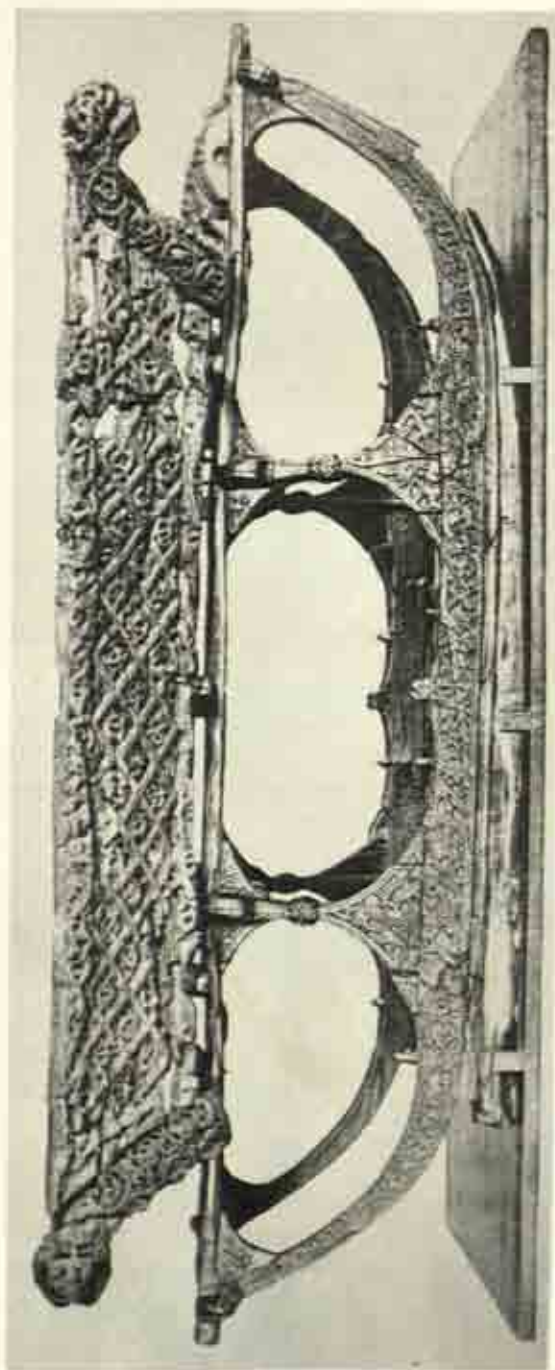
by means of which it is possible to produce an octave of notes) remain, but nothing is known of the melodies themselves. Very little more is known about classical music, in spite of intense research. We are equally ignorant of all poetic and narrative achievements of prehistoric peoples.

Concerning the visual arts themselves, the archaeologist should ask himself if these works have been created in response to a need for aesthetic expression, and if their creators considered them as works of art. It seems very likely, for example, that the Franco-Cantabrian drawings and rock paintings of the Upper Palaeolithic had primarily a magico-religious significance. The archaeologist should then chiefly consider them as such and leave to art critics the task of studying them for their aesthetic value (which is only a subsidiary factor to their magical significance).

In the same way care should be exercised in attaching too great a significance to the degree of perfection of works of art (a degree which can be judged only in a highly subjective way) in evaluating the stage of cultural advance reached by those people who created the art. From a purely aesthetic point of view, by all normal current standards, the Franco-Cantabrian rock engravings are far superior to those of the Scandinavian Bronze Age: although it is certain that the creators of the latter were in a far higher stage of culture than were the Aurignacian and Magdalenian reindeer hunters who produced the masterpieces of Altamira and Lascaux.

The archaeologist, on the other hand, should not withhold any of his attention from the decorative art of prehistoric peoples, for the way in which they decorated their weapons, tools, and pottery is so traditional that this ornamental art plays an important role both in the assigning of the remains to a particular culture and in dating them. But once again he should leave the appreciation of the decorative sense of our ancestors to the aesthete, as also their skill in ornamenting their tools with that sureness of taste often lacking in contemporary society. As to attempts which some people have made to assess the mental make-up of different prehistoric peoples founded on their decorative arts, they have displayed so much subjectivity and often such prejudice that out of charity we should not perhaps speak of them. Unfortunately, theories of this kind appear in certain archaeological works which are otherwise models of serious thought.

One question, however, which merits the whole attention of the archaeologist as much as that of the historian, but on which there is very little evidence, is that of the social role played by art in the different cultures. What social classes interested themselves in the different kinds of works of art? Lastly, what social standing had artists and craftsmen in different ages, and among different human societies? But here



xix. One of the four sledges found with a chariot and beds in the famous ship-burial of Oseberg, Norway.



xx. Prow of Viking ship, found in the bed of the river Scheldt at Appels,
near Termonde, Belgium in 1936

we are defining one of the essential tasks to be performed by the art historian to hasten the day when his discipline will have made a clean sweep of the 'aestheticism' which still keeps it from the front rank of the subjects or disciplines dignified with the name of science.

RELIGION

The primary roles which magic and religion play in all under-developed societies in modern times are generally known; it was much the same in prehistoric times. Traces of primitive beliefs are not lacking, but the great difficulty lies in correct interpretation of the remains, and the absence of written sources makes this a particularly arduous and delicate task.

The rock engravings and paintings on the walls of many caves in France and Spain, portraying in a realistic manner a very considerable proportion of the Pleistocene fauna (bison, mammoth, reindeer, bear, rhinoceros, etc.) most probably had a magical significance whose exact nature it is always difficult to determine: propitiatory rites with the object of securing success in the hunt? initiation rites? magical rites intended to appease the souls of slaughtered animals? Many different explanations have been proposed but no one can tell which are right.

In the first agricultural communities we find obvious traces of a fertility cult and of sun-worship, but here again the absence of written sources prevents us from being more specific. Worship of rivers and springs also seems to have existed very early, since in their neighbourhood have been found more than one votive offering. A very important list of objects from the Metal Ages, such as the Stettweg and Trundholm chariots, the Gundestrup bowl, the rock-engravings of Bohuslan and the Val Camonica, pose a series of religious problems to which it is not yet possible to give answers that are more than hypothetical.

Prehistoric medicine was exclusively magico-religious. Some of the oddest evidence which survives on this subject is the series of trepanned skulls from the Neolithic period. Although this operation was sometimes performed after death, it seems that in other cases it was performed on a living subject. Sometimes the patient (perhaps an individual who was thought to be possessed by a tormenting spirit which might be released by making an exit from the head) even survived the operation.

Funerary customs also had a religious significance, and are probably connected with beliefs in the after-life; one must always ask oneself if the different customs of inhumation and incineration necessarily imply

a difference in fundamental belief (as many scholars have claimed*) or do not rather imply social difference or variations in family tradition. Certain Roman families practised inhumation and others cremation, while both held the same religious beliefs.

For the religious history of classical times and the early Middle Ages, archaeology provides material additional to the written sources which both amplifies our knowledge and acts as a valuable corrective. The study of sculptured figures gives one a greater insight into the true nature of the gods, throws new light upon the development of beliefs and rites, on the survival into classical times of rites and beliefs going back to prehistoric times, and upon the adaptation of the ancient rites to those of the classical world (the whole question of the *interpretatio romana*, etc.). Without the innumerable representations of gods in the ruins of temples and shrines, without the ex-votos and cult objects, the picture of ancient religions which comes to us solely from written texts and inscriptions would be less clear and much less detailed than that provided by interpreting the archaeological evidence. It is even more so with the history of the beginnings of Christianity; textual evidence is practically non-existent, while the essentials of our knowledge rest upon archaeological facts. Had it not been for the discovery of some fourth-century churches, of tombs containing pottery or glass decorated with Christian symbols, and of some other similar survivals, the fact of the first evangelization of Northern Gaul would probably never have been known.

DEMOGRAPHIC PROBLEMS

For the proper understanding of the life of prehistoric communities, it would be of value to be able to discover what the density of population has been during different periods and in different regions. Obviously one could not hope to arrive at absolute figures, a feat which is not possible even for classical times or the Middle Ages, although there is some textual evidence for these periods. Nevertheless, interesting attempts have been made to establish the approximate density of prehistoric populations.

One of the demographic laws states that for every period of rapid economic progress there is a corresponding noticeable increase in population. It is known, for example, that the population of Western Europe increased threefold by the end of the industrial revolution of the nineteenth century. Prehistory, too, experienced periods of economic uprising: the beginnings of agriculture and of Neolithic animal husbandry; the introduction of the scratch plough in the Bronze Age,

* As I thought myself at one time.

which made possible the clearing of new territories; the 'urban' revolution, also a manifestation of the Bronze Age, but which did not reach Western Europe before the Roman conquest; the invention of the heavy wheeled plough in the Iron Age, etc.

In the Pleistocene, the population must still have been extremely scanty, particularly in the regions bordering the ice cap. In the Alaskan tundra there is a climate similar to that of Belgium during the glacial period. Towards the middle of the nineteenth century before the 'gold rush' which completely changed the population, Alaska showed a density of population of 1 person per 28 square miles. If this figure, which seems reasonable, is taken as an average for Belgium in the Upper Palaeolithic, the whole of the country would have harboured some 400 inhabitants.

The Neolithic witnessed an important increase in population. The number of houses in the village of Köln-Lindenthal—which was completely excavated—seemed to show a population of 200–250 people. At the same time there were at least twenty similar villages, also part of the spiral-meander ware culture, in Hesbaye alone, and some would seem to be of greater size than Köln-Lindenthal. It must not be forgotten that only the most fertile lands had been cleared at this time, while in other areas the people were less concentrated and continued their Mesolithic way of life.

For the ensuing periods similar approximate calculations may be made. Figures given by Caesar relating to the population of Belgium at the time of the conquest, figures which must always be taken with a grain of salt, obviously provide a fixed basis for the end of the pre-historic period.

A further population problem is speculation as to the average longevity of prehistoric man. Research into this belongs of course to the field of physical anthropology, but the results are of lively interest to archaeologists since they throw new light upon the conditions of life in prehistoric times. The examination of skeletons has been a fertile field of study. H. Vallois has shown that among Neanderthal men (Middle Palaeolithic) 40% died between birth and 14 years of age, 15% between 14 and 20 years, 40% between 21 and 40 and that 5% only lived to be older than 40. To give point to these statistics, they may be compared with the figures for Austria in 1927, when 15.4% died between birth and 14 years, 2.7% between 14 and 20, 11.9% between 21 and 40, 22.6% between 41 and 60, and 47.4% lived to a greater age than 60.

A serious obstacle to systematic research into this subject is the fact that many prehistoric peoples practised cremation. Recent research, however, has smoothed out this difficulty considerably. Although it is

still not possible in examining burned bones to hope to get results as accurate as from exhumed skeletons, the approximate age of cremated bodies can be arrived at, and very often their sex. Two examples, as yet unpublished, are given. The first case concerns bones found in five urns of Drakenstein type, found by E. Joly near Mont de l'Enclus and preserved in the Mons Museum; the examination was carried out by a foreign specialist, Dr C. Krumbein. The first urn contained the bones of a woman between 40 and 60 years, and of a child under 7; the second had exactly similar contents; the third, the bones of a woman between 22 and 40; the fourth, the remains of a man between 40 and 60; and the fifth the bones of a woman between 40 and 60 and of two children, one under 7 and one between 7 and 14. In the second case the task was to examine the burned remains found in the Hallstatt cemetery of Aalter-Oostergem. This was undertaken by the Belgian Dr F. Twisselmann, protagonist of a more 'prudent' method than that of his German colleague. The results are less detailed but certainly more accurate. The bones from 16 urns have so far been studied: 5 urns contained the remains of children (aged 2, less than 4, from 5 to 7, about 12, and from 10 to 15 respectively, of indeterminate sex); another contained a woman (?) of about 20; remains from two others belonged to people between 20 and 25 years of age (a man (?) and a person of uncertain sex); 5 urns contained the bones of adults of less than 35 years (one man (?), one woman—with the remains of either a foetus or a new-born child—and 3 persons of indeterminate sex); bones from the 3 remaining urns belonged to an adult of unknown age, to a man of 40 years or more, and to an aged subject showing signs of rheumatism. It is of interest to note that in 3 of the 4 tombs containing children were found non-human bones (a fish, a bird, an unrecognizable animal) which throw new light upon the funerary rites of the period.

The systematic study of all the somatic remains (skeletons, burned bones, silhouettes of corpses) may have many surprises for us and provide new data for the solution of the question of the relationship between technological progress and the duration of human life.

SOCIAL ORGANIZATION

To understand the basic nature of a human community, it is necessary to possess a sound knowledge of its structure, organization, usages, and customs. Such knowledge is hard enough to acquire when one is dealing with a contemporary, living community. Many generations of research workers have consecrated their best efforts to the study of ancient Greek society and institutions without ever truly realizing the exhaustive possibilities of their task. How, then, to get to the bottom

of the intimate nature of prehistoric cultures? Plainly, it is an illusory ambition. With regard to the social organization of these communities it is only possible to take hold of a few sparse and incomplete features. What do we know of the administration, political institutions, of justice, family life, of law, property, military institutions, or of religion? Little enough, in all conscience. Excavation has to be carried out with every possible care and on a scale to allow the total excavation of the village as a whole. The excavation of Köln-Lindenthal alone has taught us more about the social organization of the Omalian culture than the systematic collecting of stone and pottery equipment in many *fonds de cabanes* in Hesbaye, where no one has ever taken the trouble to study an Omalian settlement *in toto*. But even the Köln-Lindenthal excavations can do no more than make a modest contribution to our knowledge of its social organization. The basis seems to have been the family, of which several were grouped together to make a village; certain undertakings (such as defensive works for the village) were shared in common. There is no evidence of the existence of different social classes or of specialized craftsmen. Nor is there any trace of a chief being in possession of greater power or riches than the other members of the community. Was there collective ownership of fields and beasts or did each family have private property? We do not know. Our knowledge of the religions of these agricultural people is also extremely limited, and no trace has been found of a place of public worship.

The picture is different for other cultures: in some are found signs of monogamy, in others of polygamy; slavery existed in some communities; sometimes clear traces are visible of religion in public form (Stonehenge, for example, whose building must have been the work of a whole people); elsewhere are encountered clear social distinctions, powerful warrior-chiefs, and a priesthood. Some cultures have revealed cannibalism, others signs of head-hunting (the tombs of Ofnet in Bavaria); but was this cannibalism an institution of religious character as among certain primitive tribes of the present day or was it only exceptional and provoked by want or famine? All data upon social institutions remain extremely fragmentary and superficial. What fragments of social institutions have been recoverable, however, do not seem to have been determined by the technical and economic development of the cultures involved: more often communities which have reached the same technical and economic development have organized themselves socially in a different way. This fact is very important, for it puts a check upon the attempt by Soviet archaeologists to substitute for the traditional three ages of prehistory a division founded upon social evolution. If it is a fact that the division into ages of stone, bronze, and iron is out of date and has no counterpart in reality nor in

cultural, economic, nor even technological development of prehistoric man,* the new classification proposed by the Soviet School seems to be pure invention which has no basis in fact. They speak of a period in society called 'pre-clanic' (where all social organization is limited to the family, which is conceived as a promiscuous horde), followed by a period when the clan, the *gens*, formed the basis of society (and these clans seem invariably to have been matriarchal), succeeded by the period of classed society where a small minority completely monopolized the social surplus and left the body of labourers and artisans with only a part of what they produced, no more than a subsistence allowance. This classed society was patriarchal. The first stage of this classification corresponds to our Lower Palaeolithic, for which we have no certain evidence of social organization. Sexual promiscuity is pure hypothesis and not supported by a single reliable fact. The second stage corresponds to our Upper Palaeolithic and Mesolithic. Although big-game hunting in Upper Palaeolithic times presupposes the existence of a larger social unit than the family, Mesolithic people, on the other hand, living as they did in forests, seem to have formed only very limited groups. There is no indication, moreover, that society was matriarchal at that time. Certain graves of the Tardenoisian cemetery of Téviec seem rather to support an opposite view. In this cemetery three of the tombs contain the remains of men who would appear to have enjoyed considerable prestige, but there is nothing to tell us anything of the nature of this apparent superiority. Lastly, this theory would correlate the beginnings of a classed society with the advent of the Neolithic. But it is precisely for the beginnings of this period that we have the information discussed above, which points to a very great variety in forms of social organization among different cultures and at different times.

Patient research and careful deduction will certainly in the future enrich our store of information about the social organization of prehistoric communities. It is very doubtful, however, whether it will ever be possible to do more than classify the main outlines of social evolution. Certainly social evolution must have existed in the different cultures, but it is beyond question that it never developed in an identical way in two different communities.

INVASIONS, MIGRATIONS, AND THE SPREAD OF IDEAS

In the last chapter were discussed at some length the difficulties encountered in any attempt to attribute too precise an ethnic significance

* Cf. G. E. Daniel, *The Three Ages* (Cambridge, 1943).

to archaeological cultures. Examples were given of different peoples who have shown an identical culture; it was shown that the distribution of one culture rarely corresponded to the territory of a named people; and it was pointed out that natural environment and social situations could provoke profound cultural distinctions within the same people. At the same time it has been thought possible to conclude that a clearly determined culture (one which preserves its own characteristics in different places: economic organization, tools, pottery, houses, tombs, etc.) is very probably the manifestation of one 'people' or of a group of allied tribes.

During the last half-century, many archaeologists have devoted themselves to studying both the peaceful migrations and the warlike invasions of prehistoric peoples. One is at first sight astonished at the volume of their results and at the precision with which they describe the great movements of population during the last three millennia B.C. They give the people conventional names (Urnfield People, Hallstatt Warriors, etc.) replacing them where possible by historic or pseudo-historic names (Germans, Illyrians, Proto-Celts, etc.); and so great is the detail and assurance with which these scholars recount the facts that one might be reading the chronicles of an historic epoch, left as a record by the chroniclers themselves. I, however, believe that for the most part dust is being thrown in our eyes.

The foundations upon which these archaeologists build their hypotheses are often far too slight to allow conclusions of such moment to be based upon them. How often has a theory of migration or invasion been based purely upon the distribution of a pottery type, a weapon, or a burial custom? In an earlier chapter reservations were made upon the use of pottery as a criterion of ethnic value. How much stronger are the reasons for exercising restraint when, in the opinion of some scholars, evidence of an invasion is attested in a particular region not even by the pottery which is typical of another region, but only by one of the elements of that pottery, such as the shape of a vase, the decoration, or even only the method employed in making the decoration. It is, to put it mildly, audacious to deduce an ethnic affinity between two communities simply because they both decorate their pottery by means of a plaited cord, when it is clear that the two groups have plainly marked differences between the decorative motifs of their pottery and the shapes of their vases; and, in process of this deduction to ignore a whole series of other archaeological features which are wholly divergent. Why, when the spread of the great megalithic collective tombs is today generally considered to be the result of a missionary movement without any ethnic significance, should one be so sure that the spread of individual burials under tumuli and of large cremation

cemeteries are the results of invasions? In the same way, is it not absurd to want to attach too great a significance to the spread of a new weapon? That such a weapon originated in a well-defined community is acceptable, but it is equally true that if it proved more effective than older weapons, neighbouring peoples would quickly adopt and imitate it.

It is quite a different thing when it is found that two or more regions possess the same culture with all or nearly all characteristic elements in common, but that chronologically the culture is more recent in one region than in the other. In this case it is logical to conclude that a part—or sometimes even the whole—of the population of the first region has been on the move (towards other places). The striking analogies in a whole series of regions between the remains found in the *oppida* of Bibracte (France) and Stradonice (Bohemia), or between some La Tène cemeteries in France and in Northern Italy (such as those of Cividale del Friuli or of Arcevia near Montefortino) make it quite permissible to suggest a common parentage for the peoples who left these remains: these are clearly the witnesses of Celtic migrations. In this particular case, the Celts have invaded regions whose inhabitants possessed a culture very much inferior to their own, so that the newcomers had no difficulty in imposing their own civilization upon it. In many other cases, whether the invading peoples were less numerous, or whether they found in the conquered regions a civilization markedly superior to their own (as was the case with the German invasion of the Roman Empire in the fourth and fifth centuries) they became strongly influenced by the autochthonous inhabitants, with whom they evidently mixed after a very short time, so that in the synthetic culture that was the result of this merging of peoples, only a proportion of the elements was imported by the newcomers. In this case it is extremely difficult for the archaeologist to decide—particularly when dealing with periods with no written evidence—if the new cultural elements he encounters in one region at the beginning of a certain period are simply due to peaceful penetration from neighbouring cultures, or are the consequence of invasions. This is a delicate task, fraught with uncertainty at every turn. In any case, three factors should be taken much more into account than they have been up to now: first, the possibility that cultural elements (tools, weapons, ornaments, religious customs, etc.) had been transmitted by peaceful contacts or commercial relations between neighbouring peoples; secondly, the influence exercised by conquered people upon the culture of their vanquishers; and, finally, that sudden cultural changes in a particular region may arise from social or economic causes, and not necessarily from migrations or invasions.

To bring this chapter to a close, let me draw attention again to certain preconceived ideas about the diffusion of culture. For many

archaeologists the maxim *ex Oriente lux* is an article of faith: all cultural progress achieved by humanity since the most distant past originated in one or two privileged regions, particularly in Egypt and in Mesopotamia, and from there spread progressively over the world, towards the Aegean world and barbarous Europe on the one hand and towards India and China on the other. Admittedly one must look to the Near East for the origins of what is called the Neolithic Revolution, the invention of agriculture and animal husbandry,* and later the origins of urban life. But other regions have made a notable contribution to human progress. Was it not in Western Europe that Upper Palaeolithic man developed for the first time a culture which, by virtue of its specialized equipment, artistic production, and religious observances, raised man above the sub-human state which was still the way of life in Lower and Middle Palaeolithic times? Western Europe, with her invention of the heavy plough, surely very considerably furthered the progress of agriculture? And on the other hand was not Egypt very late in her use of iron?

There is a similar tendency in studies of classical antiquity, some scholars showing a desire to find a Mediterranean origin for all the elements of any importance encountered in Western European cultures, in that period, and they systematically refuse to allow any originality of culture to the Celts, Iberians, Illyrians, and Germans. Would it not be more logical to admit that all people, in accordance with the potentialities of their environment, their state of technological development, and economic situation, have had an opportunity for original development in many spheres and a chance to add their own contribution to the progress of humanity? I do not myself believe in the existence of 'favoured races'. . . .

* Probably after a series of fortuitous happenings, such as the progressive desiccation of North Africa and the Near East, when the formation of great deserts pushed all the human and animal population into certain valleys which remained fertile and into a few oases.

Conclusions

IN THE PRECEDING pages I have attempted to follow the archaeologist step by step in the carrying out of his task; to accompany him in his work of reconnaissance and upon his excavations; to look over his shoulder in his study, where he has been confronted with the delicate problems of dating and interpretation, and to see, thanks to his endeavour, a distant past come to life in various forms. I have now come to the end of this inquiry, which has allowed me to draw certain conclusions, some concerning Belgium in particular, others with a more general application.

First of all a few words to the general public for whom this book is primarily intended, and more particularly to the many amateurs and local historians whose love of their own village or region has inspired them to look into the soil for the oldest remains of their local homeland. Archaeology, as I have shown, is becoming so complicated, has made such progress, and has had recourse to such varied and multiple techniques, that its practice is now beyond the reach of anyone who has not received specialized training. This training has, moreover, to be a two-fold one, since the archaeologist ought in the first instance to be an historian and accustomed to all the rules of historical criticism in order to interpret archaeological phenomena correctly. He ought at the same time, it goes without saying, to have a solid grounding in archaeology and its particular rules. More than this: the uninstructed amateur and the dilettante run the risk, with each discovery, of destroying a precious piece of the record in the ground; only an experienced excavator is in a position to interpret and record correctly and completely the facts which are locked up in the earth.

It is a matter of the utmost urgency that measures should be taken where they still do not exist (as in Belgium, alas!) for the protection of sites, monuments, and archaeological evidence. It is high time, too, to put a stop to the exportation to foreign countries of the best pieces found in Belgian soil. The silver vase of Neerhiaren is to be found in the Leyden Museum, the gold torques from Frasnes-les-Buissenal, that were thought to have been lost, have just reappeared in the Metropolitan Museum of New York, and one has to go to the British Museum to admire the famous prow of a Viking ship found in the River Scheldt, at Appels near Termonde (Pl. XX). It seems like a bad dream to think that this unique find was made only in 1936 and that there was no legal apparatus to prevent the further despoiling of the Belgian

inheritance. Those few legal rules which archaeologists of good will, amateurs and professionals alike, have insisted on for a long time, still do not obtain in Belgium, which is the only country in Europe to be in such a position. The laws governing excavation ought to be sufficiently adaptable to command respect, and need not be so rigorous as to infringe our ancient tradition of freedom, or the rights of science, of the community or of the individual. And the same care should be taken that no person or society should be allowed the monopoly, in law or in practice, of archaeological research. A neighbouring country where a scientific heresy of this kind has established itself, is already suffering from the consequences.

Legislation of any kind, however, is always inoperable if one has failed to change the climate of opinion of the general public; equally one may fail to impress upon amateur archaeologists that it is in their own interests to call upon competent specialists to collaborate with them in their excavations. The role that enlightened amateurs can still play is very great. The professional archaeologist will always need local help in the preparation of field research: these local people are the only ones who know every stick and stone of their own terrain; by daily observation they know every aspect of the countryside; they know the legends that are current about such and such a place; over the years they have noticed the slightest suspicious irregularities in the ground. No professional will ever reject the invaluable help he can get from the good will of these amateurs. Only the closest collaboration between them will give the maximum return to archaeology as a whole.

If certain privileges in law are claimed for the properly trained archaeologist, it is for him always to remember on his side certain elementary moral obligations, rules which, deplorably, are sometimes only too readily ignored. More than once I have insisted that it is the pressing duty of every archaeologist to publish without delay a detailed report upon his work. As every unpublished excavation is an excavation lost, and is equivalent to the deliberate destruction of a piece of irreplaceable evidence, the same legislation ought to include severe penalties for lazy excavators; the repudiation of all fresh support for them and the absolute denial to them of the right to start new excavations until after the publication of previous reports. All objects found by excavation ought to be compulsorily put at the disposal of all research workers after a suitable interval. It would be as well also to make provision for measures against any museum where the preservation of objects is not adequately carried out.

I am convinced that most of the abuses to which I have drawn attention are not due to deliberate ill will, but are most often attributable to a regrettable *laissez-aller* or to an ignorance of the real possibilities of

archaeology. Many amateurs sin through ignorance, and I know of more than one who has become a valuable auxiliary to professional archaeologists once he has understood both the possibilities which were open to him and, at the same time, the limitations that he should set upon his own personal researches.

It remains finally to denounce one more danger which menaces archaeological discipline. Its spectacular side has often made of it an instrument of propaganda in the hands of 'official' scholars of governments or of political parties. The memory is still very much alive in Belgium of the Nazi *Germanenforschung* and of a certain large work upon the Frankish colonization in Belgium, which had only one purpose, namely to furnish a 'scientific' basis upon which to justify the political annexation of Belgium by the German Reich. Germany before 1945 had given much time and thought to this pseudo-science where the concepts of language, race, nation, and archaeological culture were systematically confused and kneaded into a concoction which would seem convincing to an uncritical reader with no specialized knowledge. It would be wrong to think that these regrettable tendencies were the exclusive monopoly of Germany and that they are no longer encountered today. Even now archaeological argument is frequently abused as much this side of as beyond the Iron Curtain. It is invoked both to justify excesses of the most extravagant chauvinism and to support the social ideologies of extreme left and extreme right. Unfortunately, professional archaeologists too often lend their support to these theories, which can only bring discredit upon the discipline as a whole. Archaeology can maintain its prestige only if those who practise it give proof of a balance of mind and of objectivity. Too much harm has already been done, and too often we show a tendency to accept as proved results which are based on false premises. It is high time for archaeology to submit itself to a severe critical revision and for us to re-examine the very basis of archaeological thought. This would be a most salutary thing for our discipline. It is only in this way that it can take on new life and occupy an eminent place among the auxiliary historic disciplines.

One day when he was in a rather cynical frame of mind, Theodor Mommsen satirically characterized prehistorians as 'illiterate scientists', and I am afraid that he was not alluding only to the fact that prehistorians deal with times before writing was invented. Nevertheless, it is for the archaeologists of today to prove that he was wrong in every sense.

And they can do it.

Short Bibliography

I have not attempted to draw up an exhaustive bibliography dealing with all the subjects which have been discussed or touched upon in this little book. I have been content to list a few recent contributions of general archaeological interest, devoted more especially to archaeological method, excavation technique, and to related sciences.

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Detailed List of the Plates

FRONTISPIECE: Silhouette of a body lying on its side with legs slightly bent, found at Elp in tumulus II, in the commune of Westerbolck, Netherlands (excavated by A. E. van Giffen, 1932). All traces of the body have disappeared, but it has left its imprint in the soil in the form of a dark colouring seen clearly against the light sand of the original surface of the soil. (*Photo: Biological-Archaeological Institute, State University of Groningen.*)

PLATE I: Section of the 'Berg in 't Perk', a tumulus excavated by the author at Postel, commune of Mol, province of Antwerp, in 1953. It shows clearly how the tumulus was constructed by means of large turves. Under these can be seen the former ground level, beneath which a thick podsolized layer has been formed (black humus layer over a bed of grey eluvial sand and a brownish black layer of illuvial sand). On the extreme right of the photograph the infilling of a modern ditch is noticeable, which makes that part of the section uninterpretable. (*Photo: J. Nenquin.*)

PLATE II: Section in a gravel pit at Dorchester (Oxon.). A V-shaped ditch is clearly visible, now filled in; as the arable top-soil is thicker and damper there, the corn has grown higher than elsewhere, so that the course of this ancient ditch is indicated by differences in vegetation, which are noticeable on air-photographs. (*Photo: Ashmolean Museum, Oxford.*)

PLATE III: Glass bottle, found in a third-century sarcophagus at Speyer, Germany, containing, under a layer of resinous oil, wine still in a liquid state. (*Photo: Historical Museum of the Palatine, Speyer.*)

PLATE IV: Plaster cast of a chained dog, buried beneath the ash of Pompeii during the eruption of Vesuvius in A.D. 79. (*Photo: Pompeii Museum.*)

PLATES V AND VI: Body of an Early Iron Age man, found in a peat-bog at Grauballe (C. Jutland, Denmark). According to Danish scholars, the remarkable preservation of this body, after nearly two thousand years, is the result of the tanning effect of the acids in the peat-bog. To ensure its permanent preservation, immediately after the discovery technicians of the Institute of Prehistoric Archaeology of the University of Aarhus impregnated the body with solutions having a basis of oak-bark. (*Photos: P. V. Glob.*)

PLATE VII: Oak-tree coffin from a tumulus at Egtved, Denmark.

The body rests upon a cow-hide which lines the coffin. The details of clothing can be clearly seen: a blouse with elbow-length sleeves, a short fringed skirt, a belt, a hair band, bracelets, and a large belt buckle. The body is that of a young blonde woman, of medium height, of a little more than 20 years of age. The hair is worn in a fringe at the front, but long at the sides and back. By her left side, wrapped in a cloth, are the burnt bones of a child of 7 or 8 years. The coffin also contains a few dried yarrow blossoms which shows that the woman died in the summer. (*Photo: Danish National Museum, Copenhagen.*)

PLATES VIII AND IX: Two photographs illustrating the effect of the presence of buried foundations on overlying vegetation. In the first photograph, taken on the ground, traces can be seen, but it is scarcely possible to form an idea of the complete plan of these foundations. In the second photograph, however, taken from the air, the complete plan of the buildings and the rectangular ditch surrounding it can be clearly seen. These traces are not visible until the corn ripens.

PLATE VIII: Traces of buildings between the double line of fortifications in the Roman colony of *Alba Fucens*, Aquila Province, Italy. (*Photo by the author.*)

PLATE IX: Roman villa at Ditchley (Oxon.). (*Photo: Ashmolean Museum, Oxford.*)

PLATE X: Aerial view of the southern Hallstatt cemetery of Lommel-Kattenbos, Belgium, taken one year after the excavations. The humus layer and the podsolized layer having disappeared from the site of the levelled tumuli, the yellow sandy subsoil shows up clearly in contrast with the surrounding arable land, particularly in the freshly ploughed field on the right (the furrows are very clear). The significance of the two parallel lines above and below the central burials, which were not observed at the time of the excavations and were brought to light only by the air photograph, is not known.

PLATE XI: Aerial view of the *oppidum* of Hastedon, commune of Saint-Servais, Namur province. The white line (flowering hawthorn) follows exactly the course of a pre-Roman rampart. Beyond can be seen the isthmus linking the *oppidum* to the plateau of Saint-Marc. (*Photo: J. Mutsaerts.*)

PLATE XII: *Castellum* of *Praetorium Agrippina*, Valkenburg, S. Holland. View of 1942 excavations, showing part of the north-west of the fort, seen from the west. Remains of the oldest period of the site (about A.D. 40) can be seen. In the background the

remains of a *striga* (barracks for two centuries) with the centurions' office in the centre and, on the left, rounded corner of the *intervallum*, with the timber foundations of the rampart. Nothing remains of the double tower except a few stumps of the large wooden uprights. In the foreground are vestiges of the second period (about A.D. 45): the *intervallum* and the remains of the angle-tower with a ditch in front. It will be observed that the fort of the second period is slightly larger than that of the first period, and that the *intervallum* of the former runs above the ditches of the latter. (Photo: Biological-Archaeological Institute, State University of Groningen.)

PLATE XIII: Tumulus 19 of the Toterfout-Halve Mijl cemetery (commune of Veldhoven, S. Brabant, Netherlands), of the Bronze Age. This tumulus shows work of two periods, both characterized by a double ring of posts. The photograph illustrates the western half of the tumulus, seen from the south-west. In the section (west-centre) can be distinguished traces of a secondary burial (ditch filled with turves). This ditch cuts through the older tomb a little further to the south. The mound itself has been built with heaped-up turves. In the foreground are the two double rows of posts. (Excavated 1948.) (Photo: Biological-Archaeological Institute, State University of Groningen.)

PLATE XIV: Tumulus I at Wessinghuizen, commune of Onstwedde, Netherlands, with circle of posts and burials in pits (a central primary tomb and two secondaries). The tumulus has been constructed with heaped-up clods of turf upon the old ground level below which a podsolized layer can be clearly seen. The earth from the central pit has been heaped up on both sides, and turves have been piled on the top. (1928 excavations.) Early Bronze Age. (Photo: Biological-Archaeological Institute, State University of Groningen.)

PLATE XV: Section through tomb 23 of the Aalter-Oostergem Cemetery, E. Flanders, Belgium. It may be observed that the urn containing the ashes of the dead was simply buried in a small pit dug in the ground. Some charcoal, remains no doubt of the funeral pyre, was thrown into the bottom of the pit all round the urn. (Photo: author.)

PLATE XVI: Iron belt hook found in tomb 4 (La Tène I) in the northern cemetery of Lommel-Kattenbos (Limburg, Belgium). It is made up of three layers of iron—the two outer layers being thinner—held together by a resinous material. This technique evidently served to make the hook both stronger and more supple. (Photo: A C L, Brussels.)

- PLATE XVII: Urn-field at Wessinghuizen (commune of Onstwedde, Netherlands), excavated in 1928. The photograph, taken from the east, shows clearly the key-hole-shaped ditches encircling the tombs, or groups of tombs. (The small ditch in the foreground surrounds a group of three cinerary urns.) Iron age. (*Photo: Biological-Archaeological Institute, State University of Groningen.*)
- PLATE XVIII: Three photographs of a belt buckle from the Merovingian cemetery of Lurloimmel (Lommel commune, Limburg, Belgium). The first shows the buckle as it was found, covered thickly with rust. The second is an X-ray photograph, and shows that under the rust important parts of the decoration on the buckle still remain. The third picture was taken after laboratory treatment (removal of alkaline salts, electro-chemical and mechanical treatment, and impregnation with bedacryl). (*Photos: A C L, Brussels.*)
- PLATE XIX: One of the four sledges found with a chariot and beds in the famous ship-burial of Oseberg, Norway. (*Photo: Oslo Museum.*)
- PLATE XX: Prow of Viking ship, found in the bed of the river Scheldt at Appels, near Termonde, in 1936, and purchased by the British Museum in 1938. This prow, in the shape of a dragon's head, may be dated from the beginning of the ninth century and is the most important relic of the Norsemen found outside Scandinavia. Its total length is nearly 1½ metres. (*Photo: British Museum.*)

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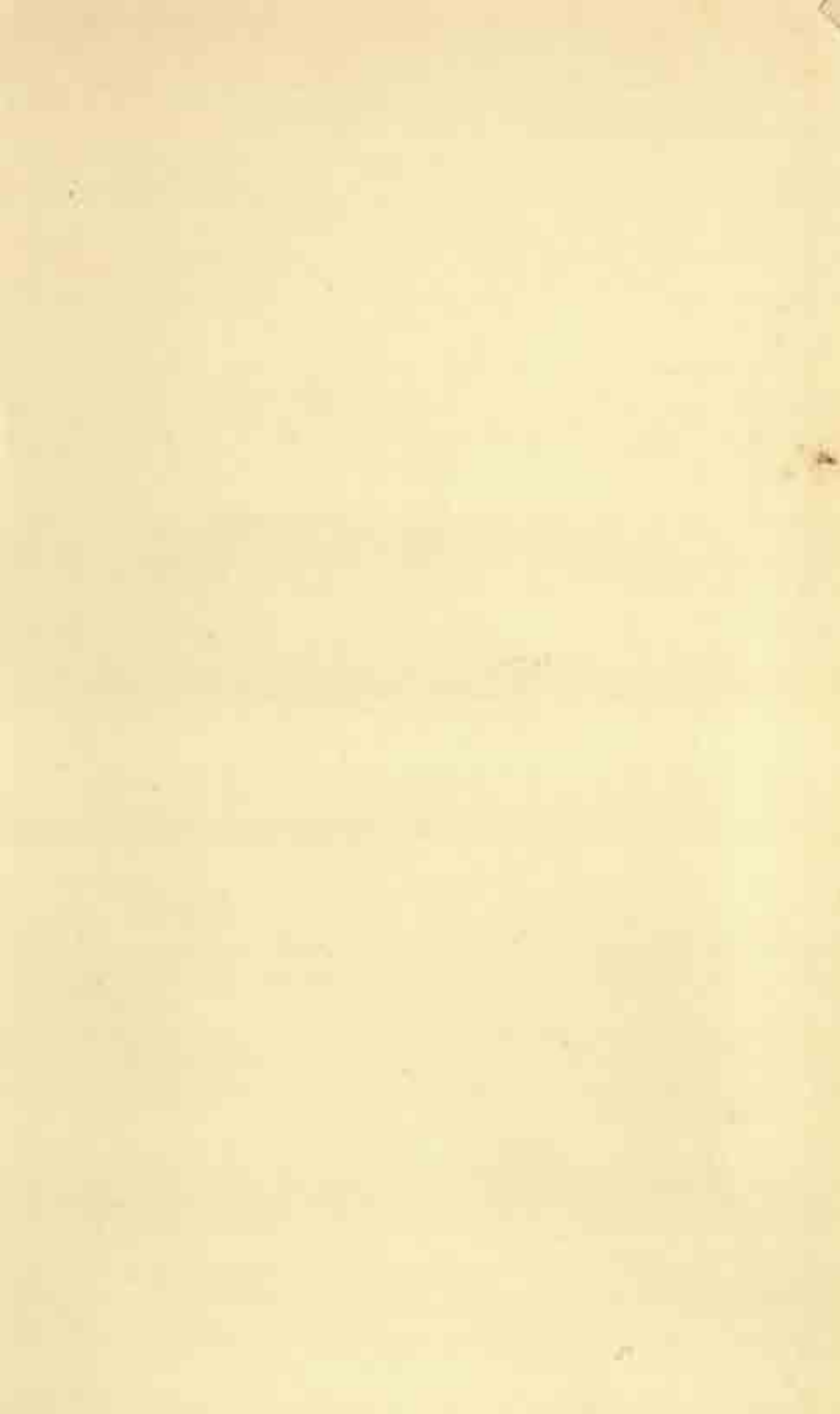
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