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FOREWORD

THE PORTAL of a new year provides occasion to peer into the swirling mists that lie before us.

But behind us too is mist, and the long ladder that Man has climbed in his quest of truth and wisdom; beneath our feet is the rung on which we now perilously perch. We shall not be challenged if we pause briefly to glance back.

At the foot of the ascent, the lowest rung of all marks Fire, the first of the dreadful discoveries that were to distinguish man from beast and start him toward mastery of his physical world. Two thousand centuries later, younger scientists have so mastered the physical world that they have it in their power to obliterate man and beast alike; this may not fairly, I suppose, be charged against that first bright son of an ape.

In the legends of the Greeks, it was Prometheus who, defying Zeus, brought fire to earth and taught man to warm himself, cook his food, make ceramics, and wring rivers of metal from the rocks; from this plot the poet Aeschylus wove a trilogy of Prometheus' triumph and defeat. But we know better: crepes suzette, pottery, glass and metal, and the roasted limestone from which we make plaster and cement did not come in a single rush when the first man captured fire; they are many inventions, made separately, at intervals of tens of centuries. . . . We *do* know better, don't we?

The governor of the state in which I live is exasperated because I have not responded to his call. He is afraid I may become a casualty and give offense to my neighbors and Civil Defense. He urges me to build, for those I love, a sturdy shelter against the new fires in the sky; and if it is from fear that I hesitate, fear lest the assessor increase my assessment by the cost of my tomb, he offers his influence,

so that the increase shall be as small as is compatible with a sound tax policy.

But ten thousand years ago I, or perhaps it was my grandfather, chose to leave my overhang of rock and dwell in a house of brick and wood and glass, warm and dry, with living spaces—rooms, you call them—disposed as I have willed them, with privacy. My fear of neutrons is not nearly as intense as my fear of community cowering. I did not leave my cave yesterday to return to it today.

Man has been facing problems for some time past. Since Man invented Speech, each generation has fascinated itself with the flattering idea that the problems which it faces are more awful, and more insoluble, than those faced by any generation before it. This is the orbit in which archaeologists revolve. Since last week's moderns began to neb into the past of Man and his struggles toward the better life, many workers have puzzled out details of the story. In the pages that follow, you may catch glimpses, not only of some distant cousins, but also of the scholars whose concern it has been to brush aside the gathered dust.

Jotham Johnson

INTRODUCTION

THE TECHNICAL definitions of archaeology inform us that it is the study of the material remains of man's past, that its ultimate aim is the reconstruction of bygone cultures, and that it deals in large measure with artifacts—those things made by man that have survived. These definitions convey little of the glamor with which the average reader invests the subject. Instinctively he thinks in terms of fabulous hoards of buried treasure, but such a view is highly oversimplified. It is comparable to a history of medicine which mentions only a Harvey, a Pasteur, and a Fleming. It takes no account of the thousands of archaeologists who, although they have made no sensational finds, have contributed in varying degrees to the complex structure of modern archaeology. Nor does it recognize the array of knowledge and sheer accumulation of fact with which the modern archaeologist must cope. Depending on his specialty, he must know a little or a great deal about ancient coinage, the manufacture of pottery, varve deposition, carbon 14 dating, pollen analysis, tree rings, trade routes, the measurement of skulls, and dozens of other subjects drawn from anthropology, geology, biology, nuclear physics, chemistry, and even astronomy (see Jotham Johnson's article on the decipherment of the horoscope of a child born about 10 P.M., July 3rd, 176 A.D.).

Yet the attitude of the man in the street is in large measure justified, for the accomplishments of archaeology have been astonishing. It has reconstructed civilizations whose very existence had not previously been suspected. It has described the histories, even the personal habits, of emperors and commoners long forgotten. It has deciphered scratches on clay tablets, written in unknown languages and buried in

the wilderness. By laboriously joining together bits of leather thousands of years old, it has thrown new light on the Bible. It has uncovered the way of life of savages who roamed the plains of Europe before the Ice Age had disappeared. It has in brief pushed back the frontiers of history and thrown new light on cultures that existed long before written records existed.

A fund of knowledge and a pickax, sometimes only the former, have served archaeologists in every corner of the globe; and archaeologists themselves have been a mixed international lot. A Moswali, Rassam, trained by an Englishman, Layard, discovered the palace of Ashurbanipal. A Frenchman, Mariette, preserved the antiquities of the Nile for Egypt, in spite of the demands of Eugénie, the queen of his own country. At Troy in Asia Minor, an American, Blegen, reexamined the stratigraphic evidence first unearthed by a German, Schliemann. An Englishwoman, Mrs. Scoresby Routledge, first dug down to the foundations of the statues on Easter Island.

Moreover, archaeology cuts across geographical lines in the broadest possible manner. Discovery of a Danish culture may fill a gap in British prehistory. A quotation from the ancient Greek, Herodotus, offers a clue to the origins of the Etruscans in Lydia. A find of Roman coins clarifies the dating of an Indian civilization. Comparison of archaeological and anthropological data throws light on whether or not the earliest inhabitants of America migrated from Asia across land now submerged under the Bering Sea. In countless ways, archaeology is international.

Despite such crossing of boundaries, the present book has been divided, for purposes of clarity, into broad geographical units. In general, each unit has been arranged according to the chronological sequences of the cultures involved. As the volume is intended for laymen and students rather than experts, scholarly apparatus has been omitted; and because of space limitations, it has been possible to cover only a

limited number of topics and include only a few selections, sometimes in abbreviated form, from the many available.

Nevertheless, it is hoped that in the portraits of great archaeologists, the discussions of archaeological problems, and the descriptions of archaeological discoveries, a rounded picture of the discipline will emerge, and that the reader will be encouraged to delve more deeply into this most entrancing of subjects.

ARCHAEOLOGY is one of the books in the series entitled THE NEW YORK UNIVERSITY LIBRARY OF SCIENCE. Other volumes, dealing with individual sciences, are in preparation. The series as a whole will encompass much of the universe of modern man, for that universe has been shaped in greatest measure by science, the branch of human activity whose name is derived from the Latin *scire*—to know.

ARCHAEOLOGY



I. **The Aims and Methods
of ARCHAEOLOGY**

1. The Aims and Methods of Archaeology

In the following selection, a great archaeologist describes in brief span the whole range of prehistoric archaeology. It has been the function of archaeology, in conjunction with anthropology, to discover everything we know about man's activities during this enormous period. For later times, archaeology becomes the handmaiden of history; yet often, as in the case of Pompeii and Herculaneum, it supplies a richness and vividness of detail beyond the capacity of written records alone.

Born in 1877, Abbé Henri Breuil was formerly a professor at the Institute of Human Paleontology in Paris. During a career spanning over forty years, he became recognized as the foremost authority on cave art. He made such beautiful reproductions of Old Stone Age cave paintings, at Altamira and elsewhere, that art historians who had not seen the originals accused him of falsifying the evidence. It was his copies, widely reproduced, that introduced the real nature of cave paintings to the scholarly world. He was also the author of such authoritative books as *Four Hundred Centuries of Cave Art*. He died in 1961.

THE ANTIQUITY OF MAN

ABBÉ HENRI BREUIL

HOWEVER long ago Man appeared on the Earth, he is the latest arrival amongst all the inhabitants; when he first made his presence evident, the oceans had already swarmed with living creatures for more than 500 million years. We find land animals and green plants in soil some ten million

years younger. The vertebrates, the first of which were Fish, are about 300 million years old; amphibious Batracians come next at 285 million years; then the Reptiles at 270 million years—though their great development into gigantic creatures only took place later when the oldest known Mammal appeared, a type of little shrew (field mouse) 160 million years ago; and the forerunners of birds which evolved from Reptiles 120 million years ago. It is only about eighty million years ago that Mammals began to multiply and to branch out from the central group into those we know as carnivora, grazing animals, rodents, and tiny little lemurs, the forerunners of Apes: this was thirty million years ago.

As yet there were no Men, only small creatures heralding the Apes which were developing only in the Old World. Certain groups of these, "*Dryopithecus*," accentuated various characteristics during several tens of millions of years before there are definite signs of Man, though these characteristics show us that they were the advance guard of Man. Some, chiefly in central and tropical Africa and in the Siwalik Hills of Northern India, developed an almost human set of teeth, a bigger brain and sometimes an upright attitude. These were not Men, however, though they resembled them, but Apes, doubtless not very different in behavior from the Chimpanzees and Gorillas of to-day. We now begin to perceive the dawn or slow arrival of Man which lasted as far as we can judge for about two or three million years—attempts at a human type, most of which came to nothing and did not survive.

One day people noticed that all over the Old World—in Asia, Europe and Africa, but mostly in warm regions, from Peking to Java and western Europe—there had been beings who had chipped stone into tools or weapons, using as well bones and deer-horns and perhaps wood (though that has perished), and who had captured Fire and maintained it, without perhaps knowing how to make it. Physically, though they were two-legged, they were not very different from the highest Apes, which I have already mentioned, but their brains were much bigger; they had feet upon which they could walk and human hands which, guided by an in-

genious mind, began to make tools. For these reasons, they were Men, or at least, a kind of Man. They must have had some way of talking, they hunted and ate the flesh of their quarry, breaking the bones and skulls of their victims so as to eat the marrow and brains, and seemingly had a sort of worship of the skulls of their dead relatives. What they thought, even supposing that they did think in our own fashion, we do not know.

About this time the climate, for astronomical reasons, changed in regions not far away from the North and South Poles. There were heavy rains in the regions now tropical, and in the temperate zones and farther north, snowfalls led to the development of huge ice-fields. The ocean, deprived by this vast frozen area of much water which the sun had sucked up from it and which had not been returned, sank considerably, leaving uncovered and dry land bridges which are to-day under the sea.

Tribes of Men, descendants of the preceding ones or of others we do not yet know, lived in the time of these great changes which obliged the animals, who liked a warm climate, to emigrate southwards. But, though life was hard, several tribes remained on the edge of the big ice-fields. In some of these their ancestral brutal appearance was exaggerated, as we see by remains found at Mauer (Baden, Germany). This happened during and between the first, second and third extensions of the ice in Northern Europe.

As the fourth Ice Age drew near, those races most brutal in appearance, such as that known as Neanderthal, prevailed in Europe and there they lived during the first half of this period, hunting mammoths, rhinoceros, great cave bear, wild horses, cattle, and reindeer. They took refuge in rock-shelters or caves. These Men lived from 187,000 to 70,000 B.C. Certain ways of burial, as well as the worship of skulls, are the only signs we have that their thought reached beyond the present life; Death, like Life, was therefore a problem to them.

It was only during the second half of the last Ice Age, after 70,000 B.C., that different groups of human beings like present-day Men appeared in Europe. They lived as hunt-

ers, like their predecessors, whom they no doubt killed off like animals. But the life of the individual, as the life of the race, grew complicated; there are signs of commerce, of the division of labor, of very advanced specialization in the working of stone, or bone—anything wooden has perished. Thanks to the graves and various somewhat involved rites in which red ocher—symbol of life—played a significant part, we know that they ornamented themselves with shells and pierced teeth made into necklaces or bracelets, or artistically arranged and sewn on to their fur garments and hoods. The cold in winter made this warm apparel absolutely necessary and, from a certain date, bone needles with eyes were made for the purpose of sewing these skin clothes together.

Javelins no doubt replaced primitive spears, and these were soon hurled by a throwing stick. These weapons in turn were later replaced by bows and arrows. Sharp stone points, cleverly made, were given to the arrows, or there were deer-horn, bone or ivory darts, sometimes decorated with figures or ornamental patterns, for these newcomers were also admirable artists. The oldest of their works were small female figures of ivory or stone; subsequently they fashioned animals.

Later still they made, in mass, freehand drawings on small objects, some on small flat stones or bone flakes or hunting amulets. But long before this art of "miniatures" developed, they had learnt to trace animal silhouettes on the walls of caves—probably places where there were sacred ceremonies. These were mostly of the beasts they hunted, more rarely of imaginary or composite animals—semi-human creatures, their heads usually covered by an animal or grotesque mask. The use of hunting disguises led to the wearing of ceremonial masks which were supposed to have magic power. Thus, if these people wished to represent spiritual beings, or even God, He or even they were disguised as powers controlling the animal world.

We see all this in the engravings, bas-reliefs, and paintings which are sometimes remarkably perfect and of gigantic size; one bull in the cave of Lascaux is about eighteen

feet long. The painting technique blossomed out at different stages and in cycles; there were two outstanding periods with intervals of lesser achievement between.

These invaders, therefore, evolved somewhere towards the East or South-East, whilst their predecessors carried on and intensified the physical characteristics and elementary civilization of early times. The newcomers quickly suppressed the degenerate remains of an older humanity, but of the origin of these invaders, who were certainly our direct ancestors, we know nothing. When we meet them in Europe they are already mature and of varied type, with a civilization which has passed its early stages, but which they ceaselessly improved. Waves of them followed each other during the last thirty thousand years before our era, each wave bringing fresh elements which mingled with the first, each sharing in the evolution of this steadily developing civilization.

The reign of these people—brilliant hunters, lovers of art and adventure, nomads and, in their own way, religious and thinkers—lasted as long as the Ice Age fauna remained in our Western world, that is to say until about 10,000 B.C.

But other branches of the same races, deep in what are now the Asiatic steppes and African deserts, having discovered pastoral life, laboriously collected flocks and herds; whilst yet others found out how to cultivate plants yielding food and textiles. These peoples had partially blended before they were driven from their original steppes by drought which brought them daily nearer famine. They started marching westwards towards the lands where forests and meadows had gained on the "tundras" and "barren grounds" of the last glacial era.

Pushing before them the weak Mediterranean and Baltic tribes who were better at gathering shell-fish than at hunting, they absorbed the more gifted races devoted to big game hunting. Setting out, perhaps 25,000 years ago from their original birthplace, they reached, step by step, our part of the world and were the first to start Agriculture. They built the first fortified cities and armed themselves to protect their harvests, both of flock and grain. This took

place between 10,000 and 5,000 B.C., according to the regions.

Then, in the Near East, the dawn of written history broke, our Europe was established and the peoples whom we know settled there, forming the base of the present nations. Not one of them remembers the very distant past, the alternating advances and retreats of the glaciers during many thousands of years, or the migrations of warm or cold-loving animals, or the tribes which lived upon them.

Some half-symbolical legends, preserved by shepherds, were all that retained a few confused echoes of the most recent of these far-off days in which the first type of Man, armed with flints and surrounded by gigantic monsters, blazed the trail to the Empire of Humanity.

All that—the deserts, first fertile, then sterile; the seas which swelled upward for about three hundred feet and then sank to double that amount, leaving coasts, archipelagos or land-bridges, first high and dry and afterwards submerged—all that, no one remembers exactly, although, until the discovery of Agriculture at least 15,000 years ago in the East, it was the terrifying setting to life for almost a million years.

Less than two centuries ago the big fossil bones of elephants were still thought to be those of the semi-legendary heroes of proto-historic times. At Hoxne in Suffolk, in 1797, John Frere was the first to declare their animal nature and their association with pointed stone axes made by Man—a detail already observed in 1690 by Conyers in London, although he believed that they belonged to the days of Caesar. John Frere never stopped trying to rouse scientific societies from their torpor on the subject. But it was not until 1847 and onwards that the repeated announcements of his discoveries near Abbeville by Boucher de Perthes brought about a change in learned opinions. It was the tenacity of this literary and philosophical genius which, in 1858–9, induced the visit and control by English savants—Falconer, Prestwich and John Evans—who, with the celebrated geologist, Charles Lyell, certified the accuracy of

his claims. A few months later scientific opinion altered, and Prehistory was born and developed by giant strides.

Not until less than 100 years ago did Humanity come to possess solid proof of its unbelievable age, of the numberless generations through which its physical and ethical types were established; the silent stages during which Fire was first harnessed; then stone-chipping learnt; and then, much later, the art of sculpture and the engraving and painting of living beings. What a marvellous romance, surpassing in its reality all the imaginative dreams of Jules Verne and H. G. Wells!

Is there any problem, any subject, freer from the gloom of present-day history, on which to exercise our imagination or that of our children? Anything farther removed from our economic and social worries? Anything more encouraging of hope in the distant future, than this History of Man in which the Age of Fire takes the place of our Age of Atomic Force?

In the beginning, when Man used Fire incautiously, he must many times have set his straw hut alight, or the dry grass of the steppes, or the forest, before he learnt to control it and use it judiciously. Paying dearly in this way, he discovered how to use Fire as his chief protection against wild beasts, making it serve kitchen and forge and the family hearth where he warmed his limbs. Is not this very much like what is now happening to us with the terrible atomic power, as yet hardly discovered?

In truth, though almost a million years old, Humanity is still in its infancy; after this short phase of three or four thousand years of written history it has still a long road to travel, doubtless longer than those forgotten childish years, the history of which prehistorians search for in the ancient sea-beaches, river terraces, and dark caves.

May Humanity at last see the victory of Peace, thanks to a parallel development on the spiritual side of Thought and Ethics. May the contemplation of this long, splendid and laborious Past be a comfort and refuge to my young readers, amidst the turmoil of the Present. May it create serenity by showing to each of us how humble is our position and

bring the hope of a juster, truer human order, in which the conquests of the Soul and the Ideal will equal those of Physical Force and its application to Industry.

The thesis of the great age of the earth is accepted today without hesitation. One hundred years ago it was the subject of the bitterest controversy, and at the beginning of the nineteenth century only a handful of scientific crackpots espoused it. The Bible was the only source—the only conceivable source—of information on Creation. That event, according to Archbishop Ussher, an Irish divine, occurred in 4004 B.C. Bishop Lightfoot calculated the time more exactly at nine o'clock on the morning of October 23rd. During the Flood, all but a handful of survivors had presumably perished but the earth had gradually been repopulated from Ararat. The details were vague, romantic, and little understood; but so little time was thought to have elapsed between Creation and the time of written history that they were considered unimportant.

The science of geology, founded at the beginning of the nineteenth century by a Scottish physician named Hutton, put a new complexion on the matter. As early as the sixteenth century, Englishmen had excavated ancient forts and barrows, but the giant bones they uncovered were considered those of "elephants"; and prehistoric tools were attributed to men of Roman times, or to fairies, elves, or lightning. Later a spirit of uneasy scientific inquiry developed. In 1797, John Frere of Suffolk wrote the Society of Antiquaries about "weapons of war, fabricated and used by people who had not the use of metal. . . . In the same stratum . . . were found some extraordinary bones, particularly a jaw-bone of enormous size, of some unknown animal. . . . The situation in which these weapons were found may tempt us to refer them to a very remote period indeed, even beyond that of the present world; but, whatever our conjectures on that head may be, it will be difficult to account for the stratum in which they lie, being covered with another stratum, which, on that supposition, may

be conjectured to have been once the bottom, or at least the shore, of the sea."

Prehistoric archaeology thus was a science waiting to be born. A considerable body of evidence was available. Museums were filled with prehistoric artifacts, but their curators had made no attempt to arrange them in logical order. Indeed, no logical order existed. Just as in the study of biology, what was needed was a theory on which to hang the facts. In biology the theory was supplied by the single monumental figure of Darwin. In archaeology the work of numerous contributors was responsible. The following selection by Geoffrey Bibby, which describes the lives of three such contributors, a Dane, a Frenchman, and an Englishman, illustrates the problem and its solution.

Bibby, a native of Westmorland, is a graduate of Cambridge University. As a member of British Army Intelligence, he worked with the Danish underground during World War II. He married a Danish girl and joined the staff of the Prehistoric Museum at Aarhus, Denmark. He has engaged in archaeological research in localities as far removed as Scotland and the Persian Gulf. His book, *The Testimony of the Spade*, from which the following selection is taken, is one of the soundest recent works on prehistoric archaeology for the layman.

THE IDEA OF PREHISTORY

GEOFFREY BIBBY

Thomsen

THE "Father of European Prehistory" is, by general consent, Christian Jürgensen Thomsen, and his claim to a renown greater than has been his lot is that he discovered and introduced to the world a conception which is now

taken completely for granted: a prehistoric succession comprising a Stone Age, a Bronze Age, and an Iron Age.

Christian Thomsen was a Dane, born in Copenhagen in 1788. His father was a prosperous middle-class merchant and shipowner, one of the leading commercial figures of the thriving capital and a director of the Danish national bank. Christian, as the eldest of the six sons of the family, was brought up as a matter of course to take his place at the head of the family business. His education laid weight in particular on modern languages, and he began at an early age to take part in the work of his father's office, filling out invoices and bills of lading, clearing the incoming ships, and attending the Copenhagen Exchange. But soon other interests claimed his attention. Among his boyhood friends were the sons of a Consul-General Grove, a wealthy Danish merchant who was in Paris during the French Revolution and there saw his opportunity to acquire from the fleeing aristocracy a considerable collection of priceless paintings. On Grove's return to Denmark in 1804 Thomsen assisted the family to unpack and hang the treasures, and expressed his intention of starting an art collection of his own. The consul-general, touched by the evident enthusiasm of the fifteen-year-old boy, gave Thomsen a small number of old coins that had also been acquired in Paris, and recommended him to specialize for a few years at least on numismatics. Thomsen took the advice to heart, and within three years had built up a creditable collection and made the acquaintance of some of the leading collectors of the capital.

Then came the Napoleonic Wars, and in 1807, Denmark being ranged on the side of the French Emperor, Copenhagen was bombarded by the British fleet under Admiral Lord Nelson. Thomsen, who served in the city constabulary during the emergency, has left a graphic description of the havoc as the copper roofs of the capital's churches and public buildings sank in sheets of blue-green flame. Among the buildings hit was the house of one of the principal numismatists, a personal friend of Thomsen's, but, working through the night at considerable risk, Thomsen and his friend succeeded in bringing out the precious coin collec-

tion. The chance shot from one of Nelson's ships of the line changed Thomsen's life. For he helped to carry the homeless collection to the keeper of the Royal Cabinet of Antiquities for safekeeping, and thereby came into contact both with prehistory and with the small group of prehistorians who were at that time agitating for a Danish National Museum.

The leader of this movement was Rasmus Nyerup, Copenhagen professor of literary history and Royal Librarian. For some years he had been canvassing for a museum of antiquities, painting enthusiastic pictures in newspaper articles of the attractions of such a museum and gradually arousing interest throughout the country. Finally, in the same year as the bombardment a Royal Commission for the Preservation of Danish Antiquities was set up, consisting of five professors, a bishop, and the Director of the Royal Cabinet. Nyerup was appointed secretary. Immediately consignments of antiquities began to arrive from enthusiastic antiquaries all over the country, and Nyerup discovered that it was very much easier to arouse enthusiasm than to satisfy it. He was by this time getting on in years and was already overburdened by his professional duties and by the work of the library. In 1816, with cases of prehistoric and historical specimens piling up in the back room of the library, he threw in his hand and retired from the secretaryship. The members of the Commission, who had little spirit for the task of cataloging the accumulation, met and, after some hesitation, unanimously appointed Thomsen as unpaid and non-voting secretary. He was then twenty-seven years of age, and probably assumed the thankless post only because he was flattered by being associated with a group of men distinguished by the academic learning that he so conspicuously lacked. One of the Commission, Bishop Münter, had said of him: "Mr. Thomsen is admittedly only a dilettanti, but a dilettanti with a wide range of knowledge. He has no university degree, but in the present state of scientific knowledge I hardly consider that fact as being a disqualification." On the contrary, pleased at having a man with business

training at its disposal, the Commission gave young Thomsen free rein.

For three years he gave a full day each week to his unpaid duties, first bringing order into the chaotic minutes and correspondence files of the Commission, and then turning to the more formidable task of systematizing the collection of specimens. He tells how the collection, then numbering over a thousand objects, lay in parcels or wrapped in bundles, lying on dusty shelves or in cupboards with no semblance of order or labeling. "I had no previous example on which to base the ordering of such a collection," he says, "nor had I any money."

He was in fact fortunate in having no model on which to base his systematization and in having little or no acquaintance with the ancient writings on which, in other lands, preconceptions of prehistory were based. He was forced to base his system entirely on the artifacts themselves, and in so doing he reached conclusions differing in important respects from those reached by the readers of the classical writings. He applied the techniques learned in the shipping warehouses of his family business and divided the collection first into objects of stone, of metal, and of pottery, and then subdivided them according to their apparent use, into tools, weapons, cult objects, and containers. Before he had been working two years he appears to have reached the conclusion that the objects of stone were of an earlier date than those of metal, belonging to a period, he says, "when metal was very expensive."

In 1819 he was able to open his museum to the public, and in it his first three cabinets contained, respectively, objects of stone, bronze, and iron. It would appear, however, that he was not yet completely aware that his division of these objects by material corresponded to a division by chronology. This realization came only gradually in the course of a widespread exchange of correspondence with antiquaries and museum directors throughout Scandinavia and northern Germany. This has resulted in a certain amount of doubt as to whether the idea of a division of prehistory into Stone Age, Bronze Age, and Iron Age actually origi-

nated with Thomsen. Recent investigations of his voluminous correspondence, however, seem to establish his right to the credit for this division, though he himself wrote, in his later years, that Professor Nilsson of Lund University in Sweden had independently reached the same conclusion.

It could, in any case, be claimed that Thomsen merely re-introduced a concept known from classical times. For the early Greek writers Homer and Hesiod lived in a period when iron was still a novelty and when local folk memory could recall the time when "armour was of bronze and tools were of bronze; for black iron was not yet."

But the importance of Thomsen's work was not so much that he postulated the Three Ages, but that he put the postulate to work and demonstrated that its application to the antiquities of a land far removed from Homer's Greece could bring order out of chaos and turn curios into historical evidence.

Thomsen was no lover of the printed word. He gave it as his considered opinion that "far too many books are printed." With characteristic modesty he was convinced that his lack of a university education must of necessity mean that he could not write, a belief to which several thousands of his letters, written in a colorful and lucid style, give the lie. His sole published work for many years consisted of a half-dozen articles to learned journals, mostly concerned with numismatics. Finally, however, he was constrained to write a short account of his arrangement of the Copenhagen museum and of his Three Age system, which appeared in 1836 under the title of *Ledetraad til nordisk Oldkyndighed* (*Guide to Scandinavian Antiquities*). By this time his system was fully worked out, and he gave not only a list of the major items included under each of the three heads but also an account of the art forms belonging to each period, by means of which it was possible to ascribe objects of other materials—bone or wood or pottery, for example—to their appropriate period, and to distinguish between the objects of bronze in use in the Bronze Age and those made of that metal during the Iron Age. His guide achieved immediate popularity, being translated into German and later

into English and French, and his system, previously known only in the restricted area of Scandinavia and in Switzerland, became widely known and discussed over the whole of Europe.

It was not, however, immediately accepted. Particularly in Germany there was strong opposition to the idea of the Three Ages. Taking the theory of division by material in its most literal meaning, the learned antiquaries asked derisively why there should not also be an Age of Pottery, a Glass Age, and a Bone Age. Even in Denmark there were many who denied the validity of the new order. They claimed that the use of the different materials was due to economic rather than chronological causes, that stone tools were used by the poorer classes at the same time the wealthy were using bronze. Later research has shown, moreover, that this was to a limited degree true during the periods of transition from the one age to the next, but otherwise has confirmed Thomsen's division to the hilt. It required many years of research and digging to quiet the doubters.

All this time Thomsen had continued to work in his father's business and had steadfastly refused to accept any salary for his museum work. In 1833, on the death of his father, he succeeded as head of the family firm, and it was only when his mother died in 1840 that he disposed of the business at advantageous terms and devoted himself fully to his museum. From then on he accepted a modest salary, the title of Director, and later the rank of Honorary Privy Councillor.

Many descriptions are extant of the middle-aged director during this period of consolidation. In all he is seen against the background of the museum, in which he spent the greater part of his time, being unmarried and having no interests beyond his coins and his antiquities. A tall thick-set man with kindly brown eyes, clean-shaven and with thick white hair falling to his high stiff collar, he could be seen any Sunday, in his frock coat and drainpipe trousers, sporting a lace stock and an incredibly tall top hat, guiding parties of visitors around his collection. Self-taught himself, he understood to the full the art of interesting others in

prehistory. He would hide behind his wide coattails some object of particular beauty or significance and hold forth at length on the story of the discovery, finally producing the object at the precise point in the story where it had first appeared in the earth. Or, taking a heavy gold torque from one of the cases, he would place it around the neck of the prettiest girl in the party, with the remark: "Yes, they were a proud and well-built race of women in the old days, to bear a three-pound weight of jewelry."

In his later years Thomsen was not always easy to work with. Being of independent means, he could never accustom himself to the necessity of applying for grants for extension of his museum, while he took it for granted that his assistants should be able and willing, as he himself had been, to work long years without salary. But this attitude, while irritating to his subordinates, endeared him to the masters of the Privy Purse, who saw a museum that was the envy and admiration of Europe come into existence at practically no cost to the Treasury. When he died in 1865 he was mourned as an admired friend and as a prehistorian of first rank even by those who had not yet accepted his epoch-making system.

In the verdict of history Thomsen's significance is greater even than his introduction of the Three Ages. He had introduced the idea of time into prehistory. Whether his theory was accepted or denied, no one, after Thomsen published his *Ledetraad*, could any longer suggest or believe that the time before the dawn of written history was a single, short, homogeneous period. No longer could stone axes and iron swords and flint arrowheads and bronze bucklers be lumped together as "Pre-Roman" or "Gothic" or "Ancient British." That Thomsen produced the right answer is not so important as that he asked the right question. In future whenever two artifacts came together a museum curator was bound to speculate which was the older. And the whole of our present knowledge of the prehistory of mankind has come from the necessity of answering that question.

De Perthes

In the year 1788, a month or two before Christian Thomsen was born in Copenhagen, another baby was born in Bethel in the French Ardennes. The baby, christened Jacques, was the first-born of the aristocratic family of Boucher de Crèvecœur. His father, Jules Armand, was the director of customs at St.-Veléry-sur-Somme, and his mother, whose surname he later added to his own, was of the ancient line of De Perthes, who traced their descent to the family of Jeanne d'Arc, the Maid of Orléans.

When Jacques was one year old the Bastille was stormed by the Paris mob and the Terror spread over France.

[In the] Year 10 of the Republic, young Jacques Boucher de Crèvecœur de Perthes started to work in his father's office at the age of fourteen. Three years later Napoleon, now emperor, determined to cut England off from her vital supplies in Europe and employed the two-edged weapon of the Continental Blockade. This necessitated increased activity in the customs service, which was enormously expanded. Jacques, not yet out of his teens, was caught up in the reorganization and was transferred in rapid succession to Marseille, Gênes, Livourne, and Foligno, rising swiftly in rank with each move. He was then sent on an extended tour of Italy and central Europe to report on the effects of the Continental Blockade in those regions, and on his return was appointed to Boulogne. The fall of Napoleon ended this period of feverish rushing from the one post to the other and, after a long tour of duty in Paris, Jacques succeeded in being seconded to Abbeville in 1825 to take over the directorship of customs there on the retirement of his father. He was then thirty-seven years old, a tall spare man with a goatee beard, and his life's work, had he known it, was yet to begin.

Jacques de Perthes had inherited an interest in natural history from his father, while his training in the customs service had perhaps given him a clearer eye than most for what might seem out of place in its environment. However



1-1. An Acheulian Hand Ax of the Type Found by Boucher de Perthes in the Somme Gravels.

that may be, a year after his appointment to Abbeville he was studying the geological strata revealed in a gravel pit not far from the town when his eye was taken by a number of pieces of flint lying in a stratum recognized by the geologists as being from "before the Flood." They appeared to him to be "foreign bodies" and their crude chipping seemed hardly explainable by natural causes. He commenced to keep his eyes open for further specimens from these levels and became a regular visitor at quarries and gravel pits around Abbeville.

It was not, however, until 1832 that he found the first proof, to his own satisfaction at least, that these out-of-place flints were fashioned by man. The proof was a hand ax, of the same type Frere had reported to the Society of Antiquaries thirty-five years before, a pear-shaped flint implement rounded at the butt end to fit the hand and chipped

to a point at the business end. Boucher de Perthes now began to collect seriously, conducting his own excavations into the drift gravels of the Somme valley, the silt levels deposited by the river in ancient times and now cut through by the modern bed.

Gradually he amassed a considerable collection of flint implements from the drift, and together with them found an increasing number of bones of extinct animals. In 1838, convinced beyond a shadow of doubt of the existence of man in northern France at a period unthinkable earlier than had ever been imagined, he laid his collection and his theory before the Société d'Émulation, the local literary and scientific club. He was received with well-bred skepticism. Nothing daunted, the following year he presented his theory before the Paris Institute. Here the skepticism was vocal and unanimous. But Boucher de Perthes was an obstinate man. In his Revolutionary boyhood he had learned that pure reason was the only arbiter, and he professed no allegiance to Biblical chronologies. It had taken ten years to convince him of the existence of fossil man; it would take more than two rebuffs to shake that conviction. He returned to Abbeville and proceeded to publish his discoveries in a monumental work in five volumes entitled *On the Creation*. His book met with no better reception than his lectures. He set to work to amass more material.

In 1847, by now president of the Société d'Émulation, he returned to the attack with a three-volume work on Celtic and antediluvian antiquities, in which he clearly stated that his flints from the drift were thousands of years older than the other antiquities of France. The tide now began slowly to turn. Thomsen's *Ledetraad* had been on the market for ten years, and European antiquaries, though still unconvinced of the universal validity of his Three Age system, were prepared to accept the idea of some antiquities being older than others and the probability that flint tools were the oldest of all. Worsaae, Thomsen's young and brilliant pupil, visited Boucher de Perthes in this year and commented favorably on his collection. But his countrymen remained unconvinced. "They employed against me," said Boucher de

Perthes, "a weapon more potent than objections, than criticism, than satire or even persecution—the weapon of disdain. They did not discuss my facts, they did not even take the trouble to deny them. They disregarded them."

But gradually they were forced to take action. In the early fifties a death blow was prepared. A Dr. Rigollet of Amiens determined to fight De Perthes with his own weapons and conducted a series of excavations at the gravel pits of St-Acheul, avowedly in order to disprove the theories that the sixty-six-year-old antiquary had now been pressing upon a reluctant world for fifteen years. But as he turned up specimen after specimen of the hand axes and other tools that now go by the name of Acheulian after his excavation site, he gradually became convinced that De Perthes was right, and in 1854 he published his excavation report, coming down squarely on the side of his erstwhile opponent.

The diggings at Acheul and Abbeville now became a place of pilgrimage for antiquaries and for geologists from both sides of the Channel, and in September of 1859 Boucher de Perthes had the satisfaction of having his theories vindicated and acknowledged before the British Association and the Royal Society. A month later the distinguished old man with the white goatee beard, his back still as straight as a ramrod, heard in person at the Académie des Sciences M. Gaudry tell how he had himself dug up nine hand axes at Abbeville in association with the bones of rhinoceros, hippopotamus, and mammoth. A twenty-year battle was won.

Instead, however, of resting on his laurels, Boucher de Perthes set to work with redoubled enthusiasm. Hitherto he had found the tools of Stone Age man together with the bones of extinct and tropical animals. Now he would crown his work by discovering the bones of Stone Age man himself. With a touching trust in human nature he offered a substantial reward to the workman who first unearthed human remains from his drift levels. It is hardly surprising that his reward was duly claimed in 1863. Boucher de Perthes accepted without question the authenticity of a jawbone

found in that year in his favorite gravel pit. But the younger school of archaeologists which was now growing up around the old master was more skeptical. An independent investigation by a British archaeologist proved not only that the jawbone was a fake, but that De Perthes's diggings had been consistently "salted" by his workmen with fake hand axes all the way back to 1860, when the acceptance of his theories by the scientific world had suddenly given his specimens a pecuniary value. De Perthes was, however, unanimously acquitted of any deliberate attempt to deceive, nor could the doubts cast upon his later finds be extended to his early work on which his proof of the antiquity of man rested. But though his theories concerning ancient man stood unshaken, his faith in modern man was broken and he retired from active field work. His death five years later, at the age of eighty, closed the career of a great archaeologist and humanist, a man in advance of his time, who had nevertheless carried humanity with him a large step forward toward the understanding of its own origins.

Pengelly

When Jacques Boucher de Perthes received his coveted appointment to the customs directorship at Abbeville in 1825, a Cornish lad of thirteen had just completed his first year as cabin boy and cook's mate on board his father's coastal vessel. He seemed at that period destined to work his way up before the mast, following the merchant seaman's trade to which all boys of his native East Looe automatically gravitated. But fate and his own iron determination had other things in store. The cabin boy was to end as a Fellow of the Royal Society and a president of the Geological Section of the British Association for the Advancement of Science.

William Pengelly desired education. He desired it with a fierce hunger that brooked no denial. In the Europe into which he was born, the Europe that succeeded the Napoleonic Wars, doors were opening up on new horizons of knowledge in every direction. And the keys to those doors

were education, the new popular education that even the working classes could share—if they had the initiative to grasp it.

Boucher de Perthes and Christian Thomsen, for all their pioneer researching and their revolutionary theories, belonged to the eighteenth-century tradition. They were of the comfortably situated, cultured upper class that expected its members to engage, sporadically and not too seriously, in academic work. De Perthes and Thomsen were in fact, for their social milieus, under-educated.

Pengelly, on the other hand, was one of the first examples of the finest nineteenth-century type, the self-educated hard-headed idealist. He had left the village school at the age of twelve, and during the next four years, spent sailing the coastal waters of England, he came to the decision that he must learn more. In 1828 he abandoned the sea and spent the next eight years studying intensively. In 1836 he moved to Torquay, in Devon, and opened a private school based on the new principles of Pestalozzi. The following year he took a leading part in the establishment of the Torquay Mechanics' Institute, one of the centers of workingmen's education which were now beginning to spring up all over England. His interest in adult education soon took up an increasing amount of his time, and he found himself committed to numerous lecture tours to Working Men's Institutes throughout the country. It was at this period that he first became interested in geology, which was one of the most popular subjects of adult education, and he began collecting fossils from sites in Devon and Cornwall. In 1844 he was one of the prime movers in the starting of the Torquay Natural History Society, and two years later he gave up his school and confined himself thereafter to private tuition in mathematics and natural science. He was an inspired teacher and a lucid and attractive lecturer, and he soon counted among his pupils many sons and daughters of the liberal aristocracy of the two counties.

In 1846, looking for a suitable piece of field work for the newly formed Natural History Society, he thought of Kent's Cavern, a cave in the hills above Torquay which had been

explored by two geologists, Father MacEnery and Godwin Austen, in the course of the previous twenty years. Both geologists had found flint implements together with the bones of rhinoceros and cave bear, and both had declared roundly that the stone tools were contemporary with the extinct animals. Here, clearly, was a suitable task for the enthusiastic amateur geologists of Torquay, and they began, under Pengelly's leadership, a careful series of excavations in the debris accumulated within the cave mouth.

Techniques of excavation had at that time not been developed and had to be improvised as the work progressed. The establishment of contemporaneity by careful recording of stratigraphy was unknown. Both the earlier workers at Kent's Cavern had been convinced that the man-made objects they had found were contemporary with the extinct animals because they had found both sealed beneath a layer of stalagmite covering the floor of the cave. But they had been unable to demonstrate this point from their drawings against the argument that men of a later date could have dug holes in the cave debris, as ovens or storage pits, and thereby introduced their implements into an earlier layer containing the bones of extinct species.

A few seasons' work convinced Pengelly that the theory of later intrusion was untenable. It was one thing, however, to be convinced oneself, another to convince the learned societies of England whose members had not examined the cave. Pengelly's published results were received with the same skepticism that had met Boucher de Perthes on his first publication eight years before. It was claimed with some truth that nothing decisive could be based on work in a cave that had been disturbed by the excavations of three separate geological parties.

The seeds of doubt were, however, sown. On either side of the Channel two men were making independent claims that man was older than had ever been dreamed, had been the contemporary of a fauna whose extreme age could not be doubted. It was no longer possible to ignore such claims; it was necessary to rebut them by counter-investigation.

In 1858 an opportunity came of testing Pengelly's claim

on a virgin site. In that year, on the heights of Windmill Hill above Brixham Harbor, the entrance to a cave was discovered in the course of quarrying. The Royal Society and the Geological Society forthwith called upon Pengelly to excavate the new site, assisted—and supervised—by a committee of geologists, the eminence of which might well have induced panic in the breast of a better qualified amateur than Pengelly. But the ex-sailor appeared delighted at the opportunity.

Through the winter of that year Pengelly watched carefully as his workmen exposed a sheet of stalagmite covering the floor of the cavern—and five of England's foremost geologists watched Pengelly. Then, satisfied that there was no break in the sealing layer, they cut through the stalagmite and investigated the levels beneath. Embedded in the stalagmite and beneath it were the bones of cave lion, cave bear, hyena, mammoth, woolly rhinoceros, and reindeer. And among the bones and below them lay numerous flint tools of undoubted human workmanship. Pengelly's triumph was complete.

It was wholly coincidental that two members of Pengelly's supervisory committee the following spring visited Abbeville and had an opportunity to inspect the collections of Boucher de Perthes, whose theories were at that time beginning to win reluctant acceptance in France. But the consequence of the visit was that in that year, 1859, in successive meetings of the Royal Society, the Society of Antiquaries, and the British Association, full acceptance was given to the results of the researches of both De Perthes and Pengelly. The antiquity of man had once and for all been established.

Pengelly had reached the climax of his career at the comparatively early age of forty-seven. He was primarily a geologist, and for some years he turned to an investigation of the lignites and clays of Bovey Tracey, on the edge of nearby Dartmoor. This study was financed by one of his former pupils, the Baroness Burdett-Coutts, daughter of a redoubtable reform politician and herself a lady of decidedly radical views.

In 1864, the year after his election to the Royal Society, he returned to Kent's Cavern at the request of the British Association for the Advancement of Science. He had now the time, the money, the prestige, and the experience needed to carry out an excavation satisfactory to his passion for accuracy. For over fifteen years he gradually worked his way through the cave, plotting the position of every flint artifact, every major fragment of bone. This time there was to be no doubt about the accuracy of his results.

Nor was there. Once again man was shown to have been the contemporary of a strange and savage fauna: mammoth and woolly rhinoceros, cave bear and saber-toothed tiger. This last animal, a carnivore about twice the size of a Bengal tiger and furnished with two long and sharp downward-projecting fangs in the upper jaw, captured the imagination of the time; the illustrated papers carried many a picture of the duel between man and his arch-enemy which once must have been fought out on the heights above the seaside resorts of South Devon.

At the same time these researches were going on, Pengelly wrote several scores of learned papers and lectured to his beloved workingmen's clubs across and across the country. He presided also with dignity at British Association meetings in 1877 and 1883, nor could anyone seeing the elderly gentleman with his humorous mouth and finely domed forehead, his polished wit and fund of anecdotes, have guessed that here stood a self-taught man whose official education had ended at the age of twelve.

He lived to the age of eighty-two, dying in 1894 after a protracted illness at the house in his beloved Torquay where he had lived for nearly sixty years.

During the period when the theory of prehistory was being developed, there were other problems which required solution before archaeology could become a full-fledged discipline. The first half of the nineteenth century saw many brilliant

achievements in field archaeology. Botta uncovered the ruins of Nineveh, Rawlinson copied and translated the stone-carved records of Darius, king of the Persians. In Italy, the ruins of Pompeii and Herculaneum were partially explored. John Lloyd Stephens found an ancient Mayan civilization in the Central American jungle. The men who did these things were amateurs, perhaps, but they were inspired amateurs. They knew the importance of their discoveries and did their best to record them. Their contributions to archaeology remain solid and enduring.

Nevertheless, the principal objective of the archaeologists was the discovery of valuable remains. This was particularly true of classical archaeologists. The British, French, and Germans who explored the lands of the Eastern Mediterranean were interested primarily in enriching their own museums. The ultimate aims of archaeology had not yet been defined.

Moreover, the techniques of excavation in the field were still rudimentary. In general, digging was done on a haphazard basis. The importance of stratigraphy was only vaguely recognized. Cross-dating had not come into existence. There were virtually no methods for the preservation of artifacts. Early records abound in mention of wood and metal objects which on exposure to air "crumbled into dust." The importance of careful recording was honored more often in the breach than in the observance.

The development of techniques was a slow and arduous process. Men like Schliemann and Petrie, though they were criticized during their lifetimes and afterward, added to the fund of knowledge. General Augustus Pitt Rivers originated methods which most nearly approximate the best in contemporary archaeology. A man who inherited great wealth, he investigated the barrows on his estate at Cranborne Chase with military accuracy and precision. Every detail was recorded with elaborate plans, sections, descriptions, drawings, and scale models. Even today, such time-consuming and costly procedures are quite beyond the reach of the average archaeologist. Nevertheless, after the work of Pitt Rivers in the eighteen eighties and nineties, standards became more rigid and haphazard field work was frowned on. Above all it was recognized that the job of the field archaeologist is, in the

words of Sir Mortimer Wheeler, "digging up, not things, but people."

The article which follows, 'Digging Up the Past' by Sir Leonard Woolley should be read against this background. Woolley had no intention of becoming an archaeologist but was induced to do so by one of his teachers. He relates that as Assistant Keeper of the Ashmolean Museum at Oxford he excavated the Roman ruins at Corbridge "in a way which would have scandalized any British archaeologist of today." He had "never so much as seen an excavation, had never studied archaeological methods even from books," but, favored by luck, made important finds. His most notable work was done in Mesopotamia. Beginning in 1912, he excavated the Hittite city of Carchemish with T. E. Lawrence, one of the most conspicuous figures in the politics of the Near East, later author of *Seven Pillars of Wisdom*, who had gotten his start in the languages and customs of Syria working as an archaeologist under Woolley. From 1922 to 1934, Woolley directed the joint expedition of the British Museum and the University of Pennsylvania which excavated Ur of the Chaldees. His finds there were spectacular, throwing new light on the civilization of the Sumerians. His account of some of these finds is printed on page 216. He died in 1960.

DIGGING UP THE PAST

SIR LEONARD WOOLLEY

BEFORE I begin to describe the methods of Field Archaeology it might be as well to say something about its aims. Nobody supposes that the digging up of antiquities is in itself a scientific end, and though there is always a thrill attending the discovery of buried treasure the ever-growing interest of the public in archaeological work is by no means limited to its dramatic accidents; behind the mere romance there is something of real and enduring value.

In these days natural science is unfolding before us a panorama which to our great-grandfathers seemed in its beginnings blasphemous: to them it undermined the foundations of belief, to us it establishes thought upon a base broader and more rational. Science reckons time in millions of years and stretches space to infinity; the wider outlook is there, part of our consciousness, and the more it is explored the better can we understand ourselves. Archaeology is doing the same thing in a smaller field: it deals with a period limited to a few thousand years and its subject is not the universe, not even the human race, but modern man. We dig, and say of these pots and pans, these beads and weapons, that they date back to 3000 or 4000 B.C., and the onlooker is tempted to exclaim at their age, and to admire them simply because they are old. Their real interest lies in the fact that they are new. If mere age be the standard, all that we unearth is insignificant compared to the dinosaur's fossil egg, and, for that matter, what is six thousand years in the life of the human race when we have to calculate that in terms of geological periods? The importance of our archaeological material is that it throws light on the history of men very like ourselves, on a civilization which is bound up with that of to-day.

The political thinker of a hundred years ago would cite his parallels and draw his arguments from the Roman or Greek world, finding that cognate with his own, but there he stopped short; Greek civilization presented itself to him as something born full-grown with no history behind it, giving little opportunity for observing development and cause. To-day we can see that modern man did not begin his career in 500 B.C., nor even perhaps in 5000 B.C.; from the flower of Attic culture we can work back and find the roots spreading far afield, and sending up perennial blossoms all differing with the nature of the soil and the tending they have received, but all of one stock, and in the light of such knowledge we can better judge and control the present and the future growth. And this enlightenment is not merely for the specialist, for the research student in history. The opening-up of the world affects us all, becomes part of

the general intellectual inheritance, and the justification of archaeology is that it does in the end concern everyone. Its direct appeal is due to the fact that, compared with natural science, it comes with simpler introductions. Its subject is modern man, not a universe which resolves itself more and more into an intellectual abstraction, and its material is the work of man's hands. We see the elaborate drainage-system of Knossos and at once feel at home; the cosmetics found in an ancient grave strike us as pathetically up to date; the surprise which a visitor to a Museum expresses at the age of a given object is in exact proportion to his recognition of the object's essential modernity—it is the surprise of one who sees his horizon suddenly opening out; and the advantage of archaeology is that it offers Darien peaks so many and so easy to climb.

I was led to write the above by being told that the first question which the reader would like to have answered might be, "Why does anyone dig?" and that came as a shock, for it had seemed to me so obvious that the purpose of archaeology is to illustrate and to discover the course of human civilization, which is certainly an end worth while. But if the historian uses as his material those relics of the past which the field archaeologist does, as a matter of fact, bring to light, could not the material be produced by casual digging? Is there any justification for a person who claims to be an expert in a specialized branch of science and then does in an elaborate way what the laborer could do much more cheaply?

If that is what the question means—and it could mean a good many things—it betrays complete ignorance of what Field Archaeology is. In its essence Field Archaeology is the application of scientific method to the excavation of ancient objects, and it is based on the theory that the historical value of an object depends not so much on the nature of the object itself as on its associations, which only scientific excavation can detect. The casual digger and the plunderer aim at getting something of artistic or commercial value, and there their interest stops. The archaeologist, be-

ing after all human, does enjoy finding rare and beautiful objects, but wants to know all about them, and in any case prefers the acquisition of knowledge to that of things; for him digging consists very largely in observation, recording and interpretation. There is all the difference in the world between the purpose and the methods of the scientific worker and those of the robber; it remains to be seen whether there is a corresponding difference in the value of the work done.

Supposing that a peasant somewhere or other unearths a marble statue or a gold ornament; he sells it, and it passes from hand to hand until from a dealer's shop it makes its way into a museum or a private collection. By this time nobody knows where it was found or how, it has been torn from its context and can be judged only as a thing in itself; its quality as a work of art does not suffer, but how about its historical value? Experts have to guess, from such knowledge as they already possess, to what country and age it belongs, and if they agree the statue or cup is assumed to illustrate further that particular known phase of art; very likely they will not agree, and it becomes merely a bone of contention for the learned, and a source of confusion for the layman. If the object found be, for instance, a clay pot having no claim to artistic merit, then, stripped of any significance it might have possessed as a historical document, it becomes absolutely valueless; if the finding of an important object be incorrectly reported it becomes a positive stumbling-block to science. Some Arabs, digging in the ruins of a Syrian church, discover by chance a silver goblet adorned with figures in relief, amongst them some which can credibly be identified as Christ and his apostles. Through various hands it passes to America. The dealers are ready with the story that it was discovered at Antioch, and "the disciples were called Christians first at Antioch"; and the world is assured that here is the Holy Grail, the actual chalice of the Last Supper, bearing contemporary portraits of the apostles of Christ; and though the goblet was, in fact, found more than a hundred miles away from Antioch, and though, judging from its style, it must have been made at

least 300 years after Christ's death, it is hard to dispel an error which has already gained a hearing and has so dramatic a ring. In this particular case the harm done to science was less because the story told was demonstrably false, and the purpose of it was clearly interested; many people might be deceived, but the expert was not obliged to recast his knowledge, gained from innumerable dated objects, of the art of the first four Christian centuries; but where the background of definite knowledge is slight an object robbed of its context may be a snare even to the expert. I recall the case of a bronze figure of a lion purchased in China; presumably it was Chinese, but to a certain scholar it seemed to present analogies with the very few such monuments that we possess of Hittite art; he declared it to be Hittite, and then made it the criterion for judging other works of art whose Hittite origin could not be disputed. Here subjective criticism based on too partial knowledge was to blame, but had anything been recorded as to the conditions of the lion's finding we should have been spared so much confusion in the history of Near Eastern art.

On the other hand an object of no value in itself may become a historical document of the greatest importance just because its associations have been properly observed. The great stone ruins of Zimbabwe, in Rhodesia, had long been a puzzle, and the wildest theories were current about them—they had been built by the Phoenicians, they were the Ophir from which Solomon obtained his gold, they were an outpost of ancient Egypt; and observe that if any one of these theories had been proved correct we should have had to revise very thoroughly our views of ancient history. A worthless scrap of Chinese porcelain found in the foundations of the buildings, but found in the course of a scientific excavation properly controlled, proves that the so-called temple is Medieval in date, and must be native African in authorship. A speculator digging for profit would never have bothered about that little potsherd nor, if he had, would anyone have paid any attention to it, for the very good reason that his method would not have been such that his discoveries could have been accepted as scientific evi-

dence: found as it was, it not only knocked falsehood on the head but opened up a new chapter in African history.

Treasure-hunting is almost as old as Man, scientific archaeology is a modern development, but in its short life of about seventy years it has done marvels. Thanks to excavation, thousands of years of human history are now familiar which a hundred years ago were a total blank, but this is not all, perhaps not even the most important part. The old histories, resting principally on written documents, were largely confined to those events which at every age writers thought most fit to record—wars, political happenings, the chronicles of kings—with such side-lights as could be gleaned from the literature of the time. The digger may produce more written records, but he also brings to light a mass of objects illustrating the arts and handicrafts of the past, the temples in which men worshipped, the houses in which they lived, the setting in which their lives were spent; he supplies the material for a social history of a sort that could never have been undertaken before. Until Schliemann dug at Mycenae, and Sir Arthur Evans in Crete, no one guessed that there had been a Minoan civilization. Not a single written word has been found to tell of it,¹ yet we can trace the rise and fall of the ancient Minoan power, can see again the splendours of the Palace of Minos, and imagine how life was lived alike there and in the crowded houses of the humbler folk. The whole history of Egypt has been recovered by archaeological work, and that in astonishing detail; I suppose we know more about ordinary life in Egypt in the fourteenth century before Christ than we do about that of England in the fourteenth century A.D. To the spade we owe our knowledge of the Sumerians and the Hittites, great empires whose very existence had been forgotten, and in the case of other ancient peoples, the Babylonians and the Assyrians, the dry bones of previously known fact have had life breathed into them by the excavation of buried sites. It is a fine list of achievements, and it might be greatly ex-

1. The reader is referred to 'Michael Ventris' and 'The Minoan Script' beginning on p. 143, for a description of work done since the above was written.—*Eds.*

panded; all over Europe, in Central America, in China and in Turkestan excavation is supplementing our knowledge, and adding new vistas to our outlook over man's past; and to what is it all due? Not to the mere fact that antique objects have been dug out of the ground, but to their having been dug out scientifically.

But there is another point arising out of that first question "Why does anyone dig?" People sometimes put the accent in a different place, and ask "Why does anyone *dig*?" Why do they have to use the spade to achieve these admirable results? How does it come about that things get buried and have to be dug up?"

Clearly, in the case of graves, which yield many of the archaeologist's treasures, the question does not arise, for the things were put underground deliberately and have remained there; but how do houses and cities sink below the earth's surface? They do not: the earth rises above them, and though people do not recognize the fact, it is happening all around them every day. Go no further than London. How many steps does one have to go down to enter the Temple Church? Yet it stood originally at ground level. The mosaic pavements of Roman Londinium lie twenty-five to thirty feet below the streets of the modern City. Wherever a place has been continuously occupied the same thing has happened. In old times municipal scavenging did not amount to much, the street was the natural receptacle for refuse and the street level gradually rose with accumulated filth; if it was re-paved the new cobbles were laid over the old dirt, at a higher level, and you stepped down into the houses on either side. When a house was pulled down and rebuilt the site would be partly filled in, and the new ground floor set at or above street level; the foundations of the older building would remain undisturbed below ground. The process would be repeated time after time so that when foundations are made for the huge buildings of to-day which go down nearly as far into the earth as they rise into the air, the excavating gangs cut through layer after layer of wall stumps and artificial filling of which each represents a stage in the city's growth. In the Near East the rate of

rise is faster. The commonest building material is mud brick, and mud brick walls have to be thick; when they collapse the amount of debris is very great, and fills the rooms to a considerable height, and as you cannot use mud bricks twice over, and the carting away of rubbish is expensive, the simplest course is to level the surface of the ruins and build on the top of them—which has the further advantage that it raises your new mud-brick building out of reach of the damp. In Syria and in Iraq every village stands on a mound of its own making, and the ruins of an ancient city may rise a hundred feet above the plain, the whole of that hundred feet being composed of superimposed remains of houses, each represented by the foot or so of standing wall which the fall of the upper part buried and protected from destruction.

I have not mentioned one way in which buildings may be buried, because it is so lamentably rare; that is by volcanic action. If the field archaeologist had his will, every ancient capital would have been overwhelmed by the ashes of a conveniently adjacent volcano. It is with a green jealousy that the worker on other sites visits Pompeii and sees the marvellous preservation of its buildings, the houses standing up to the second floor, the frescoes on the walls, and all the furniture and household objects still in their places as the owners left them when they fled from the disaster. Failing a volcano, the best thing that can happen to a city, archaeologically speaking, is that it should be sacked and very thoroughly burnt by an enemy. The owners are not in a position to carry anything away and the plunderers are only out after objects intrinsically valuable, the fire will destroy much, but by no means everything, and will bring down on the top of what does remain so much in the way of ashes and broken brickwork that the survivors, if there are any, will not trouble to dig down into the ruins; a burnt site is generally a site undisturbed. It is where cities have decayed slowly that least is to be found in their ruins.

Granted, then, that things do get buried in one or other of these ways, how, it may be asked, do you set to work to find them? Why do you dig just where you do?

Burial does not always mean obliteration, and there are generally some surface signs to guide the digger. In the Near East no one could possibly mistake the great mounds of "tells" which rose above the plain to mark the sites of ancient cities; very often, if the place was an important one, it can be identified from literary sources even before excavation begins; the difficulty is rather which point of attack to choose in so great an area. In Mesopotamia the highest mound will probably conceal the Ziggurat or staged tower attached to the chief temple; sometimes a low-lying patch will betray the position of the temple itself. Herodotus, visiting Egypt in the fifth century B.C., remarked that the temples there always lay in a hollow; the reason was that while the mud-brick houses of the town were shortlived and new buildings constructed over the ruins of the old quickly raised the ground level, the temples, built of stone and kept always in good repair, outlived many generations and remained at the same level throughout; on an Egyptian site, therefore, a square depression ringed about by mounds of crumbling grey brick gives the excavator a very obvious clue. Earthworks are enduring things, and the site, for instance, of a Roman camp in Britain can nearly always be traced by the low grass-clad lines of its ramparts, and the round barrows of the old British dead are still clear to see upon the Downs; but even where there is nothing upstanding, surface indications may not be lacking. In a dry summer the grass withers more quickly where the soil lies thin over the buried tops of stone walls, and I have seen the entire plan of a Roman villa spread out before me where no spade had ever dug; darker lines in a field of growing corn or, in the very early morning, a difference of tone given by the dew on the blades, will show where buildings run underground: nowadays air photographs bring to light masses of evidence invisible to one who stands upon the ground. An air photograph gives us the whole layout of the Roman village of Caistor, so that the excavator can confidently select the particular building he would like to dig, whereas, before, the site of Caistor was unknown; even more remarkable is it that an air photograph discovered Woodhenge,

and showed on the plain surface of ploughed fields the concentric rings of dots where thousands of years ago wooden posts had been planted. From the ground such things are often quite invisible, or visible only at some lucky moment. At Wadi Halfa, in the northern Sudan, MacIver and I had dug a temple and part of the Egyptian town, but, search the desert as we might for two months, we had failed to find any trace of the cemetery which must have been attached to the place. One evening we climbed a little hill behind the house to watch the sunset over the Nile; we were grumbling at our ill luck when suddenly MacIver pointed to the plain at our feet; its whole surface was dotted with dark circles which, though we had tramped over it day after day, we had never seen. I ran down the hill and the circles vanished as I came close to them but, guided by MacIver from above, I made little piles of gravel here and there, one in the middle of each ring; and when we started digging there next morning our Arab workmen found under each pile the square, rock-cut shaft of a tomb. The original grave-diggers had heaped the splinters of stone round the mouth of the shaft, and when they filled it up again a certain amount remained over; 4000 years had produced a dead level of stone and gravel where the eye could distinguish no difference of arrangement or texture; but for the space of five minutes in the day the sun's rays, coming at a particular angle, brought out a darker tint in the stone which had been quarried from deeper underground—but, even so, the effect could be seen only from above, and perhaps from a single point.

The archaeologist, in fact, has to keep his eyes open for evidence of all sorts. At Carchemish, in North Syria, my old Greek foreman, Gregori, an experienced digger if ever there was one, and I, completely mystified our Turkish inspector. We told him we were going to excavate a cemetery, and as we had not previously found graves he was duly interested, and asked to be shown the spot. We took him outside the earth ramparts of the old city to a ploughed field by the river bank, lying fallow that year, and, pointing to the fragments of pottery which strewed the ground, explained

that these constituted good evidence for the existence of a graveyard. Then Gregori and I, consulting together, started to make piles of stones marking the position of individual graves. This was too much for Fuad Beg, who protested that we were bluffing him; I betted that we should find a grave under every pile and no graves at all except where we had put a mark; he took the bet and lost it, and spent a month wondering why. It was really a simple case of deduction. The river bank was of hard gravel, the made soil overlying it very shallow, and disturbed to the depth of only about three inches by the feeble Arab plough; the field, being fallow, was covered with sparse growth, for the most part shallow-rooted, but with a mixture of sturdier weeds of a sort whose roots go deeply down; if one looked carefully it became manifest that these weeds were sometimes single, but often in clumps of four or five plants, but a clump never measured more than six feet across; at some time or another the gravel subsoil had been broken up, so that the plant roots could penetrate it, and it had been broken up in patches which would be just the right size for graves; the broken pottery on the surface represented either shallow burials or, more probably, offerings placed above the graves at ground level, and every deep-growing weed or group of weeds meant a grave-shaft. The deduction proved correct.

It was deduction of another sort that led to the discovery of Tutankhamen's tomb. The Valley of the Kings at Thebes contained the known graves of all the Pharaohs of the Eighteenth Dynasty except two: clearly it was the burial-ground of the dynasty, therefore *all* the kings of that dynasty ought to have been found there, and since they had not, the missing ones were still to seek, but to seek within the valley confines. For three years the late Lord Carnarvon worked in that part of the valley which was still unexplored, shifting the thousands of tons of limestone chips which filled the bottom of the ravine, scraping the cliff sides in search of a possible doorway, and it was only when the wearisome task was well-nigh done that the astonishing discovery was made: he and Howard Carter owed their success not to a

stroke of good luck but to the patient following-out of a logical theory.

While the excavation is actually in progress the archaeologist's attention is necessarily devoted to each individual object in turn; as soon as it is over he has to consider his discoveries collectively, and what were museum exhibits become units in a series out of which history has to be made. We have been dealing with a cemetery which presumably contains a large number of graves; the cemetery must have been in use for a considerable length of time and therefore ought by its contents to illustrate the modifications of culture which took place during that time; very likely there were no dates known at all when the dig began, and the objects from the graves are the only material we possess for the history of a long period; how then is the archaeologist to use his material?

A visitor from Mars seeing a great collection of English domestic objects, costumes, etc., ranging in date from 1650 to 1900, but all mixed up together, could get a general idea of a moderately high level of civilization, but could not picture what the setting of life was like at any particular date; if the things were put in historical order our Martian, assuming that he were reasonably intelligent, could not only visualize each period but could trace the course of invention and evolution throughout three centuries. That is precisely what the archaeologist tries to do.

Where inscribed documents are found the history produced by digging may be extraordinarily detailed. At Meroe, in the Sudan, Dr Reisner excavated a number of pyramid tombs which had escaped the notice of less methodical diggers; inscriptions showed that they were the graves of Ethiopian kings and queens. Now for a short time, about the seventh century B.C., Egypt was ruled by Ethiopian Pharaohs; their names were recorded, but nothing was known as to how this conquering dynasty developed in its original southern home nor what happened to it after it was again driven out of Egypt, nor by what process there evolved out of it the Graecized royal house of Candace

which ruled Ethiopia in the days of the deacon St Philip. Dr Reisner was able to put all his tombs in chronological order and to work out the genealogical tree of the entire family; as the result of a single excavation a complete chapter of ancient history could be written for the first time, and the growth of a civilization which at one time dominated Egypt could be traced in detail.

But supposing that there are no written records to define the order of our discoveries, what then? Then the archaeologist is thrown back on his own resources; he has to deduce the order from the facts which he has observed and it is on the fullness and accuracy of his notes that the value of his results will depend. Every point in which one grave differs from another may prove to be evidence for relative dating, and must be brought into the argument; because nothing is known nothing must be neglected.

Where the number of graves is large, and the objects from them are numerous, it will generally be possible to recognize with tolerable certainty an earlier and a later group. In some classes of objects there are sure to be signs of development of technique, of the gradual conventionalizing and degeneration of ornamental motives, of the evolution of vase types, and extreme instances of any such process may be taken as dating evidence for particular graves. Sometimes this modification in the contents of the graves may correspond with their position in the cemetery, and it will be clear that the latter expanded in a regular fashion, either along a line or outwards from a center, and then the plan of the cemetery will become the first basis of classification. Or the evidence may be more direct, as in the great cemetery at Ur, where very often the graves lie one directly below another in a series which may number half a dozen separate burials; obviously the lower grave must in every case be older than the upper, and wherever the series of superimposed graves is fairly long the lowest of all is likely to date fairly early in the period represented by the cemetery as a whole, and the topmost is likely to be reasonably late in the same period. This is the one certain fact on which all future argument must be based.

The archaeologist first analyses in tabular form the sum of his field notes; in parallel columns he will have the number of each grave, its depth, character, direction, and all its contents symbolized by type numbers—then he can proceed to make his comparisons. Taking first the score or so of graves which by their position at the bottom of a series he knows to be relatively early, he compares their contents, and will probably find that they have a good deal in common—that the same types of clay vessels and the same forms of weapons or tools appear in many of them. Then, taking the score or so of late graves, he may find again that there is a certain similarity between them, but that the pottery types of the early graves, and the metal forms, do not re-appear, or re-appear seldom, in the late graves, while the forms which characterize the latter are wanting in the early group. If he can establish that fact he is on fairly sure ground. Assuming that his two groups do represent approximately the beginning and the end of his cemetery period, he will go on to examine in the light of their contents the rest of his graves. Graves which contain only forms regarded as early will be added to the first group; those with some early types mixed up with others about which nothing is as yet known will provisionally be classed together as marking a step forward in time; those in which early types are outnumbered by unknown types will be attributed to the next phase of advance. Perhaps in this way a third of the graves may be placed in what is hoped to be a chronological grouping, and two-thirds will be left over as containing types still indeterminate. These provisional results must be checked. The graves of the group supposed to be the earliest but one, how do they lie in the ground? Does their depth in relation to the other graves justify our theory? Do the other contents, beads, gold ornaments, cylinder seals and so on agree with the evidence of the pottery and the bronze tools? If they do, we can assume that we are on the right track, and then the types of vessels and tools found in them but not in the graves of the earliest group of all can be taken as characteristic of their period, and can be used for classifying other graves in which they

occur, but the earliest forms are not found at all. Gradually, fresh groups are formed at the expense of the undefined residue of graves left between the early and late groups, and with fresh evidence arising from each new classification, that undefined residue is in time reduced to nothing, and the whole cemetery is classified in a series of groups of graves which follow a really chronological order and illustrate a rational process of evolution.

Then begins a further correlation. On building sites we have found the remains of houses lying one above the other, each level producing its harvest of broken clay pots, copper utensils and what not. Comparing these with what our cemetery has given us, we may be able to connect various building strata with the sequence-periods of the graves; then for each phase we shall have something of the conditions of living as well as the habits of burial; if, in the building strata, there are ruins of temples, we can add elements of religious ritual and belief.

Just as, in the process of excavation, the archaeologist requires the help of the architect for the reconstruction of his buildings, and of the epigraphist for the reading of his inscriptions, if such be found, so, too, a measure of teamwork is necessary for dealing with the mass of material of all sorts which excavation provides for the reconstruction of social life. The graves, for instance, will have produced a number of human skulls and skeletons; the anthropologist will take charge of them, and from their physical characteristics determine the racial connections of the original people and perhaps trace the advent of new stocks, and the relative dating for that advent may coincide with the appearance of new fashions in weapons or pottery; the evidence of disease, arthritis, abscesses in the teeth and so on, will help to explain life conditions, and the setting of broken bones or marks of trepanning will illustrate the surgical knowledge of the period. Figures in stone or clay, drawings on pots or engraving on metal may give some idea of the looks and dress of the people; remains of cloth—sometimes only the impression preserved on metal of cloth whose substance has perished—will show their skill in weaving, and

spindle-whorls, loom-weights, and combs will illustrate its process; the constant recurrence in the graves of a long pin lying near the shoulder and parallel with the bone of the upper arm will prove that the outer garment was an unshaped and unsewn shawl or cloak wrapped round the body under one arm and fastened by the pin over the other, a brooch under the chin will mean a shaped gown open at the neck, the remains of a belt will add to the picture which, with knowledge of materials and some idea of styles, we can begin to form. Preserved in their original order, bracelets, necklaces, and head-dresses reproduce rather than suggest the past. The elaborate head-dresses worn at Ur by the court dames of the period of the royal tombs are by now familiar—in the Sargonid age, about 2600 B.C., they have given place to simple ribbons of gold; had these been purchased in the market they would have told us nothing, but found in position they show how two long plaits with gold coiled about them were brought from behind the ears and fixed one above the other across the forehead.

The geologist will try to trace the sources from which were derived the raw materials, often imported from abroad, of the manufactured goods; foreign connections and trade routes become manifest. Etruscan graves in Italy, Crimean barrows, graves in Syria and Hungary show how the traders in Baltic amber pushed their business into the far South: the tools and weapons of the royal cemetery at Ur are of bronze, containing a certain percentage of nickel, and as the only ore known to contain nickel in that proportion comes from Oman, on the Persian gulf, we can safely assume that it was from Oman that the Sumerians of 3500 B.C. derived the metal for their foundries, while the lapis lazuli, which they employed so freely for ornaments, came from the Pamir mountains, NW. of India. Below the deposit of sand left by the Flood we found two beads of amazonite, a green stone for which the nearest known source is in the Nilghiri hills of Central India, or in the mountains beyond lake Baikal—and at once there is called up the astonishing picture of antediluvian man engaged in a commerce which sent its caravans across a thousand miles of mountain and

desert from the Mesopotamian valley into the heart of India. Bones found in the middle-heaps of houses, or scattered on their floors, will tell the naturalist what breeds of domestic animals were kept, what wild animals were hunted and eaten; the dried contents of store-jars or pots of offerings will show what grains and what fruits were grown and used for food, while arrows of special types, fish-hooks and net-sinkers, hoes, plough-shares, sickles, and grindstones illustrate the manner in which the hunter and the farmer played their part. If written documents be forthcoming with which the epigraphist can deal, much more may be learnt of social organization and of positive chronology, but even without that, the comparison of the contents of different strata ought to bring out the main vicissitudes of a city's life, as well as the slower processes of development and decay. A single excavation is not likely to yield a complete or a continuous record, but by the time a number of sites have been dug the sum of the results worked out by the field archaeologist and his collaborators will be a genuine addition to history. To-day we can read, as our grandfathers could not, the story, vivid and circumstantial, of civilizations newly unearthed and of epochs in man's experience which until recently were literally "dark ages"; and realizing that of all this we have perhaps no contemporary written evidence, or virtually none, some may have been inclined to doubt its value, mistrusting the imagination which seems to base so much on a few potsherds. There must be imagination if life is to be breathed into the dry bones of a dead civilization, but imagination has not been allowed to run riot; the value of the "few potsherds" as documents for the building-up of history depends, as I have tried to show, on the scientific methods which the archaeologist employs in his work; accurate observation and faithful record are preliminary to any reconstruction.

The prime duty of the field archaeologist is to collect and set in order material with not all of which he can himself deal at first hand. In no case will the last word be with him; and just because that is so his publication of the material must be minutely detailed, so that from it others may

draw not only corroboration of his views but fresh conclusions and more light. But no record can ever be exhaustive. As his work in the field goes on, the excavator is constantly subject to impressions too subjective and too intangible to be communicated, and out of these, by no exact logical process, there arise theories which he can state, can perhaps support, but cannot prove: their truth will depend ultimately on his own caliber, but, in any case, they have their value as summing up experiences which no student of his objects and his notes can ever share. It is true that he may not possess any literary gifts, and that, therefore, the formal presentation of results to the public may be better made by others; but it is the field archaeologist who, directly or indirectly, has opened up for the general reader new chapters in the history of civilized man; and by recovering from the earth such documented relics of the past as strike the imagination through the eye, he makes real and modern what otherwise might seem a far-off tale.

Mention has been made of the relationship between archaeology and other sciences. During the twentieth century and particularly since World War II, new scientific discoveries have revolutionized certain phases of archaeological technique. They are described here by Sir Mortimer Wheeler who, like Breuil and Woolley, is one of the great modern archaeologists.

The son of an impecunious newspaper editor, Wheeler studied at University College and was encouraged in his ambition to become an archaeologist by Sir Arthur Evans, discoverer of the Palace of Minos in Crete. After serving in World War I, he was appointed Keeper of Archaeology in the National Museum in Wales. He revolutionized the country's archaeological practice, an experience which was to benefit him later when he faced a similar task in India. Returning to England, he made a classic dig at Maiden Castle, disclosing in detail the Early Iron Age life of the inhabitants and "the whole process of the Roman attack on

the fortress." In World War II he saw active service in the African desert, going from there to head the Archaeological Department of the Republican Government of India. His experiences in India are described in his article which appears on page 264. Wheeler has been President of the Society of Antiquaries, Secretary of the British Academy, and a Trustee of the British Museum. He is a believer in rigorous techniques in field archaeology.

NEW TECHNIQUES IN ARCHAEOLOGY

SIR MORTIMER WHEELER

THE MAIN FUNCTION of this essay will be to indicate something of the preoccupations and skills of twentieth-century archaeology, and stress will be laid upon the advancing application of scientific method to the study of man during the past decade or two.

Many specific skills relate to the recovery and analysis of archaeological material from the soil, but it should be emphasized that archaeology and excavation are not synonymous terms. Whilst it is sufficiently certain that major archaeological discoveries will, in the future as in the past, be the result of excavation, no cleavage is here implied between the preoccupations of the digger and those of the antiquary whose chosen field may be Georgian architecture or church vestments. From neolithic pottery to Victorian gas-lamps, the study of the past is essentially integral; and the actual overlapping of techniques is surprisingly recurrent throughout the range of that study. If emphasis is here laid upon those procedures which are especially applicable to prehistory, that is only because prehistory is manifestly dependent to a special degree upon such precision as scientific aids can lend to it.

With that proviso, it may be averred that the basis of sys-

tematic archaeological excavation is the observation and record of the *stratigraphy* of an ancient site. The term, like much else in archaeological technique, is borrowed from geology, into which it was introduced early in the nineteenth century by William ("Strata") Smith, author of *Strata Identified by Organized Fossils*. The principle of stratification is simple enough: it is the layering or lamination of a deposit resulting from the successive operations either of nature or of mankind. In the latter case, the human occupation of a patch of ground for any appreciable time will normally produce a succession of layers due to construction or occupation; floor succeeding floor, interleaved by *débris* of one kind or another, and forming in section an aggregation of strata which, with their contents, may be compared with the pages of a book. The implication follows that in the process of dismemberment the strata (or pages), with the contained relics (or words), must be kept in proper sequence if the section (or book) is to be read and understood. It is therefore the constant endeavor of the archaeologist, digging down through a stratified site, to isolate scrupulously the successive layers and their contents and to record their interrelationship. How this principle is carried into practice lies beyond the scope of the present essay; it must suffice here to affirm the primary and overriding importance of stratigraphy as a means to the recovery of the relative sequence of structures and cultures, from the lower or earlier to the higher or later, as they lie buried beneath the modern surface of an ancient site.

This process of stratigraphical excavation was carried to a fine art by General Pitt Rivers in Dorset¹ at the end of the nineteenth century, but a precocious instance of it is recorded as long ago as 1784. The practitioner was none other than Thomas Jefferson, then Governor of Virginia and later third President of the United States.² Unfortunately, it was many years before his successors in the archaeological field caught up with this remarkable pioneer.

The scrupulous observance of stratification, then, has two

1. See page 27.—Eds.

2. See page 362.—Eds.

primary aims: first, to group relics, layer by layer, in their time-relationship with one another—relics from the same layer being normally of approximate date; and secondly, to indicate the relative time-sequence of one group of relics with another, lower groups being manifestly earlier than superimposed groups. But a *relative* chronology such as that implies, useful though it be, is not enough. Only an *absolute* chronology—calendar dates—can in the long run enable us to equate one culture or civilization with another and so to produce a comprehensive and intelligent picture of human achievement in its significant interrelationships. Unless that ultimate aim can be achieved, our archaeology will be a mere scrapbook, without plot and purpose. Written record, where it exists, is of course a vital aid in this process of rationalization; but written record carries us back no more than 5,000 years, and very inadequately at that. Prehistory is a hundred times as long as history, and other aids must be sought. Let it be said again that in recent years science has come dramatically to the rescue.

In the present century, the Swedish geologist, Baron Gerard de Geer, recognized in the clearly varved or laminated clays of his country the annual deposits of the retreating ice-field; the principle being that during the summer seasons the fringe of the ice-field had melted and deposited the geological material which it contained, and that the process had been interrupted or punctuated by the intervening winter seasons. The gradual amelioration of the climate had led to a slow over-all recession of the ice, so that (to simplify the process) from south to north the annual deposits overlapped one another like the slates on a roof. The deposits differed sufficiently in content and thickness to enable the geologists to identify them with fair certainty from pit to pit from south to north-central Sweden, where the process has continued approximately to the present day, and so to count the actual number of summers which have elapsed since the south of Sweden was first released from the ice-field. De Geer calculated the initial date as 6839 B.C.; others have preferred a slightly earlier date, but the difference is not very material. It is now generally

agreed that something like 9,000 years have elapsed since Sweden first became habitable by animals and therefore by man, and the estimate has set a term to wild guessing in this fundamental matter. In consequence it has been possible to give approximate dates to a series of changes in the Scandinavian coast-line, climate and vegetation, and to produce an absolute time-frame for the cultures of post-glacial man in northern Europe.

This attainment is an outstanding instance of the application of a purely geological stratification to archaeology. We turn now from vertical stratification to what is in effect horizontal stratification: from geology to botany, and from Sweden to Arizona. Here a younger contemporary of de Geer's, Dr. A. E. Douglass, has worked upon the tree-ring sequence of long-lived trees in the western states of America, where, for example, some of the Sequoia trees of California have lived for over 3,000 years. Again, the principle is not difficult, albeit its application is a highly technical process. It is a familiar fact that a section across a tree grown in a climate with seasonal variations reveals concentric growth-rings, usually representing annual accretions, which will differ with the age of the tree and the climate of the particular year. In years of drought the growth will naturally be less than in wet years, but a tendency for the rings to group in 11-year cycles, in conformity with the 11-year sun-spot cycle, has suggested that solar radiation is a further and independent factor. The variant features of individual rings or their groups are indeed sufficiently distinctive to enable them to be plotted chronologically from long-lived trees of recent terminal date, and to use the plot for comparison with timbers derived from ancient structures. When it be recalled that in America almost everything prior to the sixteenth century is prehistoric, the potentiality of this method as a means of extending a time-scale backwards into the equivalent of our Middle Ages is obvious. And some of the results have in fact been astonishing. In the south-western states, particularly Arizona, are prehistoric Indian villages or *pueblos* which incorporate logs or beams in their structures; and comparison of the growth-rings of these tim-

bers with the Sequoia and other time-charts has not infrequently made it possible to date them with a remarkable precision back to several centuries before the European conquest. Thus, individual *pueblo* timbers have been dated as early as the eighth century A.D., though most of them are after rather than before A.D. 1000. There remains, of course, the imponderable factor of the date of construction relative to the date at which the component timbers were actually cut. Timbers were liable to be reused from building to successive building, and a particular structure may thus be appreciably later than the tree-ring dating that one or more of its timbers would alone suggest. But the method itself has won acceptance, and is of great use within range of modern trees sufficiently aged to provide the necessary comparisons and controls.

Very recently, another kind of time-test has been applied to these *pueblo* timbers, as to many other organic relics related to the study of man in many parts of the world. The test is one that can, without exaggeration, be described as the most important addition to archaeological technique in the present century. It is a byproduct of atomic research, and was first announced by Dr. W. F. Libby and his colleagues from Chicago as recently as 1949. Its mechanism is still short of perfect, but its results are already revolutionary. It is known as the Radio-Carbon or the Carbon 14 (C14) test, and its principle is as follows.

Coming from the outer space, cosmic rays produce in the atmosphere radioactive carbon atoms of atomic weight 14. The Carbon 14 or C14 thus formed is an isotope of ordinary carbon of atomic weight 12 (C12); and both are contained in the carbon dioxide of the atmosphere in a *constant proportion* to each other. Now this carbon dioxide is taken in by plants, and, since all animals—even carnivores—derive their body-material ultimately from plants, it is universally incorporated in living organic matter. Therefore, the proportion of C14 to C12 in all living organic matter is the same as in the atmosphere.

But, once an organism is dead (for example, when a tree is cut down), it ceases to take up carbon from the atmos-

phere. On the contrary, the C14 content slowly diminishes, reverting to nitrogen at such a rate that after about 5,600 years (termed the "half-life") only half the original amount of C14 is left. After twice that period, only half the residue—i.e. a quarter of the original quantity—is left, and so forth until all the C14 has disappeared.

In dead organic matter, therefore, the ratio of C14 to C12 decreases with time *at a known rate*. The surviving proportion of C14 to C12 in a given organic specimen can be determined in the laboratory, and from it the time elapsed since the "death" of this organic matter can be calculated.

That is the principle. In practice the difficulty is that even the initial ratio of C14 to C12 is exceedingly small and therefore difficult to compute with precision. At first it seemed likely that about 20,000 years would be the maximum range of computation; but now the maximum has been doubled and, with the increasing perfection of the computing machinery, something approaching 100,000 is prophesied. Even with the inevitable margins of error and other complications as yet incompletely understood, that represents a very formidable advance of precision into prehistory, and will lead during the next generation to an extensive reassessment and enlargement of our understanding of human "progress."

Meanwhile a few examples of the application of the C14 test may serve to illustrate its present scope. Thus in North America the last (Mankato) advance of the Wisconsin glaciation passed over tree-trunks the average age of which by the C14 method is about 11,400 years from the present day, less than half the age expected by geologists. It is shortly after that time that man is thought to have first appeared in North America. The oldest artifacts determined by this method in America are several pairs of rope sandals covered by volcanic deposits in Oregon; the age indicated was about 9,050 years, i.e. about 7000 B.C. In the eastern United States, the earliest cultures are proving so far to be later than in the west. Carbon 14 dates suggest that man spread there under 5,000 years ago, but much verification is needed. Other C14 determinations are reported to confirm the beginning of the

First Dynasty of Egypt at about 3000 B.C. Charcoal and shells of land-mollusca from a village site, Jarmo, in the foothills of northern Iraq, where agriculture was seemingly practised but pottery-making was unknown, have yielded average dates of about 4700 B.C., making Jarmo at present the earliest known agricultural settlement in the world. Nearer home, C14 has ascribed a date of about 7000 B.C. to a settlement of primitive mesolithic food-gatherers at Star Carr in east Yorkshire. These and other evidences of the kind are beginning to shine like small beacons in the long dark vistas of human achievement, dimly lighting new paths for the bemused prehistorian and gradually softening the transition from history to prehistory.

Parallel with the Carbon 14 analysis, other tests have recently been applied to buried bones, in some instances with dramatic results. One of these tests is based upon the fact that fluorine, an element which is widely distributed in ground waters, is absorbed by bones and teeth buried in them. The rate of absorption varies from place to place, but bones which have lain for the same period of time in the same deposit will contain approximately the same amount of fluorine. Thus, whilst the quantity of fluorine taken in by a particular bone is no index of absolute date, it is a clear indication of relative antiquity in a comparison with the fluorine content of other bones from the *same* area.

Three notable examples will show how this method works. In 1888 a human skeleton was found by gravel-diggers at Galley Hill, near Swanscombe in Kent, at a depth, it was said, of eight feet. The same gravels produced Early Palaeolithic hand-axes of flint and remains of extinct elephant, rhinoceros and lion. The human skeleton was substantially of modern type, and if it also was of Early Palaeolithic date it was a very remarkable testimony to the antiquity of modern man. Expert opinion was divided, however, as to whether the human bones were or were not intrusive into this ancient deposit, and the matter remained in doubt until 1948. In that year both the Galley Hill skeleton and a selection of the animal bones were submitted to the fluorine test. The animal bones were found to contain approximately 1.5

per cent. of fluorine, the human skeleton only 0.5 per cent.; thus the relative modernity of the latter was proved beyond doubt, and Galley Hill man has ceased to trouble the scene.

But in the same Swanscombe gravels were found in 1935-6 fragments of another human skull, also of relatively recent type. This time the discovery was made at a depth of twenty-four feet, so that the risks of intrusion were *prima facie* very much less. Application of the fluorine test in 1948 in fact removed any possibility of doubt; the reaction was 1.7 per cent., if anything therefore slightly more than that of the bones of fossil mammals (1.5 per cent.) from the same deposit. Swanscombe man is a genuine antique; he can boast the oldest human brain-case known in Europe, and may be claimed as a veritable ancestor of modern man although he lived perhaps a quarter of a million years ago.

It was however in 1953 that the fluorine test achieved its greatest triumph, albeit a melancholy one. In this year tests were renewed upon the famous bones and implements found at Piltdown in Sussex before and after 1911. The bones included parts of a cranium comparable with that of *Homo sapiens*, a mandible and canine tooth of ape-like character, and a number of fossil mammalian specimens. Attempts to assemble the cranium and the jaw had produced an incongruous "dawn man" which had been accepted by some palaeontologists and rejected by others; but none had suspected the simple truth, namely, that the whole discovery was a fraud. Initial proof of this solution of the problem was provided by successive fluorine analysis. These showed that the jawbone, with a fluorine content of only 0.03 per cent., was utterly modern, whilst the skull bones contained just enough to show that they were ancient, though probably less than one-tenth as old as had been claimed. Further examination demonstrated that the jaw and canine were actually those of a modern chimpanzee or orang, rubbed down and colored to simulate antiquity.

It is unnecessary here to follow the process of detection in its details, but reference may be made to a confirmatory test of another kind. It has been shown that bones preserved under the same conditions lose the nitrogen of their protein

at a relatively slow and uniform rate. Thus new bones retain a proportionately large quantity of nitrogen, old bones a proportionately small quantity—a reverse process to that of the gradually *increasing* fluorine content. As applied to the groups of bones which have been described above, this test indicated that the Galley Hill skeleton retained 1.6 per cent. of nitrogen, whereas the fossil mammals ostensibly from the same deposit showed only a scarcely-measurable trace; the Swanscombe skull appropriately retained a similar faint trace; whilst the Piltdown jawbone retained as much as 3.9 per cent., which may be compared with the 4.0 per cent. in a fresh bone. In one way and another the Piltdown “discovery” has been shown up as one of the outstanding hoaxes in the history of science, and today the only remaining interest of *Eoanthropus dawsonii* rests in the personality and motive of his modern creator!

Enough has now been said, perhaps, to indicate something of the extent to which modern science is variously contributing to the study of man. Examples only have been chosen; thus nothing has been said of important estimates of time based upon the rate of sedimentation in certain Swiss lakes since the withdrawal of the ice, or of the more accurate and marvellous calculations based upon measurable variations in the amount of radiation received by the earth from the sun. Suffice it that these and other calculations, beyond the easy comprehension of the layman, are combining to provide a graded vista of the slowly accelerating efforts of man or near-man to “make” himself during the last half-million years or more. In one way and another, science has brought a new orderliness into our study of our remoter selves.

From these various efforts to create something approaching a calendar for human prehistory, we may turn to modern methods of collecting and assembling archaeological evidence in the field. Amongst the more familiar of these is air-photography, which during the past thirty-five years has won a leading place amongst archaeological techniques and has added more substantially to knowledge than has any other form of field-survey. As long ago as 1880 attempts

were made to photograph ancient sites from the air by the attachment of cameras to small balloons, and photographs of Stonehenge were taken from a war-balloon in 1906. But it was not until the First World War that serious attempts were made to procure archaeological photographs from an aeroplane, and the main credit for this pioneer-work goes to the Germans. When the German forces were operating in Sinai and southern Palestine, a special Commission under Theodor Wiegand was attached to them for the specific purpose of photographing ancient sites, and some of the admirable results of this enterprise were published in 1920. About the same time, Lieut.-Col. G. A. Beazeley observed and photographed ancient town-sites and irrigation-channels near Baghdad; he published a brief account of them in 1919, actually a year before the appearance of the German volume. But it was not until 1923 that the possibilities of archaeological air-photography penetrated beyond a limited circle of interest.

In that year Dr. O. G. S. Crawford, examining air-photographs of the Stonehenge area taken two years previously, observed upon them indications of the complete course of the "Avenue" between the monument and the river Avon. The Avenue is a processional way flanked by banks and ditches which are now visible on the surface only for a short distance from the stones. The remainder, long flattened, appeared upon the photographs as dark lines which represent the course of the former ditches and are now seen seasonally from the air owing to the ranker growth of the vegetation over the relatively loose and moist ditch-filling. The completion of the plan of the Avenue suggests its function: to provide a ceremonial approach from a water-way up which pilgrims and indeed some of the stones themselves may have been transported. For geology has established the fact that the smaller ("blue") stones of Stonehenge were brought anciently from as far afield as the Prescelly Mountains of Pembrokeshire.

Under the leadership of Dr. Crawford, this discovery was followed by many others through the same medium. In particular, whole field-systems dating roughly from 500 B.C.

to A.D. 500 have been identified on the Wiltshire, Dorset and Sussex downs and elsewhere, and our knowledge of ancient agriculture has thereby been revolutionized. New types of prehistoric structure—notably, timber circles or temples of the late Stone and early Bronze ages—have been recognized, and buried buildings and fortifications of prehistoric and Roman dates have been added almost without cease to our archaeological maps. Abroad, above all in deserts such as those of North Africa and the Near and Middle East, Roman and pre-Roman forts, town-plans and adjacent agricultural systems have been surveyed from the air. In Algeria and Syria, Roman frontier-works and the social economy of the Roman frontier-zone have for the first time been made intelligible by systematic air-photography. It is fair to say that not a year passes without some significant addition to our knowledge in this fashion.

How does air-photography “work”? In fact, there is no great mystery about this. In the first place, the camera sees nothing that the eye cannot see; indeed, it sees less since it cannot see color. But on the one hand it provides a conveniently static instead of a moving picture; and, on the other, it integrates the *dissecta* of an ancient site—its banks, ditches, pot-holes, pits and buried walls—in a manner rarely feasible in haste or at close range. Less immediately obvious, perhaps, is the answer to the question, How does the air-camera see *at all* vestiges which may be wholly or nearly invisible on the ground? Yet here again the principle is sufficiently simple.

It is this way. Soil, once disturbed by man, scarcely ever again consolidates into the semblance of unmoved earth. An ancient ditch may be filled flush with the adjacent surfaces, but its filling remains looser and more sponge-like than the latter. Roots penetrate more easily into it and find more moisture. Vegetation along the line of the filling is ranker and greener. From a height the ditch is liable to appear as a dark line along the surface of the ground. Alternatively, the favorable bedding may attract a luxuriant growth of nettles or poppies. The poppies still sold for charity on “Poppy Day” in our streets commemorate the

lines of poppies which marked the filled or partially filled trenches of the First World War in France and Flanders.

Conversely, an underlying band of hard material, such as buried road-metalling or wall-foundations, is *less* permeable than the adjacent soils. Over it the vegetation, receiving less moisture, will tend to grow shorter and, in the case of corn, will ripen sooner than uninhibited vegetation in the neighborhood. Thus the streets of a Roman town may show clearly through a ripening crop as light lines across a greener field. Here color is the main factor, though differential relief helps. On landscape, or in seasons, marked by more uniform growing-conditions, relief will be the main factor, so that observation and photography should then be undertaken in the early morning or the evening, when the sun is low and shadows emphatic. Choice of light and choice of season are thus the two main controls in archaeological air-photography.

Since the Second World War, Dr. J. K. S. St. Joseph, of Cambridge University, has co-operated skilfully with the Royal Air Forces in systematic photography of this kind; and his results, stored at Cambridge, have added very remarkably to our knowledge of old sites and new in England and southern Scotland. In particular, our knowledge or potential knowledge of the Roman conquest and military occupation of northern Britain has been enormously enlarged by his work, and it will be many years before mere earth-bound archaeologists are able adequately to exploit and define his discoveries.

Since 1946, by way of supplementing uncertain indications from air-photography or other records, an ingenious electrical device has been used effectively under suitable conditions for the planning of buried ditches, walls or roads. It has long been known that the subsoil, or rather the moisture contained by the subsoil, is a conductor of electricity, and that the degree of conductivity varies with the nature of the soil. The method is briefly as follows. A measuring-tape is laid out across the presumed line of the buried feature, and alongside the tape at regular intervals four (or five) steel rods are driven to a depth of about eight inches

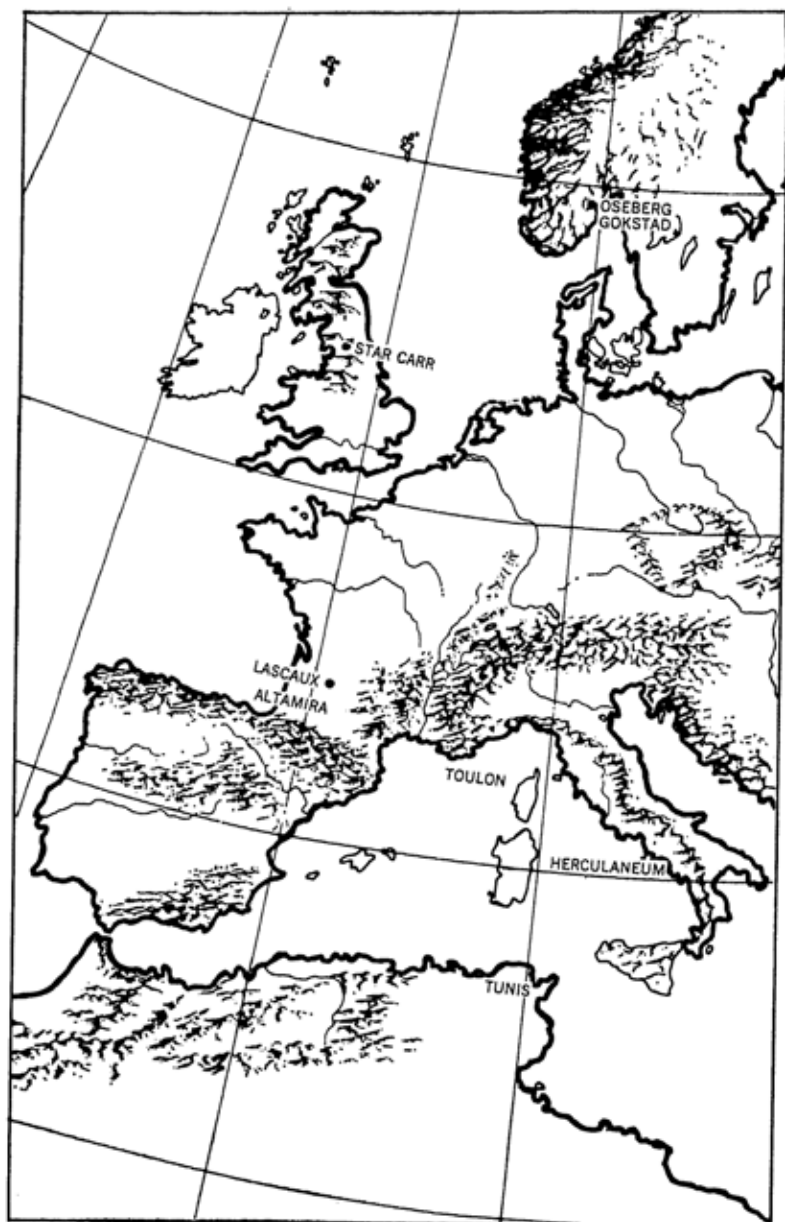
into the ground. These rods are electrodes and are linked with an apparatus which comprises (a) a generator worked by a handle and (b) an instrument for recording the resistance encountered by the current thus generated as it passes through the soil from electrode to electrode. The varying resistances are registered in ohms, and, when plotted, may be expected to indicate a higher resistance than normal when the current is obstructed by buried stonework or a lower resistance than normal when the looser and moister filling of a pit or buried ditch is encountered. The sensitivity of the instrument is limited to a depth of about four feet, and a pre-condition is a relatively uniform subsoil free from rocks or stone-debris. The best subsoils are gravel, sand, clay, peat and chalk; and in these materials surprisingly accurate results have been obtained by Mr. R. J. C. Atkinson in England and by other investigators in France, Germany and America. A classic example is the plotting of neolithic and Early Bronze Age earth-circles at Dorchester near Oxford, where subsequent excavation revealed less than a two per cent error. The outer walls of a Roman house near Oxford were also traced exactly, and the Saxon town-walls of Cricklade in Wiltshire were first detected by this method. Roman roads in the Oxford region have similarly been mapped and their width ascertained; and the extent of an Anglo-Saxon cemetery near Croydon in Surrey has been tested, the results being confirmed by excavation. Whilst no universal utility is claimed for this apparatus, its occasional utility is indubitable.

Any sketch of modern archaeological preoccupations would be incomplete without a word or two upon the advances in geographical analysis which have marked the last half-century. Here, again, a pioneer was Dr. O. G. S. Crawford who, shortly before the First World War, was already mapping Bronze Age and other distributions, and so beginning to relate ancient man specifically to his environment. But it was Sir Cyril Fox who, first in his study of the Cambridge region and later in that of Britain as a whole, set the new standard for environmental geography as the background of pre- and proto-history—or indeed of

history in its fullest amplitude. The reconstruction of a landscape on the basis of its surface-geology and the careful relation of human vestiges to its controlling features gave archaeology a three-dimensional quality which it had largely lacked, and lent an authority to sociological generalizations that was substantially new in spite of Pitt Rivers's pronouncement long ago that "distribution is a necessary prelude to generalization." With all allowance for highly important work in Scandinavia, in this matter of environment British archaeologists have tended in recent years to outpace their foreign colleagues.

Alongside the mapping of the ancient population-pattern goes the somewhat simpler problem of ancient travel and trade. It is now over thirty years since geology proved that the "blue-stones" of Stonehenge came from Pembrokeshire, although the full significance of this remarkable fact remains hidden. More recently much work has been done by geologists on the distribution of neolithic stone axes in Britain with notable but more readily intelligible results. These results, based as they are upon the microscopic examination of rock-sections, are as objective and reliable as geological science can make them, after allowance for the unlikely accident of unidentified outcrops. They prove the unsuspected extent to which artifacts in ancient times were liable to move from their place of origin. Thus stone axes quarried on Penmaenmawr in North Wales reached Hampshire on the one hand and the lowlands of Scotland on the other, and other Neolithic or Early Bronze Age industries covered a comparably wide field. This petrological survey, which has now been carried on systematically for some years, is opening a new chapter in British prehistory, and its methodical extension to the Continent is an obvious need of the near future.

II. Western Europe



WESTERN EUROPE

II. Western Europe

Approximately twenty to thirty thousand years ago, an extraordinary race of men inhabited Southern France and Northern Spain. They used rudimentary stone implements and relied on hunting to get their food. They were apparently primitive savages; yet, astonishingly, they founded a naturalistic school of art which produced delicate engravings, large and skillful friezes, and sculptures in the round and in relief. Their school is known as the Franco-Cantabrian and is the first artistic activity of which we have any knowledge. It seems to have sprung up suddenly and without ancestry, to have existed for several millennia, and to have disappeared without descendants. We can only surmise whether it came into being for purposes of magic or religion, or to satisfy some vague artistic impulse. No skeletal remains of the creators have been found. Hidden in caves or buried in the earth, there may be other examples of Old Stone Age art. So far we know of nothing else resembling it.

The story of the discovery of this cave art, the initial refusal of antiquarians to accept it as authentic, and the final recognition of its importance, is one of great dramatic interest. The outstanding specialist on this subject is the Abbé Breuil. Annette Laming who discusses it in *Lascaux and Upper Paleolithic Cave Art*, is one of the most articulate of the younger French archaeologists. She studied at the Sorbonne, became a member of the French Resistance in World War II, and since then has been a member of archaeological expeditions to Switzerland, England, and South America. Her books include *Lascaux*, *L'Art Préhistorique*, and *La Découverte du Passé*.

LASCAUX AND UPPER PALEOLITHIC CAVE ART

ANNETTE LAMING

ON 12 SEPTEMBER 1940 four boys from Montignac¹ in Périgord were strolling along the wooded plateau which dominates the valley of the Vézère from a height of more than 300 feet, when suddenly their dog disappeared down a hole which had been opened up a few years earlier by the fall of a fir-tree uprooted in a storm and was now half-concealed by brambles and brushwood. No one had ever thought of exploring this hole: indeed, the local peasants had covered it with a pile of brushwood to prevent their animals from falling into it.

The boys called their dog in vain: they could neither see nor hear it. When they threw a stone down the hole, it seemed to be very deep. Nevertheless, one of them forced his way through the tangle at the cost of a few scratches and lowered himself into a horizontal fissure of the rock. It was not very deep, but the floor of damp, slippery clay sloped abruptly downwards, until, at a depth of about 52 feet, the boy found himself in a low gallery without a chink of daylight. He was followed by his companions and soon all four boys and their dog were reunited. The gallery seemed to lead further into the gloom, which the matches they lit failed to illuminate; so, when their supply became exhausted, they had no choice but to climb up the fissure again and push their way through the hole to daylight.

There is not a single person in the valley of the Vézère who does not know of the painted caves and the rich sites which have been discovered there; and every young Périgordian is something of a prehistorian, for their schoolmas-

1. Two of the boys, Ravidat and Marsal, are natives of the Commune and subsequently became guides to the cave—indeed they still fill this office. The third, Agnel, was on holiday in Montignac, and the fourth, Coencas, was a refugee there.

ters always allocate a certain amount of time to the study of Prehistory. The four boys were therefore highly excited by their adventure; but they told no one of it. The following day they returned to the hole with a rope and a rough-and-ready lamp which they had contrived from an old grease-gun: the great moment of discovery was at hand. Following the low gallery which they had not been able to explore the previous day, they came to a vast oval chamber whose walls were painted right up to the roof with enormous bulls surrounded by horses and deer. There were also traces of other figures, but their inexperienced eyes could not decipher them.

Two galleries led from the Great Hall: on their walls red, yellow, black, or brown ibexes, horses, massive bulls, smaller cows, and files of deer followed each other in the utmost confusion. Some figures were isolated, others depicted in long files or in jumbled groups; many of them were painted, some were painted and engraved, and others, more difficult to distinguish, engraved only. The four boys were much elated by the discovery they had made, and ran to tell their former schoolmaster, Monsieur Laval, of their experience. At first he was sceptical, but finally he was convinced and accompanied the boys to the cave. What he saw there astounded him, and he lost no time in informing prehistorians that a new painted cave had just been discovered.

Abbé Breuil, the eminent expert on Palaeolithic art, was advised of the discovery on 17 September and arrived on the spot almost immediately. On 21 September, together with Dr. Cheynier and Abbé Bouyssonnie, he inspected the cave. All three of them were immediately convinced of the authenticity of the discovery; they declared it to be one of the most beautiful Palaeolithic caves known and stated that the condition of the paintings was remarkable. Monsieur D. Peyrony, at that time Director of Antiquities of the district, and the Prefect of the Dordogne were told of the cave, which they visited in their turn on 27 and 28 September. The news then spread like wildfire, and the little town of Montignac was soon in a state of great excitement. Everyone wanted to see the cave, and it was not long before

large numbers of visitors arrived—journalists, photographers, and sightseers—to whom Abbé Breuil kindly explained the paintings and commented on them. To prevent any damage being done to the cave, the four boys camped near the entrance.

Immediately its discovery was announced, the cave was classified as a historical monument and a plan drawn up for its equipment and protection. But it was war-time; so all that could be done was to close it to the public, who might do damage, and protect it from contact with the outside atmosphere, for variations in degrees of temperature and humidity play an important part in the deterioration of Palaeolithic paintings. Work on the cave was not resumed until 1948, long after the liberation of France. Apart from the fitting-up of the interior, this work included the erection of a stairway to the entrance, the organization of a system to prevent water draining from the plateau into the cave, the construction of two protective walls at the entrance with a waiting-room for visitors between, and finally, the building of a roadway to the cave in place of the old path.

Today Lascaux is one of the most famous sites of Palaeolithic rock art in Western Europe, and every year thousands of tourists and dozens of experts visit the cave to admire its paintings and engravings. The equipment—stairs, cement paths, electric lighting—has been designed as discreetly as possible and allows the cave to be visited as easily as a museum. Care has likewise been taken to illuminate each painting to the best advantage. All this work was indeed essential if the cave was to attract a large public, who would hardly care to sink into slimy clay or slide about on damp ground by the light of a candle; but those who wish to experience and understand the magic of the cave must try to forget the intrusion of modern man; they must ignore the reflectors and cement paths, the admiring throng and their comments, and envisage Lascaux deserted and mysterious as the four boys found it—exactly as it was fifteen thousand years ago.

The electric lighting, pale and constant, overpowers the paintings, for an important part is played by the irregulari-

ties of the rock-face; and the presence of people has the effect of curbing the imagination and robbing the cave of its mystery. It must be visited for a long period in solitude by the flickering light of a small hand-lamp as similar as possible to those used by the Palaeolithic artists—a candle-lamp, for example, for then, in the silence, the sanctuary of the Palaeolithic hunters with its animals leaping and running in the play of the light and shadows is seen unchanged—overwhelming and awe-inspiring.

The first example of Palaeolithic art—an engraving of hinds on a fragment of bone—was discovered about 1834 in the cave of Chaffaud (Vienne). Its great antiquity was not recognized at the time, for there was still great doubt whether “antediluvian man” had in fact ever existed; and the possibility of there having been an artistic culture at such a remote epoch had never been considered at all.

In 1879, a Spanish archaeologist, Don Marcelino S. de Sautuola, explored the cave of Altamira for the second time. His little daughter, who was playing beside him in the cave, suddenly called out to him that she saw some bulls on the ceiling. Sautuola looked up and, to his utter amazement, saw that there were indeed numerous painted and engraved animals distributed in wild confusion on the vaulted ceiling above his head: a horse, a large hind, and numbers of bison in a variety of attitudes. He immediately examined the inner galleries of the cave, where he found many more paintings.

Sautuola never doubted the extreme antiquity of the paintings; but, though supported by Juan Vilanova y Piera in Spain and Piette in France, his theories were utterly rejected by a sceptical scientific world. For a brief while, it is true, the curiosity of prehistorians was aroused; but they soon lost interest in the matter and it was not even mentioned at the International Congress of Prehistoric Archaeology and Anthropology held at Lisbon only a year after the discovery.

Years passed, and then, in 1895, at a meeting of the Académie des Sciences, Émile Rivière reported the discovery of certain paintings and engravings on the walls of the

cave of La Mouthe near Les Eyzies which he ascribed to prehistoric cultures. He too met only with skepticism. Nevertheless, such discoveries increased in number. At last, in 1901, when Les Combarelles and Font-de-Gaume in the Dordogne near the prehistoric centre of Les Eyzies were discovered within a few months of each other, the antiquity of cave art was generally recognized and these masterpieces of prehistoric art were duly acclaimed. The authenticity of all the discoveries so far made was then conclusively established, and Émile Cartailhac, one of the eminent prehistorians of the day, who had been among the first to deny the antiquity of the paintings at Altamira, now made a point of publicly recognizing the cave which he had previously done so much to discredit and condemn to oblivion. His 'Mea Culpa of a Sceptic,' published in 1902 in *L'Anthropologie*, marked the end of the experimental stage in the study of prehistoric cave art.

Examples of realistic animal portrayal are to be found in almost all painted and engraved caves. A medley of horses, wild oxen, reindeer, ibexes, bison, and long massive columns of mammoths, lions, bears, and rhinoceroses loom up from the depths of the caves; it is primarily this fauna, extinct in our regions for thousands of years and now resuscitated for us in these paintings, which gives to Quaternary art its consistent character. Cave art is essentially an animal art; whether expressed in paintings, engravings, or sculptures, in huge friezes or the most delicate tracings, it is always—or nearly always—inspired by the animal world. But the hunter-artists did not depict all the animals they knew: they selected those which must have played a large part in the minds and thoughts of the community, particularly the animals they hunted. They portrayed horses or oxen which provided excellent food; lions which were dangerous and had to be killed; and others whose tusks or antlers supplied needs now long forgotten. Hyænas, wolves, seals, reptiles, fishes, and birds are seldom portrayed.

The bare rock-face, unprepared and unsmoothed, played an almost active part in the creation; its irregularities, de-

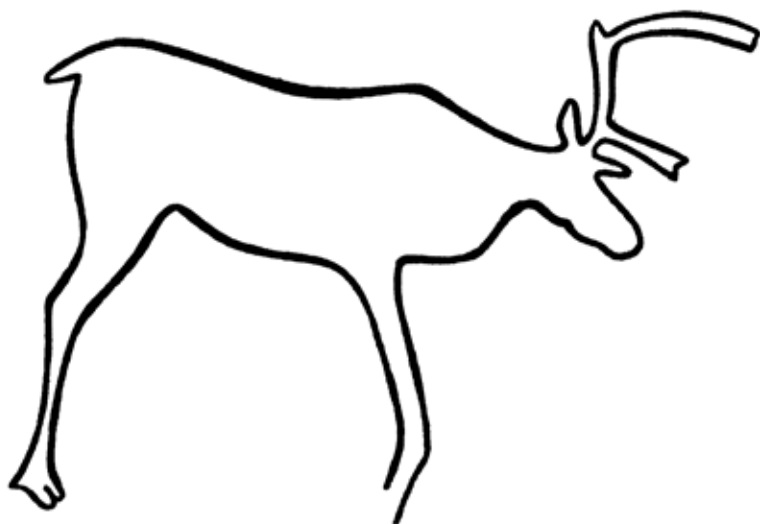
pressions, cracks, and ledges, its interplay of hollows and reliefs, far from hampering the artists, would seem to have guided and inspired them. Indeed, the natural contours of the rock, suggesting sometimes the rump, sometimes the belly or the trunk of an animal, and sometimes even the entire beast, often seem to have been the essential inspiration of a composition.

Countless examples can be cited, but neither drawing nor photograph can ever do justice to the evocative power of the rock walls of a cave. Without having spent long hours at a stretch in Palaeolithic caves examining the surfaces of the walls by the uncertain gleam of some fitful light and allowing one's whole being to be overcome by the silence and the dark, it is impossible to realize the extent to which the caves themselves guided the hands and fired the imaginations of those Quaternary artists. Some evocative projection, some play of shadow on the rock-face, has often been a decisive factor in the selection of a subject and its position. The horse's head on the right of the large panel in the cave of Pech-Merle is formed almost in entirety by a natural indentation in the rock; the contours of the bison at Altamira are strangely delineated by the irregularities of the rocky vault; the rump and a leg of one of the horses at Font-de-Gaume are entirely formed by a stalactite; at Arcy-sur-Cure the legs and trunk of a mammoth seem to emerge from massive stalactite formations; the muzzle, forehead, ears, and humped back of the little brown bear in the Hall of the Bulls at Lascaux are outlined by the irregularities of the rock wall; and at Le Portel a projecting stalactite forms the enormous phallus of a human figure.

The paintings of the Palaeolithic sanctuaries mark a culminating point in the history of mankind, or perhaps it would be more precise to say that they represent a culminating point for the historian of mankind. On the cultural plane there is no knowledge of what artistic manifestations preceded these paintings—what dances, music, or songs—and there is no knowledge of any beliefs or ceremonies. They are all lost for ever, for without tangible evidence

their existence cannot be accepted. Apart from the earliest burials, these Palaeolithic sanctuaries provide the first testimony of any human activity unconnected with immediate material needs. On the emotional plane the paintings seem to bear witness to a sense of religious awe, of harmony, and of beauty which brings these remote ancestors of ours closer to us; on the technical plane to show a capacity to create magnificent works of art; and on the intellectual plane to mark the first step towards conceptual art and writing itself.

The first groping efforts of the Aurignacio-Perigordian artists developed with amazing speed into huge impressive paintings such as those at Lascaux. It was indeed several millennia (exactly how many is not known) before this first school of monumental painting reached the period of its finest achievements; but, in comparison with the hundreds of thousands of years preceding them, these few millennia are insignificant, and the artistic development within this period



II-1. Reindeer engraved on rockface, Norway. Example of animal art of the prehistoric epoch.

was so rapid that it can justly be described as a sudden outburst of man's new-found faculties.

Cave art, however, was but a bright flame which burnt itself out. The Western European cultures which followed the Magdalenian at the end of the last glacial period and the beginning of the post-glacial era have left no evidence of any comparable graphic art. Indeed, there are no traces at all of any such monumental artistic achievements in Western Europe until the renewed flowering of religious art in the Middle Ages produced its magnificent crypts, basilicas, and cathedrals.

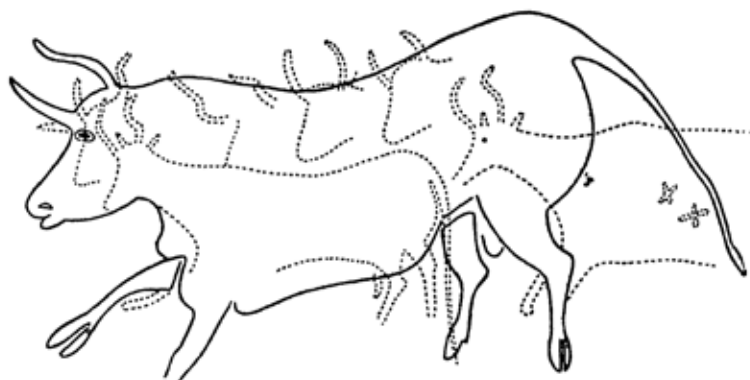
Palaeolithic art, of which the Lascaux paintings are among the most significant examples, thus stands out as an isolated phenomenon in time, the forerunner of other great artistic achievements. Neither in human societies nor in nature is progress constant: each advance is made in sudden leaps and bounds followed by halts and fresh starts.



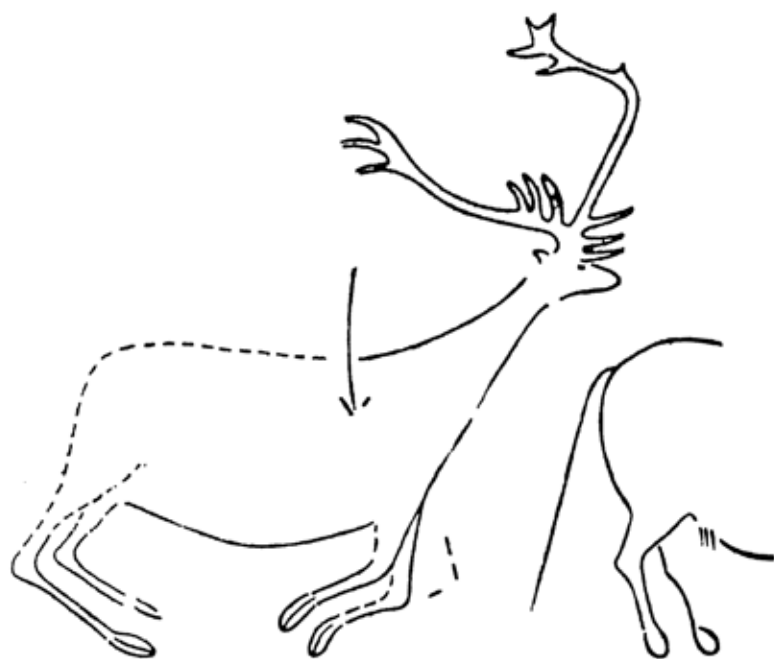
II-2. Lascaux: Group of five horses and one bison painted and engraved at the entrance to the Main Gallery. The engraving of the bison seems to show different versions of the head. Length of the first horse on the left is 3 feet 8 inches; length of the bison 4 feet 5 inches.



II-3. Horse's head engraved at the entrance to the Main Gallery.



II-4. The large black bull of the Painted Gallery and its superpositions. In the upper register: Four heads of bovids in bistre outline. In the lower register: Two slender cows painted in black and red. Length of bull from the nostrils to the root of the tail 10 feet.



II-5. Wounded deer painted and engraved on a wall in the Chamber of Engravings. The body has almost vanished, but the hoofs and the antlers are clearly visible. In front of it there is a painted and engraved horse.

The culture of the Franco-Cantabrian artists would have been classified by Thomsen as that of the Stone Age, but shortly after his time it became apparent that his simple divisions of prehistory were inadequate. The crudely chipped flints discovered by De Perthes and Pengelly and the polished tools in the Copenhagen Museum were products of entirely different cultures, separated by long periods of time. Additional masses of evidence resulted in the division of the Stone Age into the Paleolithic and Neolithic. Later a Middle Stone Age, the Mesolithic, was added. Since then a complex system of inter-related and overlapping cultures, under constant reexamination, has arisen. The Mesolithic period is the background for 'A Stone Age Hunters' Camp' by Grahame Clark. Clark is Disney Professor of Archaeology and head of the Department of Archaeology and Anthropology at Cambridge University. He is the author of *The Mesolithic Age in Britain* and *The Mesolithic Cultures of Europe*, and his excavation at Star Carr is considered one of the most brilliant in modern British archaeology.

A STONE AGE HUNTERS' CAMP

GRAHAME CLARK

A LITTLE more than half a century ago a party of archaeologists from the National Museum of Denmark began to explore traces of a Middle Stone Age settlement in the Great Bog on the Danish island of Sjaelland. They found some hand-chipped flints, which was not too remarkable. But because they were digging in a site which had been waterlogged for a very long time, they had the great luck to find also some preserved organic material: tools and equipment fashioned from bone, antler and even wood; discarded animal remains, and traces of the vegetation that had grown at the time the site was occupied.

The time was not long after the last Ice Age. The climate was still cold, with rather more marked seasonal differences than obtain today. Sea levels were a good deal lower than now, due to the amount of water still locked up in the Pleistocene ice-sheets. The vegetation was dominated by pine forests. Oak and other warmth-demanding trees were still rare. Elk and wild ox were the chief game animals; there were also some red and roe deer and wild pigs. The people who had camped at the site were hunter-fishers who did not yet know agriculture.

To these people archaeologists gave the name Maglemosian, after *Magle Mose*, Danish for Big Bog, where the first settlement was found. It was a new Middle Stone Age culture previously unknown. During the past 30 years, however, traces of similar settlements have turned up at widely separated points over the whole plain of Northern Europe, from Eastern England and Northern France to as far east as Estonia. Evidently hunting bands of the Maglemosian type had ranged over the whole of these extensive territories during the time when much of the North Sea was still dry land and the Baltic was a landlocked lake. Everywhere the hunters had camped on the shores of lakes, most of which have since been filled up and converted into bogs.

Three years ago¹ a party of young Cambridge University archaeologists started digging in Yorkshire to find out more about these people. Although a fair amount had been learned about their geographical spread in Europe, very little was known about any single group of them outside the West Baltic area, and almost nothing about the British Maglemosians. We located a likely site on the edge of an ancient lake bed at Star Carr, in east Yorkshire, and explored it during the summers of 1949, 1950 and 1951.

As so often happens in archaeology, we did not find precisely what we had expected. It turned out that the settlement we excavated at Star Carr was a good deal older than any previously explored on the Continent at which organic substances had survived. In other words, we had the chance to investigate an earlier phase in the adaptation of the North

1. In 1949.—*Eds.*

European hunters to the incoming forest. Our Star Carr people were living at a time when the forests were still composed almost entirely of birch trees with but a small proportion of pine. How long ago was this? According to our best information, including radiocarbon measurements of two samples of birchwood, it was somewhere between 9,000 and 10,000 years ago.

On digging away the overlying peat and mud, we found a small camp site of not more than 300 to 350 square yards; hardly more than three or four families can have occupied it at once. The people evidently wanted to live as near the lake as possible, for they pitched their camp directly on the reeds bordering the open water. They threw down quantities of birch brushwood, interspersed with stones and wads of clay, to help consolidate the yielding surface of the swamp. The inhabitants must have sheltered in skin tents or temporary huts.

Since the Maglemosian economy was to a large extent based on hunting, we were glad to recover quantities of animal remains—antler and bone. On the drier landward side this material was badly decayed, where it had not entirely vanished. But the bone and antler recovered from the lakeward side was quite solid and a beautiful pale chestnut brown. Because it would split and eventually disintegrate if allowed to dry out, every piece had to be impregnated with polyvinyl acetate under vacuum conditions to preserve it.

All the mammals represented were wild, and with few exceptions they were forest forms. The foremost victim of the Star Carr hunters were the red deer. Roe deer, elk, beaver and two races of wild ox were also fairly common. In addition there were a few remains of wild pig, fox, wolf, marten, badger and single bones of a hare and a hedgehog. That the Star Carr people also carried on fowling activities was witnessed by the bones of a number of birds, including the red-throated diver, red-breasted merganser, crane, white stork and grebe—all species at home on inland waters. We found no fish-bones, but it seems altogether likely that these people, living at the edge of a lake, must have fished. We did recover the middle portion of a wooden pad-

dle, apparently the oldest implement of water navigation yet found anywhere in the world. Unfortunately there was no clue to what kind of boats the Star Carr people had. At the edge of the brushwood, where the open water of the ancient lake began, was a group of felled birch trees, which may have been a rough landing-stage.

Great quantities of worked flint, mostly the debris chipped off in the manufacture of tools, lay about the site. The extreme freshness of the material has made it possible to study the processes of manufacture in unusual detail. One of the most significant tools represented was the axe or adze. There were axe marks on the stumps of felled birch trees. Apparently this tool was put to considerable use and frequently resharpened, because there were many flakes of the kind that would be struck off in the process of renewing its cutting-edge.

Most of the flint tools and fragments were connected more or less directly with hunting or with working the various materials obtained from wild animals. Among the commonest kinds were tiny pointed flakes, some of which were used to tip arrows and others as barbs set lower down the shaft. These small flints were held in position by resin, perhaps distilled from birch bark as in stone-age Switzerland. The Star Carr people gathered birch bark and, like the modern Lapps, stored it in tightly wound rolls. Other common flint tools at the Star Carr site were various scrapers, indicating that the people used animal skins for clothing and possibly for tents and boats.

Most striking, however, was the large number of flint burins—tools for working bone and antler. Animal antlers and bones played an important part in the economy of these people. We found at Star Carr no fewer than 193 barbed spearheads, almost all made from the antlers of red deer. Narrow splinters were cut out of the antlers with burins, and a row of pointed barbs was then cut along one edge. These spearheads, ranging from about 3 to 14 inches long, undoubtedly were attached to wooden shafts, sometimes in pairs or bunches. One of the points we recovered may have been a harpoon-head: it had two barbs and a hole through

one end. It is likely that the inhabitants caught fish with forked spears and other weapons, as did Maglemosians in other parts of Europe.

The Star Carr people's preference for antler in making their spearheads is most interesting, because all other groups of Maglemosians whose remains have so far been discovered preferred to make them of bone. In form the spearheads of the Star Carr people are typically Maglemosian, but their use of antlers and their technique of cutting the splinters resemble the practices of earlier deer hunters of the Old Stone Age. This further goes to show that the Star Carr culture represents a transition phase in the early development of the Maglemosians of the Middle Stone Age.

It is instructive to see how selective the Star Carr craftsmen were in the use of their bone and antler materials. For example, although they utilized the red deer's antlers (for spearheads, clubs and spatulate tools), they seem to have made no use whatever of the bones of this animal. On the other hand, in the case of oxen they used only the main leg bones. From them they made hammering tools, what seem to be anvils on which to rest flint while flaking it, and tools with concave, highly polished working ends, very much like the implements used by Eskimos for leather-stretching.

From the antlers of the elk the Star Carr people fashioned two kinds of mattock-heads; these, attached to wooden handles, were probably employed for breaking the soil. The only bones of this animal used for toolmaking were those of the lower legs. We found one large elk bone that was heavily battered, as if flint had been flaked on it, and another from which strips had been cut, perhaps for bone spearheads. There were also some small sharpened elk bones that may have been employed as pins to fasten skin cloaks together. Although there was a good deal of bone and antler of roe deer lying about, we could discover no sign of any tools of this material; apparently this animal was killed only for its meat and skin.

The picture we have painted so far is that of a small community encamped in a reed swamp close to the margin of a lake and preoccupied almost entirely with preying on other

forms of life, on which it depended for its food and much of its material equipment. Yet even at this rather brutish level the Star Carr people conformed to a recognizable cultural pattern.

Their culture, indeed, went a bit beyond stratagems to make a living. Amid the welter of discarded meat-bones and workshop debris it was pleasant to find a few articles of personal adornment. Here and there were a few beads made of thin, disklike pebbles smaller than a thumbnail, with holes bored through the middle, apparently by a bow-drill. The beads lay in groups, perhaps where they had fallen when necklaces broke. We also found some animal teeth and lumps of amber perforated with holes, indicating that they, too, were used as pendants. But none of the beads or pendants was decorated in any way, nor was there a trace of decorative carving on any bone or antler at the site.

We did, however, find some red-deer antlers that had been treated in a very peculiar manner. These antlers, in every case those of young stags, had been pared down and hollowed out, so they were merely a light shell. The inner side of the roots, where the antlers had been attached to the animal's head, was scraped smooth, but the outer side was left rough. And two or three holes were cut in the bony base of the frontlets.

The holes suggest that the antlers were meant to be mounted in some way. On posts? If so, it is difficult to account for their being reduced in bulk and scraped smooth on one side. It looks very much as if they were meant to be worn on the head as some kind of mask.

What, it may well be asked, would stone-age savages be doing with deer's-head masks? Two possibilities suggest themselves. It may be that the Star Carr hunters wore them while stalking stags at the mating season, to attract and draw them within range, much as some Caribou Eskimo are known to have done. The other possibility is that the Star Carr people wore them in some kind of ritual dance designed to assist the fertility and increase of the red deer, on which the economy of these people mainly depended. Dancing with animal masks goes back at least as far as the

latter part of the Old Stone Age in Europe. One might mention the engravings of dancers with chamois masks found in Paleolithic caves of Southwest France, or the fantastic Sorcerer of Trois Frères crowned with reindeer antlers, or the dances of Tungus shamans wearing frontlets and antlers of reindeer that are illustrated in an early 18th-century work, or even the still-surviving horn dance of Abbots Bromley, England.

Yet when all is said, no certain explanation of the Star Carr frontlets can be offered. As so often happens when we deal with the remote past, scientific procedures enable us to advance knowledge only up to a certain point, beyond which stretches a vast realm of conjecture.

In two of the most famous letters of antiquity, Pliny the Younger described the eruption of Vesuvius in A.D. 79 to Tacitus "so that you may transmit a more exact relation of it to posterity." The account is as contemporary in tone as if it were a description of Hiroshima. We "hear the shrieks of women and crying children, and the shouts of men; some were seeking their children, others their parents . . . one lamenting his fate, another that of his family . . . some praying to die, from the very fear of dying; many lifting their hands to the gods; but the greater part imagining that there were no gods anywhere."

This was the catastrophe which buried Pompeii and Herculaneum in fiery ash and pumice, preserving the minutiae of their daily lives for future generations. Their exact sites remained long unknown and it was not until the eighteenth century that they were rediscovered. At Pompeii, which was more accessible to diggers than was Herculaneum, a period of wanton and destructive pillaging then began. It continued until the beginning of the nineteenth century when systematic, large-scale excavations were undertaken. In 1860, Giuseppe Fiorelli, whose objective was the exact reconstruction of the dead city, was placed in charge. As a result of all this work, such imposing buildings as the great theater and the temple of

Isis have been unearthed. Even more important, baths, taverns, and private homes have been revealed as they existed at the moment of engulfment. They may be inspected by the modern tourist.

At Herculaneum, there were also contrasting patterns of archaeological excavation, which are described in 'A Mine of Statues' by Charles Seltman. Seltman, born in 1886, had played in the ruins of Pompeii and Herculaneum as a child. He became a specialist in ancient coins and was the author of *Masterpieces of Greek Coinage*. An unconventional and uninhibited individual, he held court in rooms at Cambridge once occupied by Erasmus. His writing reflects the charm of his personality.

A MINE OF STATUES

CHARLES SELTMAN

ARCHAEOLOGY is the discovery, recording, study and interpretation of material evidence surviving from the past of mankind. It therefore partakes both of scholarship and of science and is the natural union of two "Arts" which never should have been imagined as separate or in opposition, since it were true to say that scholarship should be science and science, scholarship.

Yet archaeology was begotten of Greed and conceived in Pride of Possession; it was born in a royal Court; sycophants were its nurses and hangers-on its servitors. But among the strange group of human beings who set all this on foot, and whose antics and intrigues can still provide some pleasing entertainment, there was one good man, one scholar-scientist . . . a Swiss engineer. Though he has been almost forgotten, his memory should be for a blessing. Where others had hunted for antiquities like hogs digging for truffles, he measured, planned, recorded, kept a diary of the work in

progress. For that reason this obscure man, Carl Weber, must be honored as the first real archaeologist.

It all happened against the romantic background of the eighteenth-century Kingdom of the Two Sicilies and on the shores of the Bay of Naples. During the War of the Spanish Succession an Austrian army, profiting by victorious actions performed elsewhere by Marlborough and by Prince Eugene, advanced through Italy annexing various Spanish possessions. In July 1707, just as an Austrian viceroy was being installed in Naples, there came to that city a certain Emanuel Maurice de Lorraine Prince d'Elboeuf, who, being a distant cousin of Prince Eugene himself, held a command in the Austrian army and was now posted to the city which attracted him. He threw himself into the social life of the Neapolitan aristocracy, amongst whom he was known as the *Duca di Belbofi*, which was the best they could do with his name; he was betrothed to a certain Princess Salsa in 1710, and spent the summer of that year in the villa of a Conte di Santi Buono at Portici by the sea immediately below the western slopes of Vesuvius.

No one at that date had any ideas about the situation of the ancient towns of Herculaneum and Pompeii which had been overwhelmed in the colossal eruption of the volcano in A.D. 79. That was something which the learned read about in books, as you read about the destruction of Sodom and Gomorrah; but it had not occurred to anyone to seek to relate the happenings to a site. Now, in 1710, a farmer near Portici decided to deepen his well in order to increase his water-supply, and, digging to a depth of some sixty feet through several layers of solidified mud, he chanced suddenly upon marble fragments and bits of columns. When this came to the ears of d'Elboeuf he purchased the site and hired workmen to extend the dig in the hope of finding statuary, being presently rewarded with the discovery deep underground of some great building—not yet identifiable—and with numerous statues, the best being three fine white, marble, draped female figures. Though he built himself a villa at Portici where he might house most of his finds, he decided to make a present of these three draped figures to

his cousin Prince Eugene for his palace in Vienna, since d'Elboeuf had need of the princely goodwill. Therefore, the statues were first smuggled into Rome to be repaired by some statue-faker. This was essential; for, while Prince Eugene, like many another nobleman of the time, was an ardent collector of "the antique," it would have been an insult to present him with incomplete figures. So one marble lady was supplied with a false head, the others with some fingers and toes. From Rome the now completed statues were smuggled to Ancona, thence by sea to Trieste and finally to Vienna where they were vastly appreciated. Meanwhile, d'Elboeuf married his Neapolitan bride in 1713 and settled in his new villa at Portici to gratify his lust for more marbles; but since duty frequently called him away, the excavations slowly petered out, he sold his villa, and no one knew as yet that there had been discovered a part of ancient Herculaneum. When Prince Eugene died in 1736, a bachelor and intestate, his heiress, a niece, sold the three marble women to Augustus III, Elector of Saxony and King of Poland, and they were transferred to Dresden where they presumably still adorn the Saxon Collection.

The d'Elboeuf episode was, as things turned out, but a prelude to greater discoveries which were to come soon after the Austrians were expelled from Naples in 1734, when the Spanish-Bourbon Line recovered possession of the Kingdom of the Two Sicilies. With the Spanish army that took Naples came Prince Charles Bourbon. The young Prince was in the following year formally appointed King with the style of "Charles III, King of the Two Sicilies and Jerusalem." Under him and at his instigation the great discoveries were made and, in retrospect, it seems rather as though they took place upon a stage set for Light Opera or Comedy—not inappropriately, for it was King Charles III who founded in 1737 the world-famous Teatro San Carlo in Naples. And here, lest the story seem too complicated, it will be best to summarize the Characters roughly in the order of their appearance.

KING CHARLES III: very intelligent and well-informed, spoke

several languages and had studied history and the sciences; a lover of music and fine art, especially sculpture, because, from his mother's side, the Royal Collection at Naples obtained much from the Farnese Collections including some of the worst monstrosities of ancient sculpture. He had a passion for hunting and for sea-fishing and loved to work with and among the ordinary longshore fishermen. The faults of his character were a collector's greedy acquisitiveness which was matched to a secretiveness about his possessions arising from his fear that others might be the first to publish the facts about them.

QUEEN MARIA AMALIA CHRISTINA: married to Charles in 1738, a daughter of Augustus III, Elector of Saxony and King of Poland, the same prince who had purchased the three marble women discovered by d'Elboeuf at Portici. Since her father was a passionate collector of painting and sculpture she had grown up art-conscious and therefore with tastes exactly like Charles's, including a tendency to secretiveness about antique possessions.

TANUCCI: a good Prime Minister, a keen antiquarian, the young King's first Counsellor.

GIUSEPPE CANART: a sculptor, a citizen of Rome whence he was imported by the King in 1739; almost a genius, certainly a most gifted worker in marble and bronze, he produced no original creation of any moment, but took the easy way of faking antiques; unfortunately not lazy and therefore a great destroyer and perverter of evidence; certainly the villain of the piece.

CARL WEBER: the hero; a Swiss engineer whose skill and efficiency were matched by his industry and common sense; he went in for the unheard-of practice of drawing ground-plans and keeping a diary of the excavation; was in charge at Herculaneum from 1750 onwards. It is difficult to find out more about Weber who suddenly appears, like Captain

Bluntschli in *Arms and the Man*, a professional amongst amateurs and shams.

Such were the people most nearly connected with the excavations at Herculaneum.

Young King Charles had not been long at Naples before he decided to go fishing and found his way to Portici. The place, the beach and probably the local fishermen pleased him, and, looking round for a small property he found he could get the villa which had been built by d'Elboeuf some twenty-five years before. When he went to view the house he was astonished and enchanted by some of the ancient marbles which had been left behind and instantly bought the place, determining, once he was established, to continue the excavations. In this he was presently much encouraged by his young Queen who shared his acquisitive zeal for antiquities. The first result of pursuing the sixty-foot-deep work on the same site was to produce more statues, parts of two splendid bronze horses, and—at last—an inscription proving that the building being dug was the Theatre of Herculaneum. And so it was only in 1738 that it became a certain fact—most pleasing to the King and most stirring for the learned world of Europe—that Herculaneum had been found. The site of Pompeii remained unidentified for another twenty-five years.

More statues from the Theatre, bronze and marble, from a square outside, then private houses found with frescoes which were cut from the walls and taken aloft to the bright light where they began to fade. But the King and Queen were both happy with their "mine" for works of art; and for a while their staff was switched to ruins near Civita Vecchia in 1748, and here Carl Weber, the Swiss, took charge. Two years later the work went back to Herculaneum, where another attempted well-shaft northwest of the "Theatre shaft" revealed the first signs of an impressive and wealthy private residence: and it was especially on this most difficult and elaborate "dig" that the genius of Weber showed itself. The work was a kind of underground mining in which, once the requisite level of a building was reached, you made trial

passages till you came to the corner of a main wall, then "squared up" on this corner, followed the rectangular building and examined its contents: if you were Weber you made a sketch-plan with careful measurements and listed your finds; if you were not you pulled out any object you might find and then filled in again.

The impressive residence excavated by Weber proved to be the finest villa of the late Republican and early Imperial ages that has even been discovered even to this day, and almost all the best bronzes now in the Naples Museum came from this one place: the resting Hermes, the two wrestling boys, two satyrs, six girls in Doric dress, many bronze busts—two Greek originals among them—were found, almost in perfect preservation. Then many marbles also turned up, and presently there was made in the same villa the most sensational of all finds, a library of over six hundred manuscript papyrus rolls. Here was work for the whole of the King's staff and especially for the all too industrious Canart. He had begun his wicked ways when the Theatre was identified ten years before by making a perfect false head for the equestrian marble statue of a certain Balbus, and by breaking up four incomplete horses and building their bits together to make one complete animal. The Charioteer, and any other bronzes which seemed to Canart too troublesome to cook up, he simply melted down, making from them numerous bronze statues of Saints as well as medallions of King Charles III and his Queen. This doubtless gratified greatly the Saints in Paradise and their Majesties on Earth.

It was the discovery of the superb villa which set on foot the fullest activity at Herculaneum. King Charles in his raptures even forgot his beloved sea-fishing. Weber acted, measured, explored, recorded. In 1735 the King founded the "Herculaneum Academy" which gradually took in hand a sumptuous publication of the finds, and, as the volumes slowly appeared and became more slowly known outside the Kingdom of Naples, the effect upon the learned, as well as upon the polite, world of these antiquities depicted in the volumes was immense. Already in 1756 a certain Dr. Robert Watson was making reports to the Royal Society about the

finds and supporting the identification of a manuscript as the work of the Epicurean philosopher Philodemus. By 1773 an English edition, not only abbreviated but, much to King Charles III's indignation, pirated by two Cambridge scholars appeared. It contained engravings of numerous fresco-paintings, some copied by a Cambridge draughtsman named Lamborn. They are not good, but are interesting as showing how the precision-loving eighteenth-century eye desired to see good first-century Greek impressionistic painting. But the Cambridge volume by Martyn and Lettice, two Fellows of Sidney Sussex College, was very popular, being subscribed for by members of the nobility and gentry, and of the Bench of Bishops, and by Heads of Houses, Fellows and College Libraries.

For Charles III an end came to happiness in 1759. His half-brother, Ferdinand VI of Spain, died, and Charles was called upon to wear the Spanish Crown, leaving the Kingdom of the Two Sicilies to his eight-year-old, backward son under the regency of the excellent Tanucci. The King must leave the Royal Villa at Portici for the Escorial. No more of the songs of Neapolitan fishermen who were his real friends, no more nets and lines, no smell of tarry boats and of the salt sunny sea, but only the long halls and chilled galleries of an inland palace heavy with memories of piety, cruelty and pain. The King went, for that was his duty; but he took nothing with him from all his wonderful collection. Even an ancient gold ring which he had found among a hoard of gold coins on one of his countless visits to Civita Vecchia and which he had worn ever after on his hand and shown it with pride—even this he took off and left in the State Collection. Perhaps it would have hurt too much to look at it in Madrid. His Majesty had begun to collect in a spirit of greed, but time had changed and mellowed him, for there was much good in him. The spirit of the ancient world began to affect him strongly, and even to incline him to a movement away from his own medievalist and royalist traditions. Martin Hume, the historian, pointed out that he went to Spain with "ministers and friends belonging to the new 'philosophical' French School, who looked upon religion

as a relic of the dark ages, and exalted the secular power of the monarchy in order to oppose the priest." Looking back upon his happy Neapolitan days he would reflect that a little roguery within the framework of a civilized society was preferable to gangsterism in a cloak-and-dagger culture. The Madrileños, with their long black cloaks, wide hats, daggers and oily side-whiskers, seemed far from picturesque to King Charles, who had come from a Court which he had made one of the most civilized in all Europe.

He died, aged seventy-three, in December 1788, and Hume has written of him as "the only good, great and patriotic King that providence had vouchsafed to Spain in modern times. Enlightened, generous, and just." The enlightenment and humanism of the King were due neither to any innate virtues of a Bourbon, nor to the traditions of his royal and princely forbears, but to contact with the freedom of the ancient world renascent through Herculaneum.

An archaeologist of today is able to assess the value and interest of Weber's work in the great villa beside Herculaneum only because the Swiss engineer left behind a rough plan with measurements, records of where works of art and manuscripts were found, and a diary of the excavation. Weber's discoveries, indeed, were much more important than he knew. The statues, of course, suffered restoration at the hands of Canart in accordance with the prevailing fashion. His worst misdeed was to scrape the patina off all bronzes leaving them the dull dark brown color which they still display. He had a dislike of the hollow eye-socket and therefore—except where ancient enamelled eyes had been preserved—he inserted false, dead-fishy, bronze eye-balls. Many of his smaller repairs have escaped notice to the present day; but one of his larger and more misleading forgeries needs to be exposed. In the first century B.C., and probably later, there was a vogue among wealthy Roman collectors for statues of *kamephoroi*—that is of Greek girl basket-bearers—carrying baskets made probably of gilt bronze wire, such figures having been frequently dedicated by the girls' parents in sanctuaries like the Athenian Acropolis. The owner of the Herculaneum Villa possessed six such life-size

statues which were bronze copies of well-known Greek originals; but one of them, on being excavated by Weber, was found to be without head, neck, throat and right arm; and, if Canart was only too eager to use up other bronze fragments in order to supply what was missing, he was merely conforming to the wishes of the Royal Collectors. Since all the other five fifth-century bronze girls were markedly individual, he decided to make his fake different too, and copied her face and the general effect of her *coiffure* from a life-size third-century female bust (nowadays known as "Sappho") which Weber had likewise discovered in the same Villa. A mere stylistic difference of two centuries was to Canart immaterial; yet having got into his head the notion that these bronzes represented "dancers," he made for the girl a forged arm and hand, so placed as to suggest that she was executing a leisurely pirouette. Thus, by means of a forgery long-ignored, all the girls came to be called *danzatrici*, and not a few modern producers of Greek dramas have allowed their ideas of choreographic effects to be influenced by a misconception due to a forgery by Canart—how appropriate his name!

And all of this is by the way; because in our day it has been possible to establish beyond all doubt that Weber's Villa and its statues—scraped and part-faked by the Canart—were the property of Lucius Calpurnius Piso Caesoninus, Consul in 58 B.C., and father-in-law of Julius Caesar. The library, consisting of hundreds of papyri belonged to his "house-philosopher," Philodemus, who was leader of all the Epicureans in his day and who lived in the Villa and taught in its spacious gardens because Calpurnius Piso favoured that philosophy. Piso himself, whom Cicero attacked with unbalanced fury, was one of those men of genius and tireless energy whom the Republic produced at the very period in its history when it was destined to merge into the Roman Empire. At his death the Villa passed to his son, a man of different caliber, though of equal eminence.

Yet it is due to Weber's natural precision and carefulness that this knowledge of an important corner of the ancient world is ours, and if ever a history of field-archaeology is

written, his name must be mentioned even before those of the famous nineteenth-century pioneers like Sir Henry Layard, Mariette, Schliemann, Petrie, Dörpfeld and Sir Arthur Evans. Not only did Weber begin almost a century before Layard started, but he had a task more difficult than the one that faced Schliemann, when in 1870 he began to cut into the hill of Hissarlik and gradually discovered stratum on stratum, proving the existence of numerous past cities of Troy. It is often supposed that in A.D. 79 the town of Herculaneum was overwhelmed by molten lava from Vesuvius. Had that been so every bronze statue would have become a formless metal mass, every marble a lump of burnt lime, and every manuscript a little heap of ashes. What happened was that streams of boiling mud flowed down the mountain, and this horrid substance seeped into every nook and cranny. But it was in its way an excellent preservative, since as it cooled it set fairly hard. For centuries between A.D. 79 and the huge eruption of 1631, Vesuvius deposited a series of mud-layers on Herculaneum, and it was into these that farmers dug in search of water, and it was through the lowest of these layers that Weber drove his big subterranean galleries to find the ground-plan of the great Villa built by Lucius Calpurnius Piso. Within the present century the Italian authorities have excavated several other sections of Greek Herculaneum and, at great cost, have removed layer after layer of the solidified mud which overlies the town. Even had he desired it King Charles III of the Kingdom of the Two Sicilies could not have afforded what was possible to Benito Mussolini. Today, however, one may observe, side by side, the modern excavations and one of the wide entrances into Weber's galleries and may perceive, over the adit, stratified layers of solid mud—each one the token of a volcanic upheaval—mud which increases the fertility of the Vesuvian earth, while it embarrasses the excavator.

The Regent Tanucci's confidence in Weber was such that, when in 1763 certain ruins near Civita Vecchia were identified by an inscription at the city of Pompeii, the Regent put him in sole charge because he had proposed a new and methodical plan of excavation. Diggers were no longer to

plunge haphazard into the ground, but the scheme was to move steadily forward by streets and blocks; and houses, instead of being filled in after looting ended, were to be left open to view. But that year was one of misfortunes for Naples which suffered from a famine; and some disease, hurtful to the undernourished, struck Weber down. He had worked for about fifteen years at the excavations and was presumably still fairly young when he died. The fruits of his skill and industry have endured.

The sophisticated civilization typified by Herculaneum in A.D. 79 found no counterpart in Northern Europe. The history of Rome contains many accounts of the barbaric tribes of Britain, France, and Germany. Scandinavia was the home of the Vikings, the warlike people whose raids became the scourge of Western Europe. They seem to have delighted in long, adventurous sea voyages. They traveled to the Mediterranean and the Azores, and briefly, as far as the New World.

Archaeology has done much to amplify the often fanciful picture of their culture contained in the sagas. The most important archaeological discoveries have been the Viking ships, the earliest of which, dated by sword types and pollen analysis at about 400 B.C., was discovered in southern Jutland in 1921. It was probably a thank offering by the Danes for having beaten off an attack by coastal raiders. Hundreds of burial ships had previously been found in Norway and Sweden. In 1880, Nicholas Nicolaysen, president of the Oslo Antiquarian Society, excavated a ship nearly eighty feet long at Gokstad on the Oslo Fiord. It was packed in blue clay and was in such excellent condition that it was removed to the university grounds in Oslo. In 1903, an even more important find, a ship dated about 800 A.D., was made at Oseberg, a few miles further north. It was excavated by Gabriel Gustafson, head of the University Museum and Professor of Archaeology at Oslo. He was assisted by Haakon Schetelig, later Professor at Bergen University. Gustafson's successor at Oslo was A. W. Brøgger, a specialist in the archaeological and sociological study of the

Vikings. The results of the excavation are described in 'Burial of a Viking Queen.' The richness of the find and the new techniques that were developed to reconstruct and preserve the remains make this report an important document in archaeological research.

BURIAL OF A VIKING QUEEN

A. W. BRØGGER, H. FALK,
and H. SCHETELIG

Planning the Excavation

IN AUGUST 1903 the proprietor of Oseberg farm (in Sem parish, Jarlsberg and Larvik) informed Professor Gustafson, then director of the University Collection of Antiquities, that he had discovered remains of some wooden construction by digging in a tumulus situated on his estate. Professor Gustafson immediately proceeded to a preliminary exploration, and was able to state at once that the tumulus contained an important ship-burial. The season being far advanced, the winter of 1903-1904 was spent in preparing for the complete excavation next summer. The tumulus was much damaged and not of imposing appearance. The ship was shown to be lying north and south; the mast had been discovered, also part of the grave-chamber that was erected in the ship. Gustafson further succeeded in tracing the northern end of the vessel, afterwards found to be the stern.

The excavation of 1904 was started in the middle of June and continued till the end of September. The upper strata of the mound were removed, a passage-way being provisionally arranged for the purpose. The stern was uncovered on July 5 and the stem on July 21. The gunwale was traced and the dimensions of the ship thus ascertained. First attention was concentrated upon a stratum left by an earlier

plundering of the grave, then on the spoil-stratum situated at a level somewhat higher than the ship; next the grave-chamber was explored, then the after-part, and lastly the forepart of the ship.

The ship was buried in a cairn of stones which covered the whole from stem to stern. All the tomb was placed under and between these stones.

The Spoil-Stratum

At an early stage of the excavation it was discovered that the tumulus had been broken into some time after the interment. This had been done by opening a passage some 3 meters broad from the southern border of the mound in the direction of the mast. The robbers evidently aimed at the grave-chamber, and reached the roof of it close behind the mast. Here a hole had been cut in the roof and the chamber had been plundered of various objects, broken fragments of which were scattered in the spoil-stratum of the mound. The objects were bedded in a layer of sandy clay.

Of much importance is the fact that practically all the remains discovered of human skeletons were found in the spoil-stratum. The robbers have, we may conclude, dragged out into the trench the two female bodies that rested in the grave-chamber, and have handled them with shocking regardlessness. The anatomical examination of the fragments has proved that two women were interred in the ship.

The Grave-Chamber

In the beginning of August the work had so far advanced that the grave-chamber was accessible for exploration. The roof was built of heavy irregular oaken planks inclining against the ridge and covered the greater part of the ship behind the mast. Owing to displacements in the mound, the ridgepole had been broken and the part of the bottom of the ship that was covered by the chamber had been pressed upwards against the roof. This state of things added to the

difficulties of the excavation as the pressure had damaged that part of the furniture in the chamber which had not been spoiled by the robbers.

The excavation of the chamber was executed in such a manner that the planks were removed one by one and the objects found entered in the diagrams. Close to the mast were located the remains of an oaken chest containing crab apples, a quantity of wheat mingled with the seed of many weeds, and a single shell of a walnut. In the interior two portable wooden posts are seen in hopeless confusion. They represent a remarkable type of portable posts terminating in animal heads and richly carved, five specimens of which were discovered in the ship. The eastern side of the chamber was the place for the remains of stuffs, many of which are woven with figural representations. The fragments were to a great extent intermingled with down and feathers from the bed-clothes.

Farther on the eastern side of the chamber two oaken chests appeared. The upper one had been broken and nothing was left in it but a bone-comb, a bit of leather, etc. The other chest was intact so that the cover turned on the hinges. It contained various objects, two lamps made of iron, a wooden club, a thread box, a pair of scissors, a bone-comb, a number of horse's calks, etc.

A large bed was placed in the grave-chamber, and not far from it the remarkable bucket with bronze mountings, two of which are enamelled (known as the Buddha bucket). At the other end of the chamber [were] again two portable wooden posts equally carved and with their iron chains still in position.

The After-Part of the Ship

The excavation of the after-part turned out to be the easiest section of the work, the grave-chamber not having left sufficient space for depositing much of the tomb furniture here. The majority of the objects found in the after-part are ordinary kitchen furniture. An iron caldron with the upper side broken in was discovered close to the northern gable of the

chamber and next to it three slender iron bars with trident terminations at the lower end, forming an apparatus for suspending the caldron. Further an iron kettle was found here, and into this had been put a kitchen-knife with wooden handle, two small troughs made of wood, and other small articles. A frying-pan, a pot-hanger, a wooden scoop, two light hatchets with wooden handles, and a kitchen-stool the seat of which is made of oak, were situated about the same spot, and close to these a hand-mill [quern]. On the starboard side in the middle of the after-part a young bull [was found] resting on its right side and with its mouth wide open. The contents of the stomach were partly preserved and have given samples of juniper, different sedges, heather, dog-rose, etc.

Some pieces belonging to the equipment of the ship were also arranged in the after-part. An oar was placed in position in a porthole.

The Forepart of the Ship

The examination of the forepart was started immediately after the grave-chamber was cleared, and it was soon evident that the richest and most astonishing finds were stored in this part of the ship. The excavation here was made particularly exciting by the confused position of these very numerous articles which were to a great extent hopelessly smashed between the big stones of the covering cairn. Consequently this part of the ship presented by far the most difficult task to the explorer.

By the unearthing of the stem a coarse hawser appeared stretching along the carved part of the gunwale adjoining the stem; it turned round the stem-pole, and was fastened to a big stone on the starboard side outside the ship. In other words the ship was regularly moored in the mound. Some of the oars were placed in the portholes of the forepart.

The gang-way used as a landing-stage was also found here. It partly rested on two barrels made of wooden staves. The anchor of the ship was found under these barrels.

Among the great number of objects found in the forepart, the carriage first of all claims our attention. It was situated with the hind-wheels close up to the southern gable of the grave-chamber and was in a very broken condition, pressed down by the cairn and the overlying mound. The various parts were forced out of position by displacements due to pressure. . . . The stones being removed, the body of the carriage soon appeared and at last the wheels.

The carriage is one of the largest objects that were deposited in the forepart. It stood on the floor-boards, which were found in complete order in this part of the ship, in the direction North-South facing South. In the carriage were placed a bed and a loom, the remaining space being filled with stones.

The Sledges

Four sledges were brought to light by the excavation. In front of the grave-chamber one sledge is situated with the forepart turned towards the south, in [fragmentary] condition. During the excavation this sledge was called Gustafson's sledge as it was uncovered by the professor himself. The name has stuck to it ever since and ought to be still preserved. To the west of the carriage on the starboard side of the ship, another sledge was deposited pointing in the same direction as the one first mentioned. It was discovered later, and the care of it being confided to Schetelig it was called at once Schetelig's sledge and that name is still attached to it.

Farther forward in the ship still, a sledge with carved decorations was placed upside down. It is generally named the 4th sledge. They are all profusely carved and provided with high detachable frames also carved and tied with ropes to the sledges. It is a curious fact that none of the frames was attached to the sledge for which it was originally designed.

The three sledges first mentioned possess richly decorated shafts which were however not found in position on the sledges. The shaft most exquisitely worked was situated at

the highest level in the forepart of the ship and was so prominent that the robbers had cut off the end of it on their way from the stem towards the grave-chamber.

Another remarkable fact has yet to be mentioned. In spite of profuse equipment of many horses, a carriage, and four sledges no trace was found of harnesses, bits, or horseshoes; in short all the belongings for the use of horses and vehicles were wanting. It is also worth noticing that several of the horses were buried with complete tethers, one of them with a halter, and some with calks. The skeletons indicate at least 15 horses in the ship, most of them being placed on the starboard side in the forepart. Here at least 10 horses were collected but some of the heads had been cut off and deposited separately at another place in the forepart. Outside the ship one of the horses was placed on the starboard side forward, and three horses on the port side close to the stem.

In addition to the remains of one or two beds discovered in the grave-chamber, the forepart of the ship also contained three beds, all much ruined partly by displacements in the mound and partly by pressure of surrounding stones. The two head-posts terminate in carved animal heads and are covered with magic symbols painted on the wood. In the bed a bull's head was deposited, the skeleton belonging to it being found on the port side of the bow.

Close to the mast-partner and resting on the bottom of the ship were some fragments of a wooden structure interpreted as a chair. Further the forepart contained the frames of two large tents. Another set of frames also found in the forepart belongs to a very curious construction, possibly to be explained as a kind of canvas-house.

An apparatus for card-weaving was found between the stones that filled the carriage. It is provided with a complete set of 52 small square cards of wood, all of them with holes in the corners through which the threads are passed for weaving the ribbons and edge-bands. A band half finished was still attached to it when it was found. [There were] two wooden buckets containing some thread-balls, a number of curious wooden implements, a piece of wax intended for rubbing the thread, a buckle, a dog's chain of iron, a small

box filled with the seeds of cress (*Lepidium sativum*, Lin.) and seeds of flax intermingled as a weed in the cress. Another small box found in [one] bucket contained a quantity of dyer's woad (native indigo). Among the contents of the bucket were further a good many crab apples and at the top of all a long and heavy comb of bone. Most of the apples were ripe.

Other objects discovered in the forepart deserve mention. A long pole inscribed with runes and a rather large trough were placed not far from the stem. Three shovels, a dish made of wood, a pair of shoes, etc. were found, and four dogs were deposited in the forepart among the horses.

The excavation of the forepart which had required so much hard work and had been so rich in surprising discoveries was completed in the middle of September. On Monday, September 19th the gunwale, prows, and rudder were finally uncovered. For the first time the whole ship was now visible, the examination during the summer having been concentrated upon details only. The sight of the ship when totally cleared was striking and at the same time most depressing. Excepting the prows the greater part of the ship was very badly injured by displacements in the mound. The bottom was pressed upwards, the planks were broken, and their bands disjointed. The part of the ship that had been covered by the grave-chamber, was literally inverted, the bottom being here raised to the interior height of the chamber. It was evident that the ship could not be moved as a whole. The only way was to take up the single fragments.

During the time required for preparation, the ship was measured and drawn by the marine engineer J. M. Glende whose drawings were later a most useful guide for the restoration of the ship.

The Preservation and Restoration of the Find

The history of the Oseberg find comprises three principal stages, first the excavation, then the restoration of the ship and last of all the preservation and restoration of all the various articles found in the ship. The last section was by far the

longest and most difficult part of the task, the objects falling into two groups, *viz.*, those made of wood and those of other materials. For the latter perfect methods of preservation were already known, but very different was the case regarding the wooden objects. Here Professor Gustafson had to face quite new problems and to work out methods of his own by experiment. The results obtained are of special interest to curators in general and deserve an extended notice here.

The many objects not made of wood have been subject to the usual treatment. Articles of iron were cleansed of rust and boiled in paraffin. Quite small iron objects were dressed with celluloid lac only, and the same method was used for the treatment of bronze and brass. All the iron objects from Oseberg were in a remarkably fine state of preservation.

Ropes from the Oseberg find are preserved in considerable quantity. The ropes kept in store-rooms and at present not exhibited in the museum represent alone a total length of at least 100 meters. The best method of preserving this material apparently is the glycerine-treatment by which the ropes are made soft and flexible and seem to be preserved in a very satisfactory manner.

Objects made of skin and leather comprising principally the shoes mentioned above, were soaked partly in whale-oil and partly in glycerine. Neither of these fluids produced quite satisfactory results, as they both contain fats of organic origin. The pieces were again cleaned and impregnated with chronometer-oil which is composed of mineral oils only.

The wooden objects were first washed in water on the spot during the excavation, wrapped in wet packcloths and stored in the cellars of the "Historisk Museum" at Kristiania. To understand the following process of preservation it should be kept in mind that all the wooden articles were broken and damaged by pressure and displacements in the mound to such a degree that most of them were completely ruined. When brought to light by the excavation the carriage, the sledges, and generally all the largest objects were reduced to fragments and had to be treated by a method to secure not only the preservation of single pieces, but their complete restoration. The wood had to be treated in such a way that it

should keep its original volume and form and that the fractured surfaces should be fairly unchanged.

The work was started with long experiments to improve the methods already known, but the results being still doubtful, special precautions were taken regarding all the more important objects. All carved decorations on the sledges, the carriage, the poles, etc. were reproduced in full size drawings mostly executed by Mrs. Sophie Krafft after 1907.

Additional care was bestowed upon some things of prime importance. It was purposed to make exact copies in wood of unique specimens like the portable wooden-posts terminating in animal heads with delicate carvings that would be exposed to deterioration by any manner of preservation. For this work Gustafson had the good fortune to find a collaborator eminently competent for the task, the wood-carver Jørgen Eriksen who executed in wood most excellent copies of the said wooden posts, of one pole and some other pieces. The copies were made of pear-wood and possess a special value as the ornament is more distinct in the bright fresh wood, and as missing details were supplied in the copies, though so far only as the original design could be traced with absolute certainty. Of course the artistic value of the originals is unattainable as well as the finely patinated character of the surface, but the copies will be of lasting interest as scientific documents.

Other wooden objects were reproduced in plaster-casts before the process of preservation. Such precautions were naturally not intended to avoid an elaborate preservation of the priceless original objects. In the autumn of 1904, immediately after the excavation, Professor Gustafson accompanied by preparator Johannessen went to Denmark, Germany, and Switzerland to study the methods there known for the preservation of wooden antiquities.

The methods which Gustafson declared to be the most suitable were the glycerine-treatment used in Copenhagen, the impregnating process of Berlin, and the formol method of Berne, though none of these methods reached the high standard required for the Oseberg objects.

In the case of hard woods obvious methods answered the

purpose. The oak, being the material most easily handled, was steamed, pressed in form, and then preserved by soaking in creosote or in a mixture of linseed-oil with karbolineum. Greater difficulties were presented by woods of a less degree of hardness, and in such cases different impregnating liquids were tried, as varnish, linseed-oil, etc.

The really difficult problems were presented by the soft woods, beech, pine, fir, etc. Experiments were made for a long time starting with the methods already known, and the process finally arrived at was alum-boiling, which has proved a splendid success in the preservation of the Oseberg find.

The principle of alum-boiling is as follows: the hot solution of alum immediately crystallizes by cooling, and a piece of wood boiled in such a solution for a time sufficient for the alum to penetrate, is prevented from shrinking by the sudden crystallization.

The treatment comprises three stages, the boiling, the drying and lastly the impregnation.

The boiling is done in a copper vessel and is in itself a very simple process. The difficulty is to determine the proper strength of the solution, to keep it at the exact temperature required, and to adjust the duration of the boiling according to the character of each piece.

By experience it was learned that the consistency of the wood is the chief thing to consider. The best results were obtained in the case of very soft woods, and the most difficult cases were the objects presenting different degrees of hardness.

The alum-solution must be made much stronger than in earlier experiments. It is found as a rule that the softer the wood the stronger must be the solution, and the very softest pieces required a solution as strong as possible. But no general direction can be given practice and experience being the only sure guide in this question. The temperature of the solution was generally kept at 80–90° Celsius.

A very important point is the duration of the process, and here also the question must be decided from experience. Regarding the softer woods a general rule may be stated that

the longer the boiling is continued the better are the results obtained. The time normally required for the boiling of fragments is possible only by means of special supports for which some fresh material was added. The only method possible for restoring the high frame of the sledge was to attach the original fragments to a new interior frame. The left length of the [original] frame is sufficient to prove that the fragments could not be mounted in any other way, and unfortunately iron-clasps and screws had to be applied at the corner-posts to keep the frame together. This brutal but necessary method is justified by the successful result.

Careful execution of this work naturally took a long time, and the objects could not be ready for exhibition all at the same time. Gustafson started with the preservation of the large things, the carriage, the sledges, and some other of the more prominent antiquities.

We have still to mention the method of preservation used for five portable wooden posts and two poles, the most precious of the Oseberg antiquities and unique as works of art from that period in all Northern Europe. From the very beginning Gustafson contemplated having these pieces kept in a preserving liquid, as any other method of preservation would injure the delicate character of the surface.

The best fluid for the preservation of the objects is water with a special admixture to kill possible organic germs in the wood, to prevent moisture, etc. The choice of a suitable mixture is confined to substances not affecting metals, as some of the wooden posts and both poles are decorated with silver-domed rivets. The best results obtained after trying many different substances were those produced by a mixture of formol, which is also recommended by other museums. The problem has not yet arrived at a final solution, but the initial results are in favor of the formol-mixture. A special case was made for each of the pieces.

The wooden post no. 1 is preserved in 122 litres of water mixed with 2 litres of formol and mounted on a celluloid stand. It has been in excellent condition for three years, the water being not once renewed all the time.

The Mound and the Farm

The place where the mound is situated is part of the farm *Lille Oseberg* in Slagen parish, near Sem, Vestfold. It is a valley watered by a brook Slagen-boekken, which had during the Viking period a more considerable flow of water than at present. It flows from the North towards the South, the mouth being a little to the east of the town of Tønsberg, about 4 kilometres distant from the tumulus at Oseberg. During the Viking period the brook was probably navigable to such an extent that a ship could be sailed almost up to Oseberg farm. Professor Jens Holmboe has made out that the plain where the tumulus was erected still at that period consisted of swampy marshes, and the interment with all its rich furniture was consequently on a site accessible to the sea at high water through the brook.

A survey of the antiquities and monuments in Slagen parish proves that the richness of the Oseberg find is quite exceptional among the remains of the Viking period in the same district. All the other finds indicate a plain and uniform condition of the population with no traces of special wealth or magnificence. The parish was not a place of importance and none of the finds can be compared to that from Oseberg. The splendid equipment of this tomb is in striking contrast to the plain monuments of the neighbourhood.

No local traditions are connected with the tumulus at Oseberg, and it is unknown in the earlier antiquarian literature. This total lack of tradition is most remarkable in the case of a mound that contained the richest find of antiquities ever discovered in Norway, but the fact is partly accounted for by the reduced appearance of the mound. As mentioned below the mound had sunk during the historic period so that it did not seem to be of very large dimensions, at least when seen from a distance.

The Tumulus and Interment

The tumulus is erected in the plain close to the broad old bed

of the brook, the level of the plain being here about 15.5 metres above the sea. The diameter of the tumulus before excavation was about 40 metres. The height in 1904 did not exceed 2.5 m. but according to the statement of Professor W. C. Brøgger the tumulus has sunk so much that the original height may be calculated at about 6 metres.

The mound chiefly consisted of sods of good quality and dimensions, arranged horizontally. The sods are cut from the surface around the mound. Special mention is made of a peculiar disposition of the sods in the western wall of the trench, the contrasting dark and bright portions of the wall meeting in a sharp line. The explanation given is that the material covering the forepart of the ship was filled in after the rest of the mound was built.

The erection of the mound, the arrangement of the ship and of all the tomb furniture necessarily required some time in spite of the evident hurry in which all was done. The body of the queen was probably kept at another place during all this time, the interment itself certainly being the last and final act of the ceremonial as recorded by the Arab traveller Ibn Fadlan in the case of a Scandinavian Viking chief who was buried in Russia at the beginning of the 10th century.

The huge mass of sods forming the mound and acting as an hermetic cover, has been a powerful means of preserving the contents of the grave. The deliberate arrangement of the sods is a most prominent feature of the tomb as a whole, and prompts the question whether the mound was built intentionally in this manner to provide lasting protection for the contents.

The Bondwoman

Attention has already been called to the remarkable fact that the Oseberg ship contained the fragments of two female skeletons. One of the skeletons is tolerably complete, the missing parts being the right hand, the left humerus and all the fingers of the left hand. In other words the missing parts are those wearing the most expensive ornaments, the

chief object of the robbers. The skeleton is identified as a woman aged 40–50 years.

The other skeleton is represented by very scanty fragments, though sufficient to indicate a woman at the age of about 30.

It is stated that the one of these women probably was the queen of Oseberg, the other being the bondwoman who accompanied her mistress. A passage from Ibn Fadlan is quoted [elsewhere] relating how the deceased chieftain is accompanied on the pyre by a bondwoman chosen of her own free will to die with him. This custom no doubt was widely spread in Northern countries during the Viking period.

In the Oseberg find it is difficult to decide which of the two women was the queen, whether the one aged 30 or the other aged 45.

The Date of the Find

The date of the find is decided by the style of the ornaments. This style flourished about 800 A.D. But beside such specimens the grave contained carvings of a later style with new animal motives. All the different stages in this change of style are represented in the find and consequently a difference of age is shown of about 30–40 years between the oldest and the latest carvings. The foundation of the grave may be thus dated about 850 A.D.

The Plundering

To decide when the mound was broken into involves considerable difficulty as very vague indications only are given by the find itself. The fact that both the bodies were at that time reduced to skeletons is of little significance, and no more information is obtained by considering the time required for the sinking of the mound.

More general considerations may possibly contribute to solve the problem, the most obvious question being whether the family to which the grave belonged and the population of the district during the pagan period would allow such a

plundering of the grave. The question is most important as we have not only to date the breaking open of the Oseberg mound but at the same time to explain the remarkable fact that traces of ancient plunderings have been noticed in most of the great tumuli in Norway.

The literary sources are reviewed, especially the legal regulations concerning valuables found in the earth, and reasons are given for believing that most plunderings of tumuli date from the early Christian period, probably during the first half of the 11th century. According to this theory the plundering of the Oseberg mound should be dated some years after the interment. A special term in the laws of Magnus Lagerbøter is subjected to a closer examination, *viz. haugodelsmaor*, the man possessing "odel" of the mound, undoubtedly meaning a direct descendant of the person buried in the mound. The word thus proves that Norwegian families even in the 13th century still knew who rested in the ancient pagan tombs.

The facts drawn from the laws are supplemented by the Icelandic Sagas which contain many descriptions, more or less fabulous, of the plundering of ancient mounds. All of these early plunderings of graves were most probably occasioned by the change of religion, by the conversion from pagandom to the Christian faith.

The Season of the Erection of the Mound

A considerable part of the remains of plants preserved in the mound must be from the year the queen died, and some of the plants provide the means of deciding at what season the mound was built. The great quantity of grass on the sods is sufficient to show that the interment took place during the vegetation period of the year, comprising the spring, the summer, and the autumn. The wheat and other seeds found in the grave-chamber may have been preserved from a preceding year. The crab apples, on the contrary were certainly the fruits of the same year, and must have been gathered after the middle of August or in September. The supposition entirely agrees with the fact that *Leontodon autumnalis* was

found with ripe fruits still on its receptacles. On the other hand the mound evidently was built some time before the leaf fell from the alder trees, branches with leaves of *Alnus incana* being found in the mound.

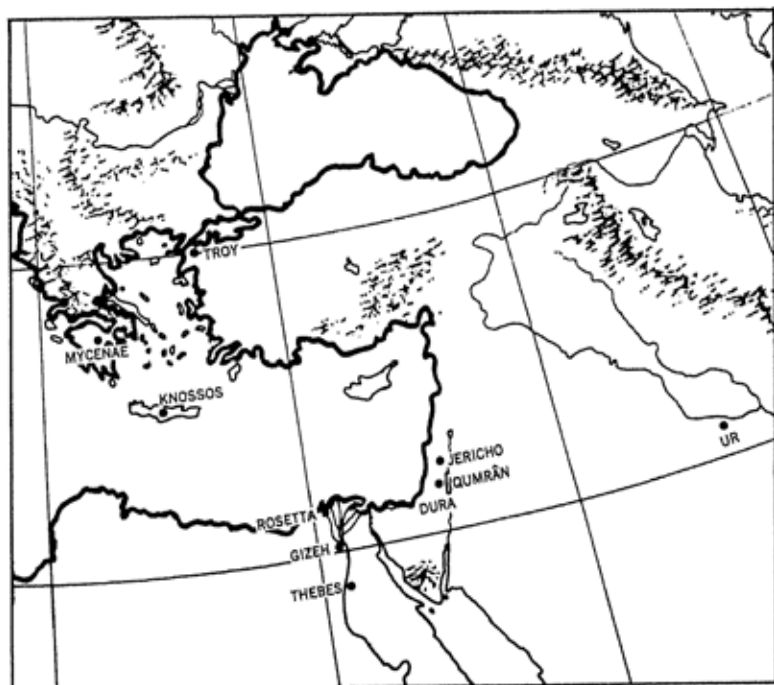
Indications in the same direction are given by the remains of the plants found in the stomach of domestic animals in the grave.

III. The Eastern Mediterranean

A. *The Aegean*

B. *Egypt*

C. *Palestine and Mesopotamia*



THE EASTERN MEDITERRANEAN

III. The Eastern Mediterranean

A. The Aegean

The discoveries of the ancient civilizations of the Aegean, Egypt, and Mesopotamia are among the greatest triumphs of archaeology. Those inveterate travelers, the British, began the investigations in the middle of the eighteenth century. The Society of Dilettanti sponsored a number of expeditions and published the results in elaborate volumes replete with drawings and diagrams. One of the purposes of these expeditions was the collection—it has been called rape—of art objects for Western museums. A celebrated example was the removal of the Elgin marbles to the British Museum.

The ancient Greeks themselves had a strong interest in their origins. Hesiod records a bronze age which preceded that of iron, and an age of epic heroes—the age which Homer celebrated—between the two. Scholars were suitably suspicious of these legendary accounts, but they were to provide clues which led to unparalleled discoveries. Heinrich Schliemann, who made the discoveries, would perhaps have ignored the clues if he had been less naïve. He was the gifted amateur par excellence and, although he was bitterly criticized, his excavations were among the most successful in the history of archaeology. They inflamed the world's imagination and gave great impetus to the study of the subject.

Some of this criticism was justified. Schliemann misinterpreted the evidence both at Troy, where he identified the wrong level as that of the Trojan War, and Mycenae, where he mistakenly believed he had discovered the burial of Agamemnon. But he was later criticized for failure to use methods which had not yet been invented—which has been compared to criticizing Napoleon for failing to use machine guns at Waterloo. The story of his two greatest excavations, in which his young Greek wife Sophia collaborated, is taken from the well-known biography written by Emil Ludwig, author of *The Nile* and many other books.

It is enlightening to compare Schliemann's results with those obtained by the Archaeological Expedition of the University of Cincinnati, headed by Carl Blegen, during the years 1932 to 1938. The purpose of this expedition was to make a reexamination of Troy in the light of modern methods. Stratigraphic analysis, preparation of detailed ground plans at every level, cross-dating of potsherds and other artifacts, interpretation of the number and position of skeletal remains and, later, the checking of results by Carbon 14 dating resulted in a detailed chronological story which takes on the authenticity of history.

The story begins with the construction, about 3000 B.C., of a small but powerful fortress at the site. For over a thousand years thereafter, through two disastrous fires and four rebuildings, it was occupied by a people with one continuing and developing culture. Then, about 1900 B.C., came a sharp break. An invading people with a new and more elaborate culture conquered the inhabitants and built a sixth city, richer and stronger than anything that had preceded it. The conquerors were skilled artisans, they had domesticated the horse, and they lived prosperously until their kingdom was destroyed by an earthquake, about 1275 B.C. Again the city was rebuilt, but this time without dignity or spaciousness. Unhappily for the romanticists, it was this mean and squalid settlement which, to use the words of Blegen, "may safely be identified with the Troy of Priam and Homer." This city, Troy VIIa in Blegen's system, was thoroughly looted and burned about 1200 B.C. The bones of slain human beings were scattered in its remains, and from this catastrophe Troy never fully recovered. It was reoccupied by the survivors, was again invaded, and after a few generations virtually ceased to be inhabited. This reconstruction of the history of the most fabled city of ancient times is a monument to modern archaeological method.

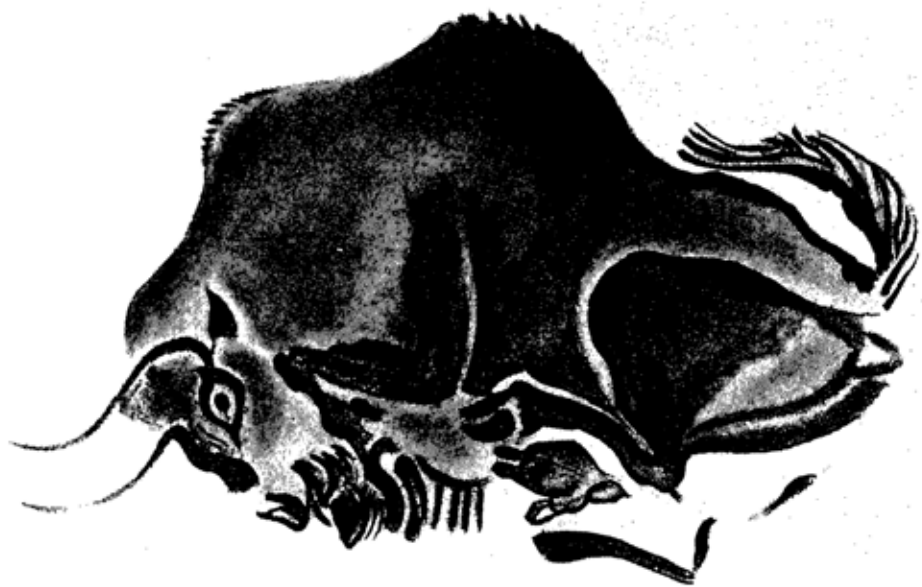


Fig. 1. Female bison from the cave of Altamira in the Cantabrian Pyrenees in Spain. Similar to the cave paintings described by Annette Laming in her article on Lascaux. *Courtesy of the American Museum of Natural History.*

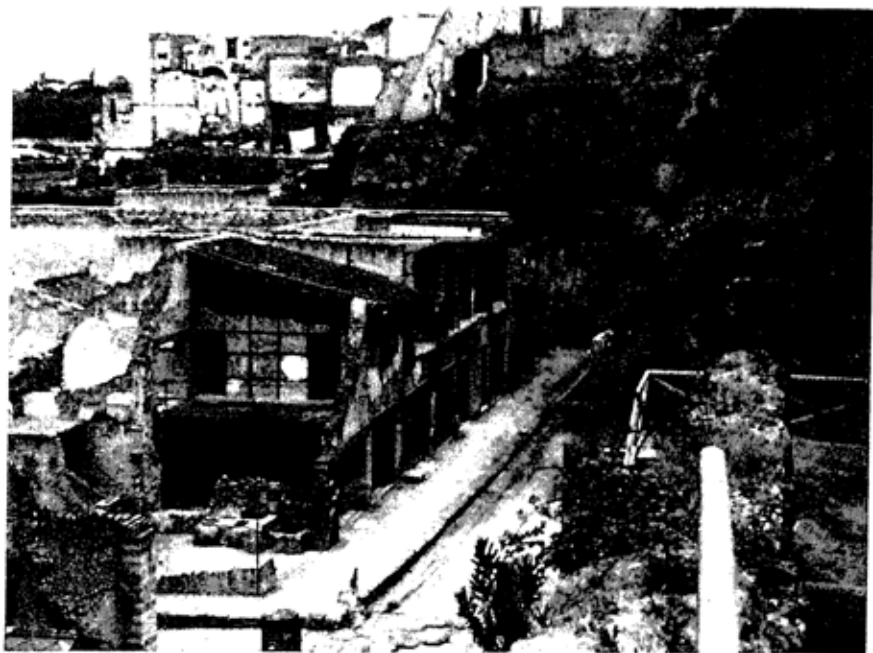


Fig. 2. Entrance of excavations at Herculaneum, showing overlay. Site of work described by Charles Seltman in "A Mine of Statues." *Courtesy of Jotham Johnson.*



Fig. 3. House of Neptune at Herculaneum, showing mosaics. *Courtesy of Jotham Johnson.*



Fig. 4. Viking burial ship from Oseberg when it was first excavated. Described in "Burial of a Viking Queen" by Brøgger, Falk, and Schetelig. Photo: Universitetets Oldsaksamling, Oslo.



Fig. 5. Prow of Viking burial ship from Oseberg. Photo: Universitetets Oldsaksamling, Oslo.



Fig. 6. Shaft graves in Mycenae, Greece, from which Schliemann unearthed the magnificent golden treasure described by Ludwig in his biography. *Annan Photo Features*.



Fig. 7. Bull painting from the palace at Knossos in Crete, excavated by Sir Arthur Evans. *Culver Pictures*.

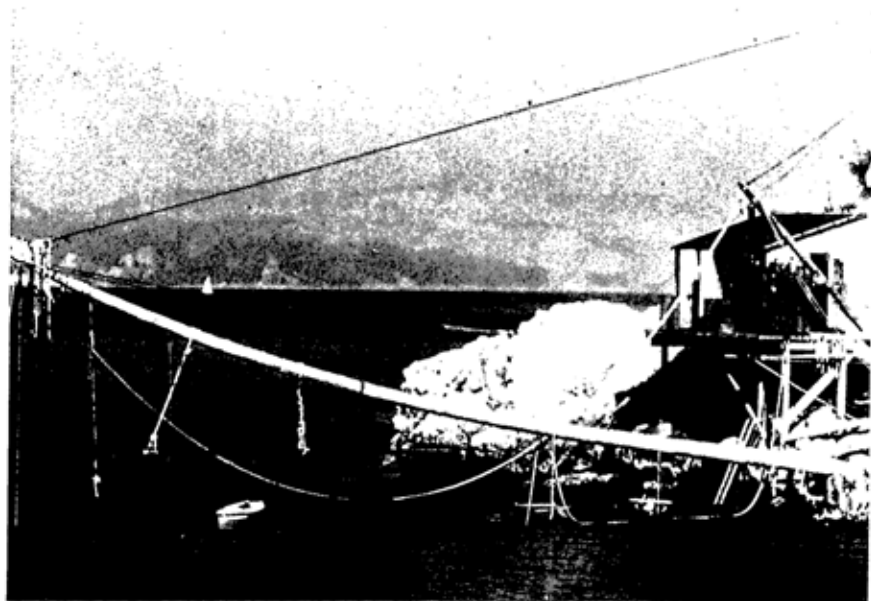


Fig. 8. Submarine archaeology. Diving installations on Grand Congoué Island near Marseilles. In region described by Philippe Diolé in "A Cargo of Art Masterpieces at Twenty Fathoms." *Courtesy of Lionel Casson.*

Fig. 9. Column drums at St. Tropez, salvaged from the Mediterranean off the coast of France. *Courtesy of Lionel Casson.*

Fig. 10. Italic amphorae salvaged from a shipwreck near Marseilles. *Courtesy of Lionel Casson.*





Fig. 11. Drawing of a clay tablet inscribed in Linear B script, found by A.J.B. Wace in Mycenae in 1952. It gives a list of men's names with the sign for "man" and their numbers. *The Manchester Guardian*.

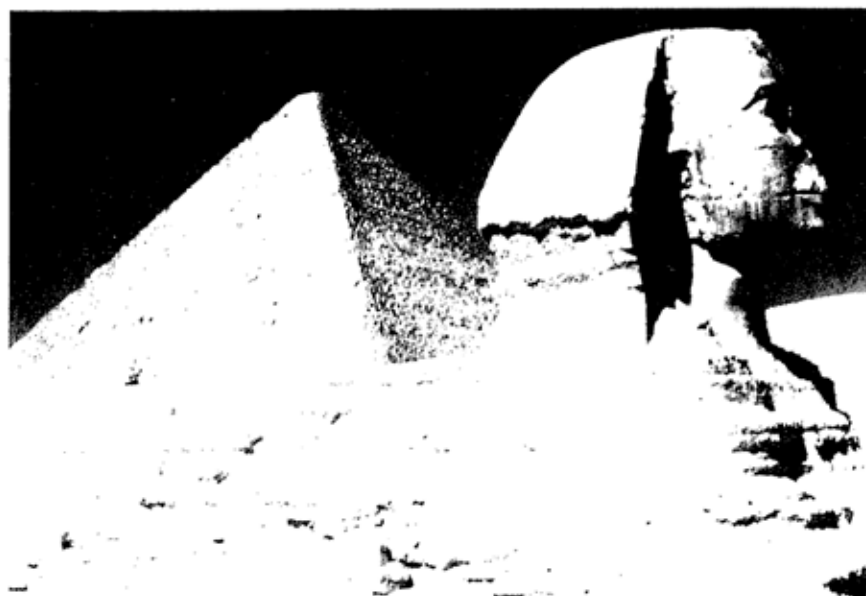


Fig. 12. Pyramid and Sphinx at Cheops. Pyramid similar to that measured by Flinders Petrie and described by Casson in his biography of the pioneer archaeologist. *Courtesy of Lionel Casson*.

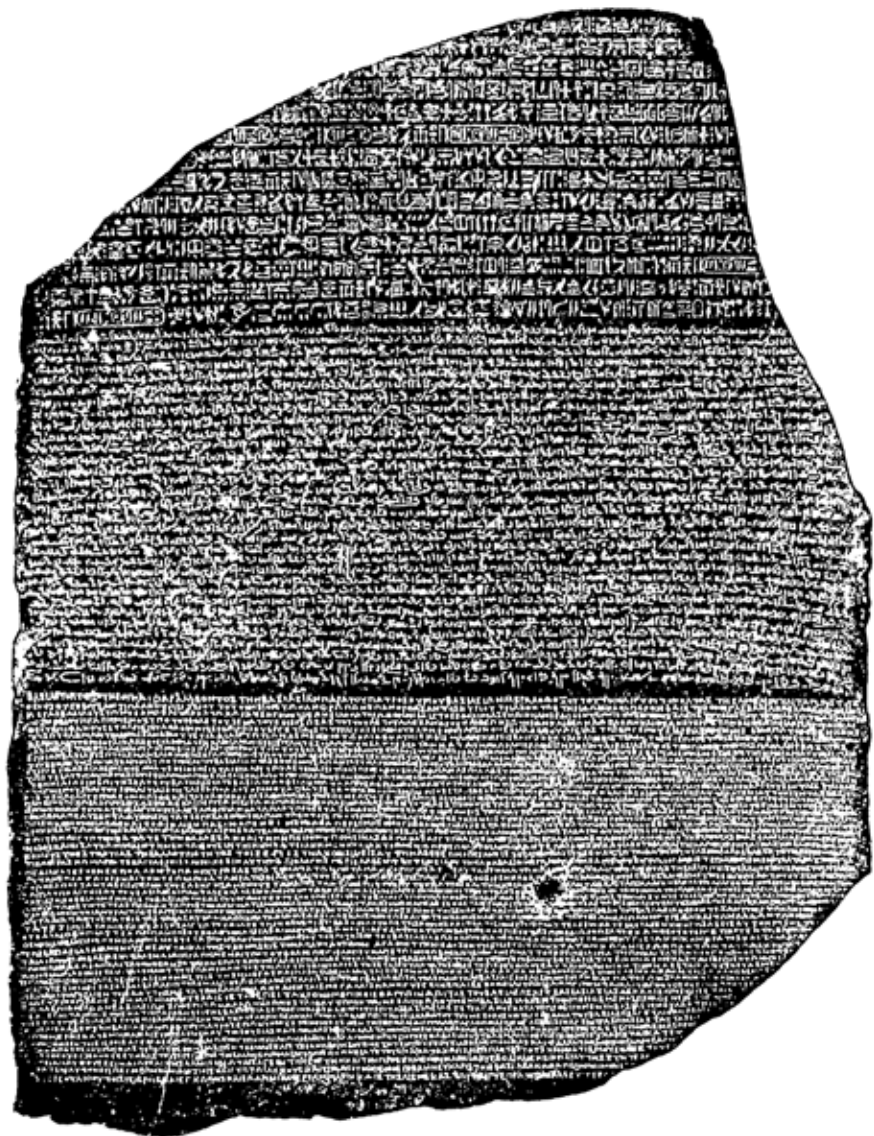


Fig. 13. The Rosetta Stone. *The Bettmann Archive.*



Fig. 14. Back panel of the throne of King Tut-Ankh-Amen, shown with his wife Ankhes-en-Amen. Delineated in sheet gold on wood and decorated with glass, polychrome faience, and stone inlay. Photograph by Harry Burton, The Metropolitan Museum of Art.

Fig. 15. Interior of antechamber of Tut's tomb after being ransacked by robbers, as it was first seen by Howard Carter. Photograph by Harry Burton, The Metropolitan Museum of Art.

Fig. 16. Unraveling of wrappings around statue from Tut-Ankh-Amen's tomb. Photograph by Harry Burton, The Metropolitan Museum of Art.

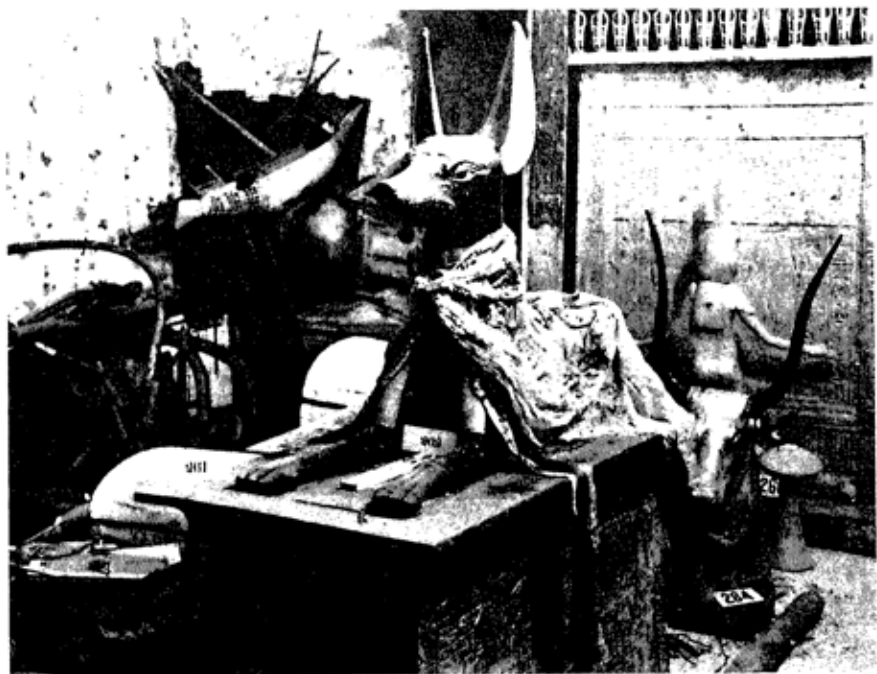




Fig. 17. Head discovered by Kathleen Kenyon in the ancient town of Jericho. Here Neolithic man removed the skin and flesh from the heads of the bodies of his dead and modeled a plaster portrait of the person over the bones. The eyes were inlaid with shell. *The British School of Archaeology in Jerusalem.*

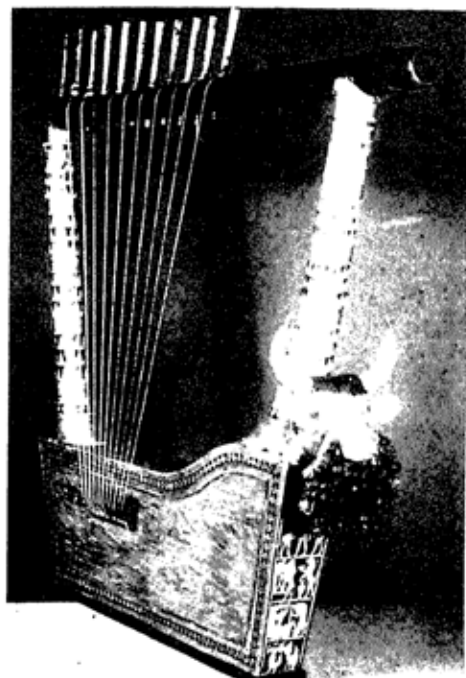


Fig. 18. Lyre from the king's grave at Ur, excavated by the Joint Expedition of the British Museum and the University Museum, Philadelphia, to Iraq. About 2500 B.C. The wooden sound box has been restored. *Courtesy of the University Museum, University of Pennsylvania.*



Fig. 19. Detail of the lyre. Bull's head made of gold and lapis lazuli. *Courtesy of the University Museum, University of Pennsylvania.*



Fig. 20. Ram in a thicket, made of gold, silver, and shell. Excavated from one of the royal tombs at Ur by the Joint Expedition of the British Museum and the University Museum, Philadelphia, to Iraq. *Courtesy of the University Museum, University of Pennsylvania.*



Fig. 21. Queen Shub-ad, the Sumerian queen. Reconstructed head showing original headdress and jewelry found by Sir Leonard Woolley in a royal tomb at Ur. *Courtesy of the University Museum, University of Pennsylvania.*



Fig. 22. The scrollerly where the brittle fragments of the Dead Sea Scrolls are spread out under glass plates, identified, and pieced together in a gigantic job of jigsaw puzzle detection. *Palestine Archaeological Museum.*



Fig. 23. Parchment from the Dead Sea Scroll of Thanksgiving. *Philip Gendreau, New York.*





Figs. 24 & 25. Pot and group of clay toys from Chanhudaro in the Indus Valley, not far from Mohenjo-daro, the great early civilization described by Sir Mortimer Wheeler in "Archaeology in India." At Mohenjo-daro, Wheeler identified Roman remains from the first century A.D., thereby cross-dating two divergent civilizations. *Courtesy of the Museum of Fine Arts, Boston.*

Fig. 26. Chinese pottery, from the Prehistoric Period, Kansu type. Soft, fine-grained, buff-colored clay painted with symbolic patterns in black and chocolate brown. Similar to the pots discovered by J.G. Andersson and described in "Archaeology Takes Charge." *Courtesy of the Smithsonian Institution, Freer Gallery of Art, Washington, D.C.*



Fig. 27. Rock carvings from Rana Rao, Easter Island. *Courtesy of the American Museum of Natural History.*



Fig. 28. Stone image inside crater of extinct volcano, Rano-Raraku. *Courtesy of the American Museum of Natural History.*



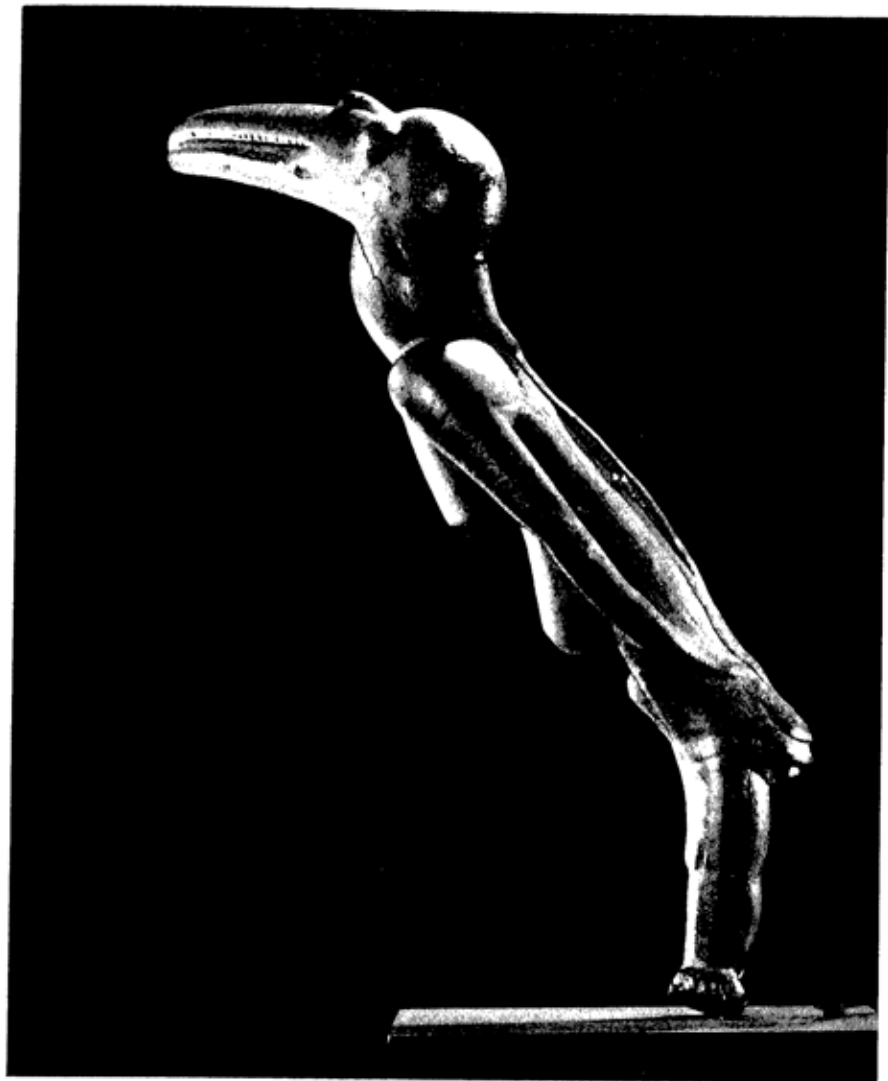


Fig. 29 (left). Raising of a giant statue on Easter Island. On his famous expedition to the island, Thor Heyerdahl uncovered the bases and remounted many of the stone images. Here three wooden poles are used to lift the statue by fractions of an inch while small stones are gradually shoved underneath it.

Fig. 30 (above). Carved wooden figure, "Bird Man," from Easter Island. *Courtesy of the American Museum of Natural History.*

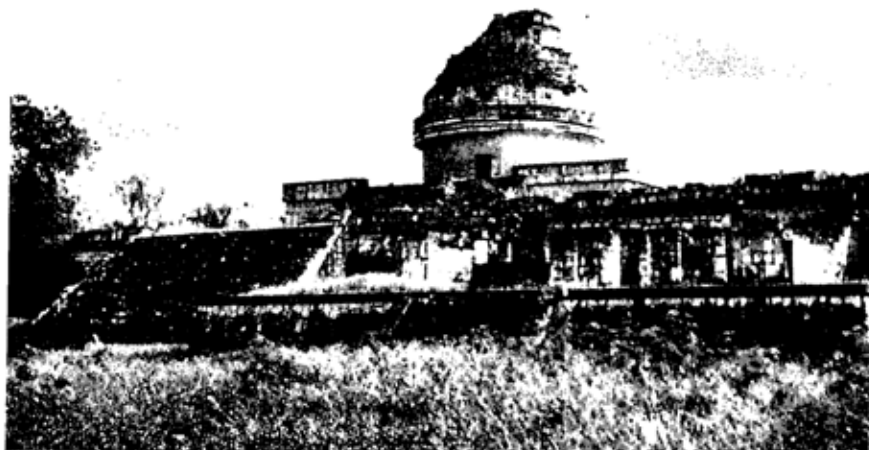


Fig. 31. The Caracol at Chichen Itza in Yucatan, near the Sacred Well excavated by Edward Thompson. *Philip Gendreau, New York.*

Fig. 32. Scenes of human sacrifice by the Maya, such as those described by Thompson in "The Well of Sacrifice," taken from monuments, codices, and wall paintings. *Reprinted from The Ancient Maya by Sylvanus Griswold Morley and George W. Brainerd with the permission of the publishers, Stanford University Press. © 1946, 1947, and 1956 by the Board of Trustees of the Leland Stanford Junior University.*





a



b



c



d



e



f

Fig. 33. Illustrations from the *Codex Florentino*, showing (a, b, c) the arrival of Cortez in Tenochtitlan with his Spanish soldiers, (d) rout of chieftains from the pyramid temple by the Spaniards, (e) bodies of Montezuma and Itzauhtzin cast out of the palace by the Spaniards, and (f) Montezuma's body being carried away.



Fig. 34. The National Stone, now in the Mexican National Museum. It shows symbolically the Sacred War, the conflict between opposing forces of Nature. *Courtesy of the American Museum of Natural History.*



Fig. 35. Aztec intertwined snake, probably from Central Mexico. Stone sculpture, 11 1/2 inches high. *Courtesy of the American Museum of Natural History.*



A Sun Disk



Sun God, Tonatiuh



13 Acatl



4 Ocelotl



4 Ehecatl



4 Quiahuitl



4 Atl



Warrior's Ghost



1 Tecpall



1 Quiahuitl



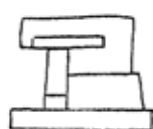
7 Ozomalli



1



2



3



4



5



6



7



8



9



10



11



12



13



14



15



16



17



18



19



20

THE 20 DAY-SIGNS OF THE AZTEC MONTH—CODEX FORMS

Fig. 36. Codex forms for the days of the Aztec month.
Courtesy of the American Museum of Natural History.

HEINRICH SCHLIEMANN

EMIL LUDWIG

Troy

ANYONE LOOKING for an example of the phenomenon that it is sometimes nothing but the will to greatness that makes a man great, may well find it in Schliemann.

For a long time an inner voice had been drawing him to Greece; for fourteen years he had been conversant with both modern and ancient Greek; he knew the classical writers, the historians, and above all, Homer. Now that the sum of his years totalled forty-six, there lay behind him thirty exciting years, in which his desire for gold had won everything, but his deeper desire, which was always of the mind, had won but little.

When, in Ithaca, in July, 1868, with the thermometer at one hundred twenty-five degrees, he trod Homeric soil for the first time, he was scarcely more than an enthusiast. On the summit of Mount Aetos which, because of a circuit wall, the people believed to be the site of the citadel of Odysseus, his enthusiasm was "so great that I forgot heat and thirst. Now I was investigating the neighbourhood, reading in the "Odyssey" the stirring scenes enacted here, now admiring the splendid panorama."

But the very next morning his inborn impulse towards action came to the fore; about five in the morning he climbed the peak with four workmen, first had the bushes pulled up by the roots, and then the northeast corner dug up, "where, as I judged, the beautiful olive tree must have stood out of which Odysseus constructed his marriage-bed and round which he built his bed-chamber (Od. XXIII, 183-204)." When he found nothing there, he made them dig round about, until after three hours' work, they reached the foun-

dations of a small building, obviously Roman. After making further observations, he dug further with a pickaxe, but four inches down he broke a beautiful little vase containing human ashes. He found some more like it, the curved blade of a sacrificial knife, a clay goddess with two flutes in her mouth, and a few other small things, but, unfortunately, no inscriptions. The small vase he believed to be far older than the oldest in the Naples museum, "and it is quite possible that in my five little urns I have the ashes of Odysseus and Penelope or their descendants."

On this first morning of his life which Schliemann spent with spade and knife, instead of with pen and pencil, there are already to hand all the elements suggestive of what his work was henceforward to be. The foundation was Homer, and Homer read with the absolute faith of a child or of a believer who, from a sense of reverence, takes as true every word that he reads, and follows the poet's imagination because he possesses one himself, and who thrusts in the spade to find what is to be found, with the faith of the amateur, not with the skepticism of the scholar.

Yes, this is Ithaca, Schliemann kept saying to himself at this time, and wherever he was, whether enjoying the fruits of the island with his workers in the shade, or in a cave he had found by the sea, or on a wide field, he constantly recited passages of those verses which he, in all seriousness, called divine. This was "perhaps the place where Odysseus shed tears when he saw again his beloved dog, Argos, who died of joy."

On the "field of Laërtes," he began to read the twenty-fourth book aloud to himself.

But the peasants began to crowd around, wanting to make something out of the stranger, overwhelmed him with questions, until he "thought it the wisest thing" to read aloud to them the twenty-fourth book of the "Odyssey," lines 205 to 412, and to translate it word for word into their dialect. "The enthusiasm was boundless when, in Homer's melodious language, the language of their glorious ancestors of three thousand years ago, they heard of the terrible sufferings which the

old King Laërtes endured on this very spot where we were assembled." Then the astonished men pressed round, with their wives and children, and cried to him: "You have given us great pleasure! We thank you!" And when these poor peasants suddenly felt themselves to be the descendants of that great king, each one of them offered the stranger what he had, and none of them accepted money.

In exactly the same way he followed his belief in Homer when, presently, after a short visit to Mycenæ and Tiryns, he approached the Trojan plain. Nearly all the scholars had placed the site of ancient Ilios at a spot high above the Turkish village of Bunarbashi. When Schliemann arrived here, he wrote:

"I confess that I could hardly control my emotion when I saw before me the immense plain of Troy, whose image had hovered before me even in the dreams of my earliest childhood. Only, at the first glance it seemed to me to be too long, and Troy to lie much too far away from the sea." But if, as the scholars said, Troy lay on this hill, three hours' distant from the coast, how was it that the Greek troops were able several times on the same day to traverse the distance between the place where the ships were anchored and the enemy citadel? And how could Achilles have pursued Hector three times around the walls of this citadel, whose steep slope to the river was almost impassable?

How could Homer's description of the gigantic palace of Priam, with its sixty-two rooms, the pursuit of the Trojans before the gate of this palace, and, within the citadel, the palace and court of Hector and of Paris, and the great gateway through which the wooden horse was brought, be reconciled with this little hill?

But there was, at an hour's distance from the coast, another flatter, much broader tableland, near the present village of Hissarlik. According to the American Calvert, to whom it mainly belonged, and to a few scholars before him, this was the site of the ancient Ilium. This idea at once took a great hold on Schliemann.

After he had twice carefully examined the plain of Troy,

Schliemann discharged his workmen. "Contrary to my expectation, I had had no opportunity to use them in Hissarlik; for even without attempting excavations I had become completely convinced that this had been the site of the old Troy."

Scarcely had he identified, during that first visit, the spot which the topography of the hill appeared to indicate, than he entered into a lively correspondence with the brothers Calvert, and received from these practical idealists, who owned part of that coast, counsel, help and encouragement. They also showed him the way to obtain a firman from Constantinople, that is to say, a permit from the Sultan to carry out excavations on Turkish soil.

In April of the year 1870, Schliemann turned over the first spadeful of soil at the northwest corner of the hill of Hissarlik. He came upon the remains of a wall, but immediately found himself involved in a dispute with the owners of the land, whereupon he broke off the work and returned to Athens to await a settlement of the dispute.

The wall which he had discovered near the surface was Roman, but what was concealed below? On this point he wrote from the scene of his labors: "I have discovered the ruins of palaces and temples on walls of much older buildings, and, at the depth of 15 feet, I came upon huge walls six feet thick and of most wonderful construction. Seven and a half feet lower down, I found that these walls rested upon other walls 8½ feet thick. These must be the walls of the palace of Priam or the temple of Minerva."

A wide, hilly plain, on which flocks of sheep grazed, bordering on the sea on one side and stretching away on the other three sides until it merged into the steppes of Asia Minor; a dirty little village, inhabited by a few hundred stolid shepherds—amid these surroundings suddenly appeared a slightly built stranger, of medium height, with hat and stick and spectacles, concerning whom the rumor ran that he had untold wealth far over the seas, and, moreover, a crazy idea of digging into this Old World's crust in search

of treasure. Had they not been Orientals, a revolution must have broken out; as, however, they were Orientals, they merely gazed at the stranger with their dark wise and melancholy eyes. When he hired a gang of a hundred men, placed in their hands shovels and spades, which he had brought with him, and bade them dig a trench nearly one hundred feet wide right through the hill, neither their zeal nor their pace increased.

There it lay, dark and inscrutable, the hill that was supposed to conceal the traces and treasures of Homeric times. But there was no guide to tell him where to begin, how wide to dig the trench, or in what direction it should be dug; moreover, tradition, too, was scanty as a guide. At that time neither Olympia, nor Delphi nor Mycenæ had been excavated, and just as the plan of operations had to be based on intuition, so also a technique had to be developed as need arose. When Schliemann began his work there was no existing technique of excavation. Ox waggons lumbered slowly over the trackless steppes, camels transported the objects discovered, and the men in their Turkish trousers who followed them seemed little likely to outdo the oxen in speed. As he was under obligation to hand over half of his discoveries to the Turkish authorities, he was subject to the continual surveillance of an Armenian, to whom he himself had to pay twenty-three piastres a day to discharge this irksome office.

It was in very restrained terms that Schliemann issued to the public the first of his series of reports: "I am finding much that is wholly inexplicable to me in this stone age, and I, accordingly, consider it necessary to present everything as objectively as possible, in the hope that one or another of my esteemed colleagues will perhaps be able to enlighten me on obscure points. . . . I cannot understand how it is that I am unearthing stone implements throughout the whole length of my excavations at the present stratum."

"18th November: Much that was unintelligible before has become clear to me, and I must first of all correct the mistake I made in it of thinking that I had come upon a

stone age. . . . For the past two days I am unearthing . . . nothing but large blocks of stone, some wrought, some unwrought, and beneath them lie huge blocks. For instance, this morning I was occupied for three hours with 65 workmen in clearing a single door-sill with the aid of block and tackle."

In the following year both Schliemann and his wife worked in the Troad almost continuously from April until August. On the northern slope a large terrace was cleared, a broad trench begun from the south, which was to meet the trench from the northern side in the middle, thus enabling the mound to be penetrated from two sides. A number of very early stone implements, bronzes and pieces of pottery were found. Regarding the arrangement and the period of the various strata Schliemann was then uncertain. The new technique of excavation, involving measurements and photographs, had scarcely begun, and he was unable to apply it at this stage; moreover, no one had yet thought of enlisting the services of architects. Hampered by public opposition, which had even then begun to murmur and was to swell into a fierce chorus, he had nothing but Homer to guide him in the work of exploring this bewildering hill which had been inhabited by many generations and on which town had been built upon town. Inevitably, therefore, he made mistakes at first, in the same way as did the first Arctic explorers, who nevertheless, are honored for their initiative, their pioneer spirit and the partial successes they achieved.

So truly, however, did his instinct guide him that he was puzzled by the corner of the wall on which he had come. For, on excavating the circuit wall of what was later described as the sixth stratum, he uncovered the southeastern corner of a building which, ten years later, it was possible to declare definitely to belong to the Homeric Troy. As his imagination was in search of splendor, he did not at first identify this corner, but nevertheless a presentiment such as later explains all his successes bade him suspend the work: "The foreman Photiadis has to-day brought to light a mag-

nificent bastion constructed of large blocks of finely wrought shell limestone, without cement or plaster, which, however, does not appear to me to be older than the time of Lysimachus. To be sure it is holding us up, but it is too beautiful and venerable for me to dare to lay hands on it. It must be preserved as it is."

On the other hand, he considered two fragments of what is known as the second stratum to be parts of one and the same wall, and as they corresponded in thickness and were on the same level, fancy immediately became translated into reality in his mind: he imagined he had discovered the Great Tower mentioned by Homer, that "sacred, and stately monument of the heroic days of Greece."

But where was the gold under the earth? Did not Homer speak of splendid treasures? Were not the jewels of the women, the glitter of weapons, the riches of these kings described with an exactitude which could only have come to the poet through the sight of his own eyes or the description of an ancestor? To go on digging for months among stones and débris without finding anything but some bits of wall, fragments of pottery, and, occasionally, a funeral urn; to go on sacrificing health, time and enormous sums of money, and yet, in the darkness of this pile of débris, to advance but toilsomely and without results that would spread his fame afar—all this might have wearied even sooner a nature set like Schliemann's on glory and success. It was, therefore, truly amazing to find them next spring once more on the hilly plain of Troy. An attempt was to be made first of all further to lay bare the Great Tower.

He now found at a greater depth terra cotta vases, a copper lance, large bronze and black vases, all showing very scanty designs and most of them broken. With every few feet inwards and downwards he revised his entries, and "I retract entirely the view I expressed previously that Ilium remained inhabited up to the ninth century A.D."; it was more likely that it was entirely abandoned after the fourth century.

Schliemann kept a diary of his life and work during these four months.

In May things suddenly became extremely interesting: they discovered two gates about twenty feet apart, and also locks, vases with owls' heads on them, and the remains of a house filled with remarkable things.

"The removal of the *débris* was very difficult, because . . . it had to be dragged in wheelbarrows up a steep path for over 160 yards. But all my expectations were . . . surpassed. . . . Behind the second gate I brought to light two buildings of different age, the more modern being built on the ruins of the older one; both were destroyed by terrible outbreaks of fire, of which the walls bear clear traces." The house he declared to be the palace of Priam, the gate, the Scaean Gate. A little before this he had written to his son Sergius:

"We have been digging here for three years with from a hundred to a hundred and fifty workmen, and have laid bare half the ancient town and most, if not all, of the monuments of deathless fame. We have dragged away 250,000 cubic metres of *débris*, and have collected in the depths of Ilium a fine museum of very remarkable antiquities such as have never before existed. Now, however, we are weary, and since we have attained our goal and realised the great idea of our life, we shall finally cease our efforts here in Troy on 15th June."

Sophia had gone to Athens in May, on account of her father's sudden death. At that time he was so despondent that he wrote to his publisher: "The hardships are beyond my strength, and I have decided to continue with the excavations until 1st June, and then abandon them for ever. Later I will dig only in Greece, and begin with Mycenæ, Agamemnon's capital." It was not until Sophia had returned to her husband that the great discovery was heralded. It was as if the discoverer's hand of the Hellenist became effective only in the presence of this Greek girl. For in the middle of June, immediately before he intended to cease the excavations "for ever," he suddenly found the gold.

It was on a morning in the middle of June, one day before the termination of the work. The two Schliemanns were

standing not at the main excavation site, but, along with one or two workmen, at the point where the circuit wall continues northwest from the "Scaean Gate," close to the "House of Priam." Shovel and spade were at a depth of twenty-eight feet. Suddenly Schliemann noticed a big copper object of remarkable shape. Immediately afterwards, through the dirt and dust, he caught sight of something gleaming in the sun. No one else had noticed the glitter of the gold: the man who for thirty years had dreamed of gold and had been looking for it here for three years was attracted by the gleam before any of the others who stood close beside him. Then the woman saw it too.

Now the great business man came into action, the man of the world and adventurer too, who had spent a year among the gold-seekers in California, had had to deal with gold-seekers, had unearthed lucky finds and sold them. Here beckoned the prize, the gold beneath the earth, the gold of Homer. The problem was to get the overseer of the Turks out of the way, to have none of the workmen about. To bring it all to light alone, alone with his wife. And before Sophia could utter an unguarded word or ask a question, he called to her: "Go at once and shout '*Paidos*'" (the Turkish for a rest interval).

"Now, at seven o'clock?"

"Quick. Tell them that to-day is my birthday, and that I have only just remembered it. Every one will get his wages to-day without working. See that they go off to the village. See that the overseer doesn't come. Hurry. Shout '*Paidos*'"

She had been accustomed for months to shout "*Paidos*" three times a day, for breakfast, at midday and in the evening. To-day, she did it in the morning, and gave the message to the men, and these Orientals, who were glad of any opportunity for a holiday, wasted no time in wondering. Then she came back to her gold seeker.

"Go quickly and bring your big shawl," he called to her, cutting with his knife around the hole in which his discovery was hidden. She went and returned. Her husband was not strong, he had never dug himself, and had very seldom

used spade and shovel; he had always been the brains; to-day he was to be the hands as well.

"On the top of the copper vessel lay a solid layer of red ash and calcined ruins about five feet thick, and above this again a wall of fortification $5\frac{3}{4}$ feet broad and $19\frac{1}{2}$ feet high, composed of large stones and earth, which must date from the period immediately following the destruction of Troy. . . . In great haste I cut out the treasure with a big knife, which entailed the utmost exertion, and which might have involved the most frightful danger to life. For the great wall of fortification which I had to undermine threatened to fall in on me any moment. But the sight of so many objects each one of which was of incalculable value, made me rash, and I did not think of danger."

One by one he raised the golden treasures out of the copper receptacle, Sophia laid them in her big red shawl, and together they dragged the Homeric marvel into their wooden hut, locked the door and spread out the treasure.

Perhaps this was the supreme moment in Schliemann's life. Had not his faith in Homer been splendidly vindicated? Had he not set out, almost with nothing but the "Iliad" in his hands, had first established the hill on which Troy must have been situated, then dug, ever wider and deeper, seeking and finding, but only fragments of pottery, vases, building stones, and once, a late metope? But now, here in this silent room, from the red cloth was revealed the gold of Priam, for whose else could it be? Every thought of this restless life had been directed towards gold and fame. Here both lay before them: he was at once discoverer and possessor, and at his side stood a beautiful Greek girl of twenty, the mother of his daughter Andromache. He hung chains and rings against her breast and ears, and as the two looked and trembled, the dream of this visionary was realised. This was Troy, and he, a poor clergyman's son from the North Sea, stood on the shore of the Hellespont, dipping his hands in the treasures of the ancient world.

The treasure which Schliemann uncovered included thousands of necklaces, rings and other gold objects. He was convinced

that the Turks would have no idea of the scholarly value of the find and would in all probability melt down the gold. And he was himself much interested in the financial aspects of the matter. He therefore determined, despite his agreement, to keep everything in his personal possession. It was smuggled aboard ship, taken to Athens and there it disappeared, scattered among his Greek wife's relatives. The result was a cause célèbre which lasted for years, until it was finally settled by the payment of one hundred thousand francs.

Schliemann, who had already visited Mycenæ and Tiryns, decided on the former as the site of his next excavation. But while the Greek public was on his side in the litigation with the Turks, the authorities were justifiably suspicious of his motives and the learned fraternity jealous of his success. He at last succeeded in obtaining permission to dig at Mycenæ on condition that the finds be turned over to the government. All work was done with an overseer constantly and officiously in attendance. A succession of arguments, charges and countercharges and innumerable letters and telegrams to and from the authorities in Athens ensued. The latter threatened to forbid him the site, Schliemann threatened to abandon work, but somehow the excavation went on.—Eds.

Mycenæ

A traveler approaching Mycenæ, especially in winter, under a grey sky with dark driving clouds, as he slowly climbs the hard road leading to the stone citadel on the hills, would imagine the gloomy landscape, focused, as it were, in the gigantic walls of the fortress, to be the home of dark and savage natural powers, would picture it as the scene of tragedies of the heroic age, even if he did not know what happened there.

The legend of these hills and peaks leads back to Perseus, and Agamemnon, the grandson of Pelops, seems already to belong to a younger age. What happened here, sung by Homer, tragic dramatists, and by ever new poets of Greece, the fate of the victor returning from Troy, treachery and revenge, has been accepted by all artistic epochs as the archetype of tragedy, and no European saga, not even the

wrath of Achilles or the adventures of Odysseus, has taken stronger root among all peoples throughout the centuries than the history of this dark dynasty, which stretches from Athens through Helen to Iphigenia. The man who could penetrate to the evidences and remains of this Mycenæan world would unveil the archmyth of the Mediterranean. Pausanias writes on the subject as follows:

"Among the ruins of Mycenæ are the subterranean buildings of Atreus and his children, in which they preserved their treasures. There lie his tomb and the tombs of Agamemnon's fellow warriors who on their homecoming from Troy were slain at the banquet of Ægisthus. There too lies the tomb of Agamemnon and that of Eurymedon, his charioteer. Teledamus and Pelops were interred in the same tomb. Electra lies there too. Clytemnestra and Ægisthus were buried at some distance from the wall, for they were regarded as unworthy of being interred within, where rest Agamemnon and those who were slain with him."

These positive statements in the ancient guidebook were bound to attract the attention even of sceptical spirits and scholars who regarded Homer purely as a minstrel and a visionary, and excavations were undertaken in and around Mycenæ at various times. But without result. Following the above description, they had all located the tombs in the outer city. Schliemann, the dilettante, who thought with his eyes, was the first to do the natural thing, and to see what their very erudition had made the others miss. What he saw and could grasp, those Cyclopean walls, he regarded as the citadel wall mentioned by Pausanias. The realist in him took what he found and did not search after the complicated; the believer in him clung to Homer and to the friend and guest of Odysseus, who went into raptures over the gold in the palace of Menelaus. His twofold genius told the gold-seeker that the tombs must be inside the walls, and that in the tombs was the gold.

In the neighborhood of the Lion Gate, which is regarded as the oldest artistic monument in Europe, Schliemann, always assisted by from a hundred and fifty to three hundred workmen and always supervised by the representative of the

Archæological Society, began by unearthing many crudely painted statuettes of Hera and terra-cotta cups, hundreds of clay figures of animals—mostly in the form of cows—arrow-heads, hatchets, stone whorls, bronze knives and iron locks, marvellous lentoid gems, pierced glass balls, and chiselled stones of granite and basalt, most of them dating from very early times, but all belonging to very different periods.

Later, when he found the sepulchral *stelæ*, he immediately related them to his Homeric heroes, who lay buried here, for hunters and warriors on their war chariot were represented on these stones, just as Homer describes them. The stone-encircled square in which he found them he declared to be the agora (the market place), and the Cyclopean house near by, to be the palace of the king.

Stone slabs which surrounded the agora in two parallel rows, some of which were still in an upright position, were obviously the places for the citizens to sit and talk. Since this new discovery confirmed his belief that the tombs of the kings were situated within this enclosure, he could infer that the gravestones, which were also proved by their reliefs to be such, obviously indicated the position of the royal tombs.

Sophia found the first gold ring. The tombs had been discovered.

All the workmen were immediately dismissed. Only the éphor remained with the two discoverers. A cordon of soldiers formed a wide radius around Mycenæ. They lived in a fortress. Everything that was now to happen was to be confined to four hands, and as Sophia's young hands were defter than those of a man of fifty-five, the larger share of the work fell to her. For twenty-five days Sophia Schliemann on her knees, very carefully, often with only a pocket knife, removed in fine layers the soil which still covered the royal tombs. Every evening they rode home, Sophia with a basket full of ancient gold on her arm, and behind her, her husband and the official. In the house, everything was counted, numbered, and locked away.

Schliemann, in his usual fashion, was not sparing of telegrams: telegrams to the King of Greece, to the Prime Minis-

ter, to the editor of the *Times*, to a police commissioner with whom he was on terms of friendship, and to the Emperor of Brazil, who a little time before had viewed the investigations and had dared, though an entirely unscientific person, to express skepticism. These telegrams included the following to the Minister at Athens:

"In the last tomb three bodies, one without ornaments. Have telegraphed to Nauplia for a painter, to preserve the dead man with the round face. This one is very like the picture which my imagination formed of Agamemnon long ago."

Thus at last, after three years' searching, straying, hoping and despairing, he held it in his hands, the golden mask of the Mycenæan king who was murdered there. He had brought to the light the image of that heroic figure that had haunted his mind twenty years before. The gold-seeker kissed the death mask of Agamemnon which he had unearthed out of the débris, in the midst of rain and cold.

These five tombs of which Pausanias had spoken he found not far from another tomb, at a different depth, and partly hewn in the living rock, which contained the skeletons of twelve men, three women and two children. The débris and ashes of the first tomb were shot through with golden ornaments, plundered from the corpse in ancient times; the second skull was covered with a gold mask, behind which the skull crumbled to dust immediately; the third, still fairly well preserved, was more crushed, and had a golden mask on the face, round gold disks on the forehead and the eyes, and a similar disk on the breast, also a gold girdle and a bronze sword. In addition, his kinsmen had sent with him to the other world eighty swords, many with beautiful decorated hilts, knives and lances, battle-axes, amber beads, thirty-seven gold leaves, three magnificent gold plaques on which were represented stags pursued by lions, gold and silver goblets, an alabaster vase, and gold buttons with rich ornamentations.

In the second grave, along with the similarly disposed dead bodies, were found three diadems, four crosses of golden laurel leaves and other objects. In the third grave lay women,

literally laden with jewels and gold surrounded by seven hundred leaves, ornamented with serpents, butterflies, flowers and spirals, gold ornaments representing grasshoppers, griffins, stags, women with doves and lions, and also sceptres of silver-gilt with handles of rock crystal, and sardonyx and amethyst gems. One of the women wore a magnificent gold crown on her head.

"I have found an unparalleled treasure of trinkets and jewels," wrote the enraptured discoverer to his French colleague in Athens. "All the museums in the world put together do not possess one-fifth of it. Unfortunately nothing is mine but the glory." And to another correspondent: "It is impossible to give you the faintest idea of the richness of the ornamentation of these jewels. It must have taken the artist, one would imagine, five years to engrave these hunting or battle scenes like an instantaneous photograph, on the rings. In the pottery, too, I have discovered a new world for archaeology, and am eager to publish my results quickly, this time in English."

In his rapid impetuous way, he himself at once began sending reports to the *Times*, almost every day, first long telegrams, then articles, which procedure occasionally necessitated his correcting himself. He flew into a fury, when his colleagues in Athens attempted to steal the fruits of his victory.

Meanwhile the town of Nauplia had declared that it would not give up the treasures, but would build a museum for them. When, in spite of this, they were finally brought to Athens, the dispute about the keys began between the Ministry and the Society. Twelve chests, stored for safety in the cellars of the National Bank, had been locked by the Ministry, but the President of the [Archaeological] Society wrote: "Give us the keys, for by law we are also permitted to have them. It is a sign of lack of confidence for you to withhold them."

The curse of the Atridæ seemed to have followed their gold even into the glass cases of the museum. Hardly had the treasures been brought up to the light of day than the cities of Greece began to dispute about them, just as in an-

cient times. This was followed by a dispute between the State and a group of its citizens. Each one wanted to have them, and each grudged them to the other, and between them stood, in toil and tension, the discoverer.

Scarcely had they returned to Athens than he rushed at his book on Mycenæ, wrote it in English in eight weeks, immediately translated it into German himself, negotiated with Brockhaus in Leipzig and with Murray in London, considered who would be able to write the most weighty preface, treated at the same time with leaders of various parties in Athens, in order not to lose further opportunities for excavation, continued the almost uninterrupted negotiations with his protector in Constantinople, in order to secure fresh Turkish permits for Troy, began to reply to the growing volume of criticism, mainly from German scholars.

As the new treasure, unlike the Trojan one, did not belong to him, he was now freer to pursue his pure ambition, and all he wanted was Gladstone's name, to give him a scholarly background. The "grand old man," then approaching seventy and not at the moment prime minister, was the ideal helper for Schliemann; for like himself, Gladstone was both man of the world and scholar, had early made a name for himself by his Homeric studies, and then multiplied it a hundred times by his political career, just as Schliemann first gained some reputation as a merchant, and then a great one as a discoverer.

Schliemann had met Gladstone two years before this, in the summer of 1875, when he addressed the most distinguished scholars in England at the Royal Society of Antiquaries.

Gladstone now said that he had only once written a preface, for a book about Bulgaria, by a young lady whom he loved and esteemed. He had refused all the others, but he could hardly do so in this case. Soon afterwards he wrote to Murray the publisher: "I have now read Schliemann's *Mycenæ*, and I am quite worried, as I am not the right man for it. As, however, it is useless to advance this quite correct argument, after careful consideration I may tell you that I am prepared to do it."

On this occasion, six months after the discovery of the golden treasures of Agamemnon, when Schliemann was for the second time staying in London as the lion of the season, his wife remained behind ill in Athens, and received his youthfully naïve letters with all the wisdom of a woman thirty years younger. He wrote in English:

"I am very sorry to hear that you are not coming. You would have found thousands of friends here. Look, for example, at the enclosed newspapers, and think of the extraordinary honor it is for a mortal woman to be invited by the Archæological Institute here, and to receive its honorary diploma before a thousand people. For heaven's sake give these papers to Mr. D., so that he may publish the account of it. But get him to return them as we must preserve this remarkable document. I continue to be the lion of the season and you would be the lioness. I receive invitations from lords and dukes every day. The London Photographic Society has paid me £40 for permission to take and sell my photograph. . . . Hodge the painter has been after me for weeks for permission to paint me life-size for the Royal Academy, for nothing, of course, as he thinks he would make a name for himself if he could say he had painted Schliemann."

So he bustled along, thinking perhaps that he was now the great gentleman. But when he heard that Sophia was also to receive the diploma, his imagination at last took flight again away from the country houses and dinners, dukes and expensive grapes, and his early dreams revived. He despatched a flood of telegrams to bring his convalescent wife to London. She collected her daughter and her brother, and came.

At last both were seated, in face of a thousand curious eyes, on the platform of the Society. It was the 8th of June, 1877. She was twenty-eight and he fifty-six. He made his speech first; then she spoke in English, a model of discretion. She told how she had had the supervision of thirty workmen, then how she excavated the tomb of Clytemnestra, all as if each one of these listening, gazing, curious ladies at the meeting had, like herself, lived for months in the winds of the plain of Troy and in the blazing sun between the Cyclopean walls of Mycenæ, always lonely, always remote from

the gifts of life, in order at the last, on her knees for five and twenty days, to bring to the light the dead bodies and the gold of the Atridæ. She concluded with an appeal to Englishwomen to have their children taught Greek, first modern, then classical. "In this way your children will learn in one year what later would take them ten. Now I will conclude with grateful thanks for the patience with which you have listened to an admirer of Homer."

Schliemann, who had translated the speech from Greek into English for her, was perhaps not listening during that half-hour. Possibly the adventure that his life had been flitted across his mind, the thought that from Ankershagen to St. Petersburg, from Troy to Mycenæ to London, the gods had been gracious to him. Praised be Pallas Athenel Did he not see her at that moment as she was when she wore the jewels of Helen, gazing at him with an unfathomable glance, questioning rather than demanding? But he had to thank her for still another boon. For as she stood there in her beauty and addressed the crowd, as if she were merely a learned woman, only he knew that she would give him a son before half a year was past. For this time it must be a son, and what Schliemann had set his mind on, he ultimately made come to pass. He knew what no one else in the room knew: she was carrying within her the son, the Greek, of whom he dreamed. And both knew what his name was to be—Agamemnon!

Schliemann resurrected a great civilization, but in the way of such discoveries, it raised as many questions as it answered. Where did the Mycenæans originate and what was their connection with the civilizations of both Egypt and Asia Minor? Schliemann, remembering the tale of Theseus, the Attic hero who had journeyed to Crete and slain the Minotaur, thought naturally of the island as a site for future excavation. On a trip there, his interest was heightened by the discovery of pottery similar to examples he had unearthed at Tiryns, and in

1883 he obtained a permit to dig. The site he chose was owned by a Cretan peasant who demanded an exorbitant price. The haggling went on for years and when Schliemann finally discovered the peasant in a piece of sharp practice, he broke off negotiations. To quote his biographer Ludwig, "the merchant got the better of the scientific investigator" and he lost his chance to discover the Palace of Minos.

Meanwhile the German scholar Milchhöfer had advanced the theory that the Greek and Cretan cultures were strongly similar. He had examined certain sealstones engraved with primitive writing and his work stimulated the interest of an English archaeologist, Sir Arthur Evans.

Evans had been born in 1851 and educated at Harrow and Oxford. He was the son of Sir John Evans, who had helped authenticate the claims of Jacques de Perthes. He thus came naturally by his interest in archaeology. In 1884 he became Keeper of the Ashmolean Museum at Oxford. He made expeditions to Sicily, Russia, the Balkans, and Greece, and was thus a trained archaeologist when he discovered the Palace of Minos. Unlike the discoveries of Schliemann, his find was immediately accepted by scholars.

Evans had hoped to complete his excavations in short order but they occupied him for a third of a century. He uncovered evidence of three periods of Minoan civilization, which he named Early Minoan, Middle Minoan, and Late Minoan, each with three subdivisions. They bridge a span of some 3,000 years, beginning about 4000 B.C. As Baikie notes, his initial interest in the excavation was "the hope that he might be led to the discovery of a Cretan system of writing." He discovered three such systems, termed hieroglyphic, Linear A and Linear B, but their decipherment eluded him. Although his discoveries were of massive dimensions, the problem with which scholars had been concerned for generations—the connection between the cultures of Crete and mainland Greece—remained a mystery until after his death.

James Baikie, who here describes the results of Evans' first season's digging at Knossos, was a graduate of Edinburgh University who became a minister in Edinburgh. He was also an outstanding scholar in archaeology and a lecturer in Egyptology at Oxford.

THE PALACE OF MINOS

JAMES BAIKIE

IN THE revival of interest in the origins of Greek civilization it was manifest that Crete could not long be left out of account, for the traditions of Minos and his laws, and of the wonderful works of Dædalus, pointed clearly to the fact that the great island must have been an early seat of learning and art. Most of these traditions clustered round Knossos, the famous capital of Minos, where once stood the Labyrinth, and near to which was Mount Juktas, the traditional burying-place of Zeus.

The attention of Schliemann and Stillman had been drawn to a hill called "Kephala," overlooking the ancient site of Knossos, on which stood ruined walls consisting of great gypsum blocks engraved with curious characters; but attempts at exploration were defeated by the obstacles raised by the native proprietors. In 1878 Minos Kalochærinus made some slight excavations, and found a few great jars or *pithoi*, and some fragments of Mycenæan pottery; but up to the year 1895, when Dr. A. J. Evans secured a quarter of the Kephala site from one of the joint proprietors, nothing of any real moment had been accomplished. Dr. Evans had been attracted to Crete by the purchase at Athens of some seal-stones found in the island, engraved with hieroglyphic and linear signs differing from Egyptian and Hittite characters. In the hope that he might be led to the discovery of a Cretan system of writing, and relying upon the ancient Cretan tradition that the Phœnicians had not invented letters, but had merely changed the forms of an already existing system, he began in 1894 a series of explorations in Central and Eastern Crete. On all hands more or less important evidence of the existence of such a script came to light, especially from the Dictæan Cave, where a stone libation-

altar was found, inscribed with a dedication in the unknown writing. But Dr. Evans was persuaded that Knossos was the spot where exploration was most likely to be rewarded; and his purchase of part of the site of Kephala in 1895 was the beginning of a series of campaigns which have had results not less romantic than those of Schliemann, and even more important in their additions to our knowledge of the prehistoric Ægean civilization.

In the beginning of 1900 Dr. Evans was at last able to secure the remainder of the site, and on March 23 in that year excavation began, and was carried on with a staff of from 80 to 150 men until the beginning of June.

Almost at once it became apparent that the faith which had fought so persistently for the attainment of its object was going to be rewarded. The remains of walls began to appear, sometimes only a foot or two, sometimes only a few inches below the surface of the soil, and by the end of the nine weeks' campaign of exploration about two acres of a vast prehistoric building had been unearthed—a palace which, even at this early stage in its disclosure, was already far larger than those of Tiryns and Mycenæ. On the eastern slope of the hill, in a deposit of pale clay, were found fragments of the black, hand-made, polished pottery, known as "bucchero," characteristic of neolithic sites, some of it, as usual, decorated with incised patterns filled in with white. This pottery was coupled with stone celts and maces, obsidian knives, and a primitive female image of incised and inlaid clay. All over the palace area, as the excavations went farther and farther down, the neolithic deposit was found to overlie the virgin soil, sometimes to a depth of 24 feet, showing that the site had been thickly populated in remote prehistoric times.

But the neolithic deposit was not the most striking find. On the south-west side of the site there came to light a spacious paved court, opening before walls faced with huge blocks of gypsum. At the southern corner of this court stood a portico, which afforded access to this portion of the interior of the palace. The portico had a double door, whose lintel had once been supported by a massive central column of

wood. The wall flanking the entrance had been decorated with a fresco, part of which represented that favorite subject of Mycenæan and Minoan art—a great bull; while on the walls of the corridor which led away from the portal were still preserved the lower portions of a procession of life-size painted figures. Conspicuous among these was one figure, probably that of a Queen, dressed in magnificent apparel, while there were also remains of the figures of two youths, wearing gold and silver belts and loin-cloths, one of them bearing a fluted marble vase with a silver base. At the southern angle of the building, this corridor—the “Corridor of the Procession”—led round to a great southern portico with double columns, and in a passage-way behind this portico there came to light one of the first fairly complete evidences of the outward fashion and appearance of the great prehistoric race which had founded the civilization of Knossos and Mycenæ. This was the fresco-painting, preserved almost perfectly in its upper part, of a youth bearing a gold-mounted silver cup. His loin-cloth is decorated with a beautiful sixfoil pattern; he wears a silver ear-ornament, silver rings on the neck and the upper arm, and on the wrist a bracelet with an agate gem.

“The colors,” says Dr. Evans in that brilliant article in the *Monthly Review* which first gave to the general public the story of his first season’s discoveries, “were almost as brilliant as when laid down over three thousand years before. For the first time the true portraiture of a man of this mysterious Mycenæan race rises before us. The flesh-tint, following, perhaps, an Egyptian precedent, is of a deep reddish-brown. The limbs are finely molded, though the waist, as usual in Mycenæan fashions, is tightly drawn in by a silver-mounted girdle, giving great relief to the hips. The profile of the face is pure and almost classically Greek. . . . The lips are somewhat full, but the physiognomy has certainly no Semitic cast. . . . There was something very impressive in this vision of brilliant youth and of male beauty, recalled after so long an interval to our upper air from what had been, till yesterday, a forgotten world. Even our untutored Cretan workmen felt the spell and fascination. They, indeed, regarded the dis-

covery of such a painting in the bosom of the earth as nothing less than miraculous, and saw in it the icon of a Saint! The removal of the fresco required a delicate and laborious piece of under-plastering, which necessitated its being watched at night, and old Manolis, one of the most trustworthy of our gang, was told off for the purpose. Somehow or other he fell asleep, but the wrathful saint appeared to him in a dream. Waking with a start, he was conscious of a mysterious presence; the animals round began to low and neigh, and 'there were visions about'; 'φαντάζει,' he said, in summing up his experiences next morning, 'the whole place spooks!'

The Southern Portico gave access to a large court which turned out, from later investigation, to have been really the Central Court of the palace, the focus of the life of the whole huge building. The block of building between the West and the Central Courts was divided into two by a long gallery, 3.40 metres in breadth, running almost the whole length of the structure, and paved with gypsum blocks. Between this gallery and the western wall of the palace lay a long range of what had evidently been magazines for the storage of oil and perhaps of corn. They were occupied by rows of huge earthenware jars, or *pithoi*, sufficiently large to have held the Forty Thieves. Down the centre line of each magazine ran a row of small square openings in the floor—"kasselles," as they came to be called—which at one time had evidently been receptacles, some of them, perhaps, for oil, but some of them, certainly for valuables. They were carefully lined with lead, and in some cases the slabs of stone covering them could not be removed without lifting the whole pavement. In spite of such precautions, however, they had been well rifled in ancient days, and little was left to tell of what their contents may once have been. The magazines were well fitted to convey a strong impression, not only of the size, but also of the splendor of the palace which needed such storerooms. There was no meanness or squalor about the domestic offices of the House of Minos.

To the rooms composing the block of building between the Long Gallery and the Central Court, access had been

given from the latter area; and it was in these rooms that, as the excavations progressed, some of the most remarkable features of the palace began to disclose themselves. About halfway along the court were found two small rooms, connected with one another, in the center of each of which stood a single column composed of four gypsum blocks, each block marked with the sign of the Double Axe; and these pillars suggested a connection with ancient traditions about Minos and his work. They were apparently sacred emblems connected with the worship of a divinity, and the Double Axe markings pointed to the divinity in question. For the special emblem of the Cretan Zeus (and also apparently of the female divinity of whom Zeus was the successor) was the Double Axe. And the name of the Double Axe is Labrys—a word found also in the title of the Carian Zeus, Zeus of Labraunda. But tradition linked the names of Minos and Knossos with a great and wonderful structure of Dædalus which went by the name of the Labyrinth; and the coincidence between that name and the Labrys marks on the sacred pillars and on many of the blocks in the palace at once suggested that here was the source of the old tradition, and here the actual building, the Labyrinth, which Dædalus reared for his great master. "There can be little remaining doubt," says Dr. Evans, "that this vast edifice, which in a broad historic sense we are justified in calling the 'Palace of Minos,' is one and the same as the traditional 'Labyrinth.' A great part of the ground-plan itself, with its long corridors and repeated successions of blind galleries, its tortuous passages and spacious underground conduit, its bewildering system of small chambers, does, in fact, present many of the characteristics of a maze." The connection thus suggested even by the first year's excavations has grown more and more probable with the work of each successive season.

Passing farther north along the line of the Central Court, access was given by a row of four steps to an ante-chamber, which opened upon another room, of no great size in itself, but of surpassing interest from the character of its appointments. "Already, a few inches below the surface, freshly preserved fresco began to appear. Walls were shortly uncov-

ered, decorated with flowering plants and running water, while on each side of the doorway of a small inner room, stood guardian griffins with peacock's plumes in the same flowery landscape. Round the walls ran low stone benches, and between these, on the north side, separated by a small interval, and raised on a stone base, rose a gypsum throne with a high back, and originally covered with decorative designs. Here truly was the council chamber of a Mycenæan King or Sovereign Lady." The discovery of the very throne of Minos, for such we may fairly term it, was surely the most dramatic and fitting recompense for the explorer's patience and persistence. No more ancient throne exists in Europe, or probably in the world, and none whose associations are anything like so full of interest.

The Throne Room still preserved among its débris many relics of former splendor. Fragments of blue and green porcelain, of gold-foil, and lapis lazuli and crystal, were scattered on the floor, and several crystal plaques with painting on the back, among them an exceedingly fine miniature of a galloping bull on an azure ground; while an agate plaque, bearing a relief of a dagger laid upon a folded belt, almost equalled cameo-work in the style and delicacy of its execution. In a small room on the north side of the Central Court was found a curiously quaint and delicate specimen of early fresco painting—the figure of a Little Boy Blue—more thoroughly deserving of the title than Gainsborough's famous picture, for, strangely enough, he is blue in his flesh-tints, picking and placing in a vase the white crocuses that still dapple the Cretan meadows.

The northern side of the palace was finished with another portico, and in this part of the building there came to light a series of miniature frescoes, valuable, not only as works of art, but as contemporary documents for the appearance, dress, and surroundings of the mysterious people to whom this great building was once home. Here were groups of ladies with the conventional white complexion given by the Minoan artists to their womankind, wonderfully bedizened with costumes resembling far more closely the evening dress of our own day than the stately robes of classic Greece with

their severe lines. In their very low-necked dresses, with puffed sleeves, excessively slender waists, and flounced skirts, and their hair elaborately dressed and curled, they were as far as possible removed from our ideas of Ariadne and her maids of honor, and might almost have stepped out of a modern fashion-plate. "Mais," exclaimed a French savant, on his first view of them, "Mais ce sont des Parisiennes." These fine Court ladies were seated, or perhaps rather squatted, according to the curious Minoan custom, in groups, conversing in the courts and gardens, and on the balconies of a splendid building. In the spaces beyond were groups of men, of the same reddish-brown complexion as the Cup-bearer, wearing loin-cloths and footgear with puttees halfway up the leg, their long black hair done up into a crest on the crown of the head. In one group alone thirty men appear close to a fortified post; in another, youths are hurling javelins against a besieged city. "The alternating succession of subjects in these miniature frescoes suggests the contrasted episodes of Achilles' shield. It may be that we have here parts of a continuous historic piece; in any case these unique illustrations of great crowds of men and women within the walls of towns and palaces supply a new and striking commentary on the familiar passage of Homer describing the ancient populousness of the Cretan cities." Only the wonderful tomb paintings of ancient Egypt can excel these vivid miniatures in bringing before us the life of a bygone civilization; nothing else to approach them has come down from antiquity.

The main entrance of the palace seemingly lay on the north side, where the road from the harbor, three and a half miles distant, ran up to the gates. Here was the one and only trace of fortification discovered in all the excavations. The entrance passage was a stone gangway, on the north-west side of which stood a great bastion, with a guard-room and sally-port—a slender apology for defence in the case of a prize so vast and tempting as the Palace of Knossos. Obviously the bastion, with its trifling accommodations for an insignificant guard, was never meant to defend the palace against numerous assailants, or a set siege; it could only have been sufficient to protect it against the sudden raid of a handful of

pirates sweeping up from the port. How was it that so great and rich a structure came to be left thus practically defenceless? The mainland palaces of the Mycenæan Age at Tiryns and Mycenæ are, so to speak, buried in fortifications. Everything about them points to a land and a time in which life and property were continually exposed to the dangers of war, and the only security was to be found within the gates of an impregnable stronghold. But Knossos, far richer, far more splendid, than either Tiryns or Mycenæ, lies virtually unguarded, its spacious courts and pillared porticoes open on every side. Plainly, the Minoan Kings lived in a land where peace was the rule, and where no enemy was expected to break rudely in upon their luxurious calm. And the reason for their confidence and security is not far to seek, if we remember the statements of Thucydides and Herodotus.

"The first King known to us by tradition as having established a navy is Minos," says the great Athenian historian. The Minoan Empire, like our own, rested upon sea-power; its great Kings were the Sea-Kings of the ancient world—the first Sea-Kings known to history, over-lords of the Ægean long before "the grave Tyrian trader" had learned "the way of a ship in the sea," or the land-loving Egyptian had ventured his timid squadrons at the command of a great Queen so far as Punt. And so the fortifications of their capital and palace were not of the huge gypsum blocks which they knew so well how to handle and work. They were the wooden walls, the long low black galleys with the vermilion bows, and the square sail, and the creeping rows of oars, that lay moored or beached at the mouth of the Kairatos River, or cruised around the island coast, keeping the Minoan peace of the Ægean. So long as the war-fleet of Minos was in being, Knossos needed no fortifications. No expedition of any size could force a landing on the island. If the crew of a chance pirate-galley, desperate with hunger, or tempted by reports of the wealth of the great palace, succeeded in eluding the vigilance of the Minoan cruisers, and made a swift rush up from the coast, there was the bastion with its armed guard, enough to deal with the handful of men who could be detached for such a dare-devil enterprise. But in the fleet of

Knossos was her fate; and if once the fleet failed, she had no second line of defence on which to rely against any serious attack. There is every evidence that the fleet did fail at last. Minoan Sovereigns failed to maintain the weapons which had made and guarded their Empire, or Minoan sailors met at last with a stronger fleet, or more skilful mariners. Seapower was lost, and with it everything.

Near the main north entrance of the palace was found one of the great artistic treasures of the season's work. This was a plaster relief of a great bull's head, which had once formed part of a complete figure. These figures of bulls, as we have already seen in connection with the Palace of Tiryns, were among the most favorite subjects of Mycenæan and Minoan art; but nothing so fine as the Knossos relief had yet been discovered. "It is life-sized, or somewhat over, and modelled in high relief. The eye has an extraordinary prominence, its pupil is yellow, and the iris a bright red, of which narrower bands again appear encircling the white towards the lower circumference of the ball. The horn is of greyish-blue, and both this and the other parts of the relief are of exceptionally hard plaster, answering to the Italian *gesso duro*. . . . Such as it is, this painted relief is the most magnificent monument of Mycenæan plastic art that has come down to our time. The rendering of the bull, for which the artists of the period showed so great a predilection, is full of life and spirit. It combines in a high degree naturalism with grandeur, and it is no exaggeration to say that no figure of a bull, at once so powerful and so true, was produced by later classical art."

But the discovery which will doubtless prove in the end to be of greater importance than any other, though as yet the main part of its value is latent, was that of large numbers of clay tablets incised with inscriptions in the unknown script of the Minoans. Of these deposits, one contained tablets written in hieroglyphic; but the rest were in the linear script, "a highly developed form, with regular divisions between the words, and for elegance scarcely surpassed by any later form of writing." There are human figures, chariots and horses, cuirasses and axes, houses and barns, and ingots followed by a balance, and accompanied by numerals which

probably indicate their value in Minoan talents. It looks as though these were documents referring to the royal arsenals and treasuries. "Other documents, in which neither ciphers nor pictorial illustrations are to be found, may appeal even more deeply to the imagination. It is probable that some of them are contracts or public acts, which may give some actual formulæ of Minoan legislation. There is, indeed, an atmosphere of legal nicety, worthy of the House of Minos, in the way in which these records were secured. The knots of string which, according to the ancient fashion, stood in the place of locks for the coffers containing the tablets, were rendered inviolable by the attachment of clay seals, impressed with the finely engraved signets, the types of which represented a great variety of subjects, such as ships, chariots, religious scenes, lions, bulls, and other animals. But—as if this precaution was not in itself considered sufficient—while the clay was still wet the face of the seal was counter-marked by a controlling official, and the back countersigned and endorsed by an inscription in the same Mycenæan script as that inscribed on the tablets themselves."

The tablets had been stored in coffers of wood, clay, or gypsum. The wooden coffers had perished in the great conflagration which destroyed the palace, and only their charred fragments remained; but the destroying fire had probably contributed to the preservation of the precious writings within, by baking more thoroughly the clay of which they were composed. As yet, in spite of all efforts, it has not proved possible to decipher the inscriptions,¹ for there has so far been no such good fortune as the discovery of a bilingual inscription to do for Minoan what the Rosetta Stone did for Egyptian hieroglyphics. But it is not beyond the bounds of probability that there may yet come to light some treaty between Crete and Egypt which may put the key into the eager searcher's hands, and enable us to read the original records of this long-forgotten kingdom.

Even as it is, the discovery of these tablets has altered

1. For later developments, see the articles by John Chadwick and R. D. Barnett which follow.—*Eds.*

the whole conception of the relative ages of the various early beginnings of writing in the Eastern Mediterranean area. "In any case," said Dr. Evans, summing up his first year's results, "the weighty question, which years before I had set myself to solve on Cretan soil, has found, so far at least, an answer. That great early civilization was not dumb, and the written records of the Hellenic world were carried back some seven centuries beyond the date of the first-known historic writings. But what, perhaps, is even more remarkable than this, is that, when we examine in detail the linear script of these Mycenæan documents, it is impossible not to recognize that we have here a system of writing, syllabic and perhaps partly alphabetic, which stands on a distinctly higher level of development than the hieroglyphs of Egypt, or the cuneiform script of contemporary Syria and Babylonia. It is not till some five centuries later that we find the first dated examples of Phœnician writing."

Nine weeks after the excavations on the hill of Kephala had begun, the season's work was closed, and, surely, never had a like period of time been more fruitful of fresh knowledge, more illuminative as to the conditions of ancient life, or more destructive of hoary prejudices. It was a new world, new because of its very ancientry, that had begun to rise out of the buried past at the summons of the patient explorer.

Although Evans was a trained archaeologist and Schliemann was not, in one respect—promptness of publication of results—the businessman was the more professional. Evans published "*Scripta Minoa*" in 1909 but omitted many tablets. In one case a Scandinavian archaeologist who forestalled him incurred his wrath. Final publication was postponed until 1952, after the death of Evans, when his former assistant Sir John Myres completed the work. By that time publication had become of crucial importance.

Evans himself believed that Cretan culture was most in-

timately linked with those of Egypt and Lydia. He attempted, not entirely successfully, to synchronize Cretan and Egyptian chronologies. Other authorities found links with Anatolia and Greece but conclusive evidence was lacking. As late as 1950, in *A Hundred Years of Archaeology*, Glyn Daniel expressed the hope that a bilingual key—"perhaps a bill of lading in Egyptian and Minoan"—would be discovered. Two years later a young British architect named Michael Ventris deciphered Linear B without bilingual aid, thus proving a close relationship between mainland Greece and Crete.

In the first of the two articles that follow, John Chadwick, lecturer in classics at Cambridge University, who was Ventris' collaborator and close friend, offers a character sketch of Ventris. In the second, written shortly after initial announcement of the decipherment was made, R. D. Barnett, Deputy Keeper of the Department of Egyptian and Assyrian Antiquities at the British Museum, explains its significance.

MICHAEL VENTRIS

JOHN CHADWICK

Michael Ventris

THE URGE to discover secrets is deeply ingrained in human nature; even the least curious mind is roused by the promise of sharing knowledge withheld from others. Some are fortunate enough to find a job which consists in the solution of mysteries, whether it be the physicist who tracks down a hitherto unknown nuclear particle or the policeman who detects a criminal. But most of us are driven to sublimate this urge by the solving of artificial puzzles devised for our entertainment. Detective stories or crossword puzzles cater for the majority; the solution of secret codes may be the hobby

of a few. This is the story of the solving of a genuine mystery which had baffled experts for half a century.

In 1936 a fourteen-year-old schoolboy was among a party who visited Burlington House in London to see an exhibition organized to mark the fiftieth anniversary of the British School of Archaeology at Athens. They heard a lecture by the grand old man of Greek archaeology, Sir Arthur Evans; he told them of his discovery of a long forgotten civilization in the Greek island of Crete, and of the mysterious writing used by this fabulous people of prehistory. In that hour a seed was planted that was dramatically to bear fruit sixteen years later; for this boy was already keenly interested in ancient scripts and languages. At the age of seven he had bought and studied a German book on the Egyptian hieroglyphs. He vowed then and there to take up the challenge of the undeciphered Cretan writing; he began to read the books on it, he even started a correspondence with the experts. And in the fullness of time he succeeded where they had failed. His name was Michael Ventris.

He was born on 12 July 1922 of a well-to-do English family, which came originally from Cambridgeshire. His father was an Army officer in India, his mother a highly gifted and beautiful lady who was half-Polish; she brought him up in an artistic atmosphere, and accustomed him to spend his holidays abroad or in visiting the British Museum. His schooling too was unconventional; he went to school at Gstaad in Switzerland, where he was taught in French and German. Not content with this, he quickly mastered the local Swiss-German dialect—an accomplishment that later on endeared him at once to the Swiss scholars whom he met—and even taught himself Polish when he was six. He never outgrew this love of languages; a few weeks in Sweden after the war were enough for him to become proficient in Swedish and get a temporary job on the strength of it. Later he corresponded with Swedish scholars in their own language. He had not only a remarkable visual memory, but, what is rarely combined with it, the ability to learn a language by ear.

Back in England, he won a scholarship to Stowe School, where, as he once told me with typical modesty, he "did a

bit of Greek." One cannot help thinking that his unusual interests would have made him difficult to fit into a normal school routine; but he seems to have settled down happily enough, though none would then have prophesied that his hobby would make him famous. He did not go on to a university; he had made up his mind to become an architect, and he went straight to the Architectural Association School in London. The war came to interrupt his studies, and he enrolled in the R.A.F., where he flew as navigator in a bomber squadron. Characteristically he chose navigation. "It's so much more interesting than mere flying," he remarked; and on one occasion he horrified the captain of his aircraft by navigating solely by maps he had made himself.

After the war, he returned to the study of architecture, and took his diploma with honors in 1948. Those who saw his work as a student were impressed and predicted a brilliant future for him as an architect. He worked for a time with a team at the Ministry of Education engaged on the design of new schools; and he and his wife, herself an architect, designed a charming modern house for themselves and their two children. In 1956 he was awarded the first *Architects' Journal* Research Fellowship; his subject was 'Information for the Architect.'

He might well have become one of the leading figures in his profession; but it was not in this way that he was to win fame. He had never lost his interest in the Minoan scripts, and with a rare concentration he devoted much of his spare time to painstaking studies of that abstruse problem. In 1952 he claimed to have found the key to its understanding, a claim which has been fully vindicated during the last five years. Honors he received included the Order of the British Empire "for services to Mycenaean palaeography," the title of honorary research associate at University College, London, and an honorary doctorate of philosophy from the University of Uppsala. These were but a foretaste of the honors that would surely have been paid to him.

"Those whom the gods love die young," said the Greek poet Menander; yet we had never dreamed that the life which had shown so much genius, and held promise of so

much more, would be cut short in the very hour of triumph. On 6 September 1956, driving home alone late at night on the Great North Road near Hatfield, his car collided with a lorry, and he was killed instantly.

For me, who had the privilege of being his friend and of working closely with him for more than four years, it is hard to find words in which to describe him. I know how he would recoil from extravagant praise; yet he was a man whom nothing but superlatives fitted. His brilliance is witnessed by his achievement; but I cannot do justice to his personal charm, his gaiety and his modesty. From the beginning he advanced his claims with suitable caution and hesitancy; a promising sign to those who had repeatedly experienced the assurance of previous decipherers. But even when his success was assured, when others heaped lavish praise on him, he remained simple and unassuming, always ready to listen, to help and to understand.

If we ask what were the special qualities that made possible his achievement, we can point to his capacity for infinite pains, his powers of concentration, his meticulous accuracy, his beautiful draughtsmanship. All these were necessary; but there was much more that is hard to define. His brain worked with astonishing rapidity, so that he could think out all the implications of a suggestion almost before it was out of your mouth. He had a keen appreciation of the realities of a situation; the Mycenaeans were to him no vague abstractions, but living people whose thoughts he could penetrate. He himself laid stress on the visual approach to the problem; he made himself so familiar with the visual aspect of the texts that large sections were imprinted on his mind simply as visual patterns, long before the decipherment gave them meaning. But a merely photographic memory was not enough, and it was here that his architectural training came to his aid. The architect's eye sees in a building not a mere façade, a jumble of ornamental and structural features; it looks beneath the appearance and distinguishes the significant parts of the pattern, the structural elements and framework of the building. So too Ventris was able to discern among the bewildering variety of the mysterious

signs, patterns and regularities which betrayed the underlying structure. It is this quality, the power of seeing order in apparent confusion, that has marked the work of all great men.

THE MINOAN SCRIPT

R. D. BARNETT

The Minoan Script

In 1896 Mr., later Sir, Arthur Evans was attracted to the site of Knossos in Crete and soon began to excavate it, discovering a palace not unlike those already found by Schliemann at Tiryns and Mycenae on the mainland and attributed by him to the Achaean Greeks of Homer's *Iliad*. But at Knossos Evans believed he had found the palace of the pre-Greek kings of Crete, who bore the dynastic name of Minos, and ruled in the midst of taste and splendor the first maritime empire of the ancient world. This empire apparently collapsed in 1400 B.C. when the palace was sacked and burnt, presumably by Achaean invaders from the mainland. At various points in the destroyed palace Evans found some two thousand documents inscribed on clay—the writing paper of the neighboring peoples of the ancient Near East.

These tablets were usually flat and oblong, and probably were shaped in imitation of palm leaves, on which, according to tradition told by Pliny, the ancient Cretans were accustomed to write.

Cretan Writing

In the first volume of his "*Scripta Minoa*" (1909) Evans showed that there were three stages of writing in Crete. First hieroglyphs represented on early engraved seal-stones; next, a more cursive script called Linear A; thirdly, a later script

in reality modified from Linear A, called Linear B. This script was the commonest, and was in use at the time of the sack of Knossos. Evans worked out its system for recording numbers, and was able to discover that it used a system of pictograms rather like "determinatives" in cuneiform, to indicate classes of objects or commodities described—e.g., axes, cups, chariots, swords, men, women. Soon it became apparent that these tablets were mainly inventories and accounts, not religious or literary texts.

An important development soon followed when this script was discovered to have been used in "Achaean" sites on the mainland such as Thebes, Orchomenos, and Mycenae. Greek legend remembered this in the story that Kadmos, the brother of Europa and founder of Thebes, introduced the art of writing into Greece.

But how were these tablets to be read? Many futile attempts have been made. Various enthusiasts in turn tried them as Sumerian, Basque, Hittite, Finnish. In all cases these futilities came to grief from lack of logical method and ignorance of the cold, mathematical principles of cryptography, now well established after two world wars. It was long argued that to decipher an unknown script is impossible without a bilingual text, which would act as a sort of "crib" from which to start. Such was the Rosetta Stone for Egyptian or the Behistun Rock for the cuneiform. Determined work on the Hittite hieroglyphs produced a fair degree of decipherment even before the discovery of a bilingual in 1947. But for the Minoan script there has been no bilingual, and yet by the brilliant application of sound method the feat has been achieved. How?

In 1935 the British School of Archaeology at Athens (of which the present writer was then secretary) celebrated its fiftieth anniversary with an exhibition at Burlington House. A schoolboy visitor from the classics form at Stowe, named Michael Ventris, heard Sir Arthur Evans describe how these tablets still defied decipherment. Accepting it as a challenge, he chose it as his hobby. After eighteen years it still is so, for he is now an architect. But meanwhile in his task he has succeeded, helped by two events. In 1939 Professor Carl Blegen,

a distinguished American excavator, began work at Pylos, in the Western Peloponnese, the traditional home of Nestor, the aged counsellor of the Greeks before Troy. Here he found a palatial Mycenaean building in which lay some six hundred tablets in the Linear B script. Yet though that script ceased in use at Knossos when it was sacked in 1400 B.C. here it was used till 1200 B.C. in what was evidently a Mycenaean, i.e., early Greek, milieu. These tablets were published in 1951. In 1952 Sir John Myres completed "Scripta Minoa," Volume II, which Evans had left unfinished at his death. In this were published all the Linear B tablets found at Knossos.

A good supply of material, well classified, can go a long way in competent hands to make good the absence of a bilingual, by supplying variant spellings and opportunities for all manner of internal comparisons.. Already by 1940 Ventris had found that Linear B contained some seventy common signs for sound values, apart from the ideograms mentioned above. Such a number indicated that it was a "syllabary," each sign representing a consonant-plus-vowel, as a script with this number of signs can cover all the possible sounds of the human throat. Such a script is modern Japanese or in antiquity the Hittite hieroglyphs and Cypriot systems; both no doubt evolved in close connection with the Minoan. Invaluable work was done meanwhile by an American, Alice Kober, in recognising inflection and some endings. But in 1952 Ventris decided that the Linear B must in fact conceal a form of Greek. This conclusion was not absolutely new; but his handling of it was. He explained his discoveries briefly at a joint meeting of the British School of Archaeology at Athens and the Society for the Promotion of Hellenic Studies on June 25; a fuller account prepared jointly with John Chadwick now appears in the "Journal of Hellenic Studies," vol. LXXIII.

The script which emerges proves singularly ill fitted for writing Greek, but this is probably because it was invented originally for writing not Greek but Minoan, and was taken over by the Achaeans for their language, just as the Semitic Babylonians took over for their language the cuneiform script which the latter had invented for their own tongue.

Decipherments

But in decipherments the real test is simple: does it make sense? And when an inventory of swords, recognizable as such by the accompanying pictogram ends with a number and the "total": to-sa-pa-ka-na ("so many swords") for which the Classical Greek equivalent would be *tossa phasgana*, it is clear both that it is Greek and sense. Similarly, chariot wheels, recognizable by the pictogram, are described plausibly as *kakodeta* or *kakia*, "bound with bronze" or "brazen." A whole series of endings, too, appear, corresponding to the typical Homeric genitive masculine in -oio and feminine instrumental in -phi. Chariots, again recognizable by the pictogram, are plausibly described as equipped *aniaphi*, "with reins."

Other tablets contain lists of men, followed by the names of ancient Cretan cities, Knossos, Amnisos, Phaistos, Lyktos, Tylissos, Itanos. Most remarkable of all, perhaps, are two tablets from Knossos and one from Pylos, on which the names of the Greek gods appear: "Lady Athena," Enyalios (an old name for Ares), Pan, Posidon, Zeus, Hera, and "The Lady." Another tablet mentions Dionysos, whom scholars had hitherto believed to be a much later immigrant from Thrace. All this cannot be mere fancy, nor can a list of over one hundred names of trades and crafts which emerge, nor can we doubt authentic Greek names such as *Idomeneia* (a slave at Pylos), *Aigeus*, or *Eudamos*.

But, to put the matter beyond any doubt, a tablet found at Pylos last year, but only just available, was described by Ventris in his lecture, which has almost the effect of a bilingual. On it are drawings of tripods and vases. The signs accompanying the pictures of tripods, read with Mr. Ventris's values, give the unmistakable Greek word *ti-ri-po-de*, "tripods." The rest of the tablet, proving the decipherment correct, is in the same strain.

Thus from the Linear B tablets an early dialect of Greek has emerged, significantly like that of Homeric Greek, though of course between the tablets and the poems of Homer, as

written down probably first in the sixth century B.C., a huge interval exists. But if these tablets are Greek, two points arise. First, they are the earliest contemporary record of any Indo-European language. Second, they make it possible that some form of bardic poetry may have existed even before the fall of Troy, as Homer himself suggests. Clearly, both the study of Homer and of the Greek dialects and language must now be reopened from their foundations. It will not be easy or popular, for the vocabulary that these texts use is very hard to establish. Sometimes nothing can be made of them at all, and perhaps then one may suspect that the tablet is written not in Greek but Minoan. It is at least an encouragement to think that in this way we may also eventually come to read the real Minoan language in some of these tablets or work back from the Linear B Greek to the apparently Minoan Linear A.

The resultant change in our picture of Greece at this period is worth noting. Evans had always championed the view that the mainland lay completely under Cretan influence, certainly until the earthquake of 1400 B.C. The Achæan dynasties, Myres wrote in 1952, are shown by their genealogies to have been established only circa 1250 B.C. Wace disagreed and saw early signs of independence on the mainland which he believed to be already Greek. Not only must this view be right, but we may guess that Knossos had already fallen under Achæan rule by, let us say, 1450 B.C. if records in Greek were already filed by 1400 B.C.

It has been thought for some time that the actual language of Homeric times was probably nearest to the archaic dialects which still survived in Classical times, isolated by later Dorian and Ionic invasion and restricted to Cyprus and, on the mainland, to the mountain district of Arcadia. This view is now likely to receive unhoped for confirmation. When the Dorian and Ionian invasions came at the beginning of the Iron Age, the Mycenaean civilisation collapsed and with it all recollection of the arts of writing, except for the memory of the tablet inscribed with "baleful signs" which Proitus gave to Bellerophon to carry to the King of Lycia, which was really a request to have him killed.

In the Iron Age the lost art of writing had to be reintroduced by the importation from Phoenicia of the alphabet. In Cyprus, however, a form of the Minoan syllabary survived until Hellenistic times, and it is worth noting that nearly a score of its signs and values are identical with those of Linear B as now interpreted.

Much more work on these tablets will now be needed. The work has only begun. More economic than literary information may be expected. But the most gratifying fact is that Ventris has at last rung up the iron curtain which for long cut Greek archaeology into two apparently disconnected halves—a Bronze Age, Mycenaean, but virtually pre-Greek, and a Greek Iron Age. They are now seen to be all one.

In a year of British achievement which includes the scaling of Mount Everest it is good to be able to record a similar feat in the purely intellectual field, for this was surely the Everest of Greek archaeology. And besides the names of other great and honored pioneers of decipherment in this and other countries, Champollion, Rawlinson, Sayce, George Smith, we now add that of Ventris.

Greek art masterpieces have been considered legitimate prey by both antiquarians and generals and have enriched art collections throughout the western world. One such consignment failed to reach its destination, ending at the bottom of the Mediterranean. It was resurrected by a most unusual archaeological expedition, described in 'A Cargo of Art Masterpieces at Twenty Fathoms,' by Philippe Diolé. The author, a Frenchman, is a leader in bringing scientific method to bear on under-seas archaeology. His article is placed in this section because the art masterpieces resurrected were of Aegean origin.

*This branch of the science is a child of the twentieth century which was largely inactive until the development of the aqualung after World War II. Its foremost exponent is Commandant J. Y. Cousteau, who has described several of his archaeological adventures in the best-selling book *The Silent World*. Skin diving enthusiasts have brought up coins, pottery,*

statues, and other artifacts which throw light on ancient commerce in the Mediterranean. At present, the archaeological methods are rudimentary. Whether the science will develop significantly depends on the solution of obvious problems, but as pure adventure it has undeniable fascination.

A CARGO OF ART MASTERPIECES AT TWENTY FATHOMS

PHILIPPE DIOLE

The richest Museum of antiquities in the whole world is still inaccessible. I mean the sea-bed of the Mediterranean. . . . We can explore without much difficulty both earth and air, but beneath the surface of the sea we are far from being able to compete with the fishes who, as Saint Augustine put it, saunter at will along the pathways of the Deep.

SALOMON REINACH (1925).

THE OLDEST in date and, till now, the most rewarding of all our deep-sea explorations was carried out, from 1907 to 1913, off Mahdia, which is a small Tunisian port.¹ It brought to light a sunken ship which had been carrying a cargo of works of art. The story of this adventure is instructive in more ways than one, and deserves detailed narration.

Mahdia is the name of an Arab town in the Gulf of Gabes, situated between Sousse—the ancient Hadrumetum—and Sfax—formerly known as Taparura. It is a small, sheltered harbor humanly contrived in the living rock. The workmanship is Punic. The word used to describe a place of this description is *Cothon*, doubtless derived from a Semitic root meaning to cut or carve. Mahdia has seen the passage of several. The submarine undertakings at Cerigotto in 1900, admirable though they were of their kind, can scarcely be regarded as an example of undersea archaeology proper.

eral cultures, migrant peoples and conquering armies. It is now no more than a fishing-village spread out upon a promontory jutting into a sea which is often rough and unwelcoming. The Arab houses are massed on one side, the rest of the peninsula being overrun with cropped grass. High walls stand in close juxtaposition with Punic masonry, Roman cement and Berber buildings, the confusion being eloquent of a complicated past which had this in common, that those who lived here were for ever pinched between a harsh mainland and an angry sea.

Mahdia is one of those staging-posts where history, in its various phases, has bifurcated, but where few traces remain of vanished passions and ancient struggles: one among sleepy little places such as are to be found in plenty on the African mainland. It is not, however, a matter of indifference to us that chance chose to endow it with an additional prestige, archaeological as well as historical. It is there that we find past and present richly and intimately mingled in the sea: it is there that an ancient wreck was located with a more than usually large crop of "finds."

The discovery would never have been made had not the quadrilateral of several sea miles lying off Mahdia continued to attract the sponge-divers who, for two thousand years, have been drawn to the spot from always the same Greek villages. In the old days they went about their work naked, reaching the required depth by means of a stone attached to their feet. Nowadays they have been replaced by helmet-divers. The boat they use is the local *sacolève*, which carries one enormous sail and can be propelled with oars like the vessels of Homeric days.

In the month of June 1907, a diver belonging to one of these groups working at some distance from the shore noticed in the course of one of his descents a submarine *tell* or mound projecting from the general level of the mud-bed. When he returned to the surface he reported that he had seen something that "looked like a lot of big guns." A more attentive examination of the site revealed fragments of bronze corroded by the sea, and a deal of broken earthenware. These

remains were duly handed over to the local authorities, and the find was officially catalogued.

The Director of Tunisian Antiquities, who at that time was Monsieur Alfred Merlin,² realized the interest attaching to this discovery. He at once organized a quick undersea survey, and devoted all his efforts to recovering from this particular site everything of archaeological and instructional value. The enterprise was, at this time, one of especial daring, and he managed to enlist the interest of the Maritime Prefect of Bizerta, Admiral Jean Baëhme, as well as of several distinguished patrons of the arts: the Duc de Loubat, Mr. James Hazen Hyde, and Edouard de Billy. He obtained financial aid from the Government of Tunis, from the Ministry of Public Instruction, from the French Institute and from the Académie des Inscriptions. His action makes it clear that the first duty of an archaeologist is to obtain sufficient monetary support to enable him to carry out his task. This is a lesson which we should do well to remember.

Five exploratory expeditions were undertaken in 1908, 1909, 1910, 1911 and 1913. Greek divers were employed, because, at that time, they were almost the only men capable of working at a depth of twenty fathoms. They were joined by a Turk, whose ambition it was to obtain from the Bey of Tunis, the Nicham Iftikhar, a distinction which was conferred upon him in recognition of the services he rendered and of the high degree of professional devotion which he had shown in the matter.

The Navy helped by sending the tug *Cyclope*, commanded by Enseigne de vaisseau Tavera. To this the Ponts et Chaussées added the tender *Eugène Resal*. These vessels, however, were not always available, and most of the work had to be entrusted to *sacolèves*.

The main scene lay at a depth of just under twenty fathoms. Its central feature consisted of some sixty or so columns. They were lying side by side in six rows, one behind the other, from north to south. The space thus covered was about thirty-three to thirty-five yards long. The rows contained an

2. Monsieur Alfred Merlin later became Curator in Chief of Greek and Roman antiquities at the Louvre.

unequal number of columns varying in size. "All around lay a mass of marble fragments piled up in no sort of order—capitals and bases, carefully squared blocks, architectural elements of many different types. Mixed with these objects, and especially towards the northern end of the site, was a profusion of broken earthenware, all that remained of the pottery which had been on board—amphorae, very few of which were intact, vases of many kinds used for the carrying of oil, wine, water, foodstuffs and ingredients needed by the crew during the voyage. . . . Further columns, marble blocks, amphorae and anchors were found under a deep layer of mud from which they stuck out in a confused mass. Before any results could be achieved, it was necessary to move the various obstructions and to dig into, and clear away, the enveloping slime. . . .³

Most of the column shafts were rather more than twelve feet in height, and about twenty-five inches in diameter. Such massive objects were very difficult to move. As soon as they were disturbed the water in their immediate neighborhood became dark and opaque. The diver worked with his hands, kneeling on the sea-bed, feeling his way forward, now contriving a small tunnel through which a hawser could be passed, now scooping out a trench by which he might reach something which, by the feel of it, promised to be interesting. So strong was the current at this depth that the men had to keep up a continuous struggle. From time to time one of them would return to the surface in an exhausted condition, and not a few of the operations ended in tragedy. It was impossible to work under water for more than thirty or forty minutes on end, and quite often the state of the sea or the strength of the current made it necessary to suspend all diving for a while.

"When the men managed to dig under such of the columns as could be separated—or to work their way between them"—wrote Monsieur Merlin at the time—"they very soon came on a layer of timber, about eight inches thick, and in a condition, more or less, of decomposition. Penetration of this

3. A. Merlin, 'Les fouilles sous-marines de Mahdia' (*Revue Tunisienne*, 1911, p. 113 et seq.).

protective envelope brought to light objects of a more delicate type: bronze statuettes of fine workmanship, fragments of beautifully ornamented furniture. It seems clear that when the vessel foundered, she plunged straight to the bottom without breaking up, having sustained a certain amount of damage but not turning turtle. The rotting timber had once been the ship's deck. The columns and some of the less fragile objects had rested upon it, the columns having been laid sufficiently far apart to make movement between them possible, and so as not to interfere with the handling of the vessel. The bales containing the smaller and more precious portions of the cargo were stowed between decks. The hold was filled with works of art in metal or marble. Two large openings, one forward, the other aft, and so arranged as to correspond with the gaps in the stowing of the columns, gave access to the interior of the ship."

The principal articles contained in this cargo, and saved from the sea in the manner I have described, now fill six rooms in the Bardo Museum at Tunis. The main items are as follows: an *Eros as a Victorious Archer*, a bronze of rather less than fifty inches in height; a herm of *Dionysos*, signed "Boethos"; two large cornices, which were almost certainly figureheads taken from a votive monument; eight large statuettes, three of which were grotesque and represented dwarfs playing at knucklebones, and a clown; numerous decorative motifs, and fragments of a number of beds, urns and candelabra.

The works in marble are no less numerous and no less beautiful: a bust of *Aphrodite*; a *Pan*; a *Niobe*; two *Niobids*; two *Satyrs*, one male, one female; and a *Youth*. In addition to these fragments of full-sized statues there are two torsos of youths, several statuettes, and some fine decorative pieces—candelabra and kraters in the Neo-Attic style.

This mere listing has something of the dryness of a catalogue. It can give no idea of the thrilling reality. That could be conveyed only if each separate dive were described, and each hour of the time spent waiting on the surface of a sea being thus forced to yield up its secrets. Gods emerged from the water covered with shellfish, unrecognisable, and many

of them mutilated. The operation went on, and suddenly a piece of bronze released from the mud would turn out to be a missing part of the Eros, one that completed the pose and restored the sense of life to what, till then, had been a dead object. The boat lay rolling on the swell. Twenty fathoms down, in a sea so muddy that no eye could penetrate it, a man was busy searching for the past, hard on the track of yet further masterpieces. His only means of communication was the safety-line. If he signalled that he wanted to be pulled up, the reason was that he was bringing with him yet another portion of the drowned treasure. A row of faces lining the gunwale watched while he was slowly hoisted to the surface, bearing in his arms another god dripping water and draped in seaweed. It is easy to imagine the globular brass helmet, the shining rubber suit, the lump of corroded bronze, and the outstretched arms of the watchers, as eager to grasp it as rescuers in some dramatic life-saving adventure.

"It was," says Monsieur Merlin, "the most exciting of all the operations in which I have been privileged to take part in the whole course of my career."

The divers could not find words strong enough to express their feelings about the mud which the smallest gesture set swirling. All the same, this mud it was that had protected most of the works of art from the depredations of shellfish. "It may have smothered everything, but it preserved everything," writes Monsieur Merlin. It fulfilled, in fact, the same protective role as the desert sands of Egypt. What it covered and buried was shielded from the assault of rock-boring animals—*Pholas* and *Lithodomus*. Mud had protected one of the faces of an Ionic capital: the other was terribly worn away. Seeing so much clean, sharp definition neighbored, on the same piece of marble, by such terrible scars, we feel as deeply moved as we might be at the sight of some human loveliness horribly mutilated.

Glamor still surrounds the Mahdia adventure, even after forty years, for it was the first triumph of undersea archaeology. It was amazing luck that the first ancient wreck on which divers were able to lay their hands should have been

carrying a load of masterpieces. It is as though the sea, wishing to make offering of a vessel which had lain for two thousand years in the depths, had chosen the richest.

"Nothing comparable has come to light," wrote Salomon Reinach, "since Pompeii and Herculaneum."

This particular wreck is, as it were, an inventory, an epitome—than which none could be better—of civilization as it existed at the moment of the disaster. Only on board a ship could one hope to find assembled, in so small a space, so great a weight of evidence—cooking-pots and millstones, lamps and foodstuffs, with, in addition, a cargo of the kind recovered at Mahdia. It is as though a whole segment of human life had gone, complete in every detail, to the bottom of the sea. The great aim of archaeology is to restore the warmth and the truth of life to dead objects. Even on the sea-bed marbles and bronzes still retain the power to move us.

But not only had the sea hidden away a large Roman ship in a state of preservation better than we could ever have dared to hope: it had left sufficient testimony to allow us to make a plausible reconstruction of its story.

We know, as near as no matter, what sort of a vessel she was. Her length over all was approximately one hundred and twenty feet, and her beam was thirty-six. In other words, she was a merchant craft, a "round" ship rigged for sailing, a *corbita*, certainly not a galley. The type has persisted in the Mediterranean for five or six centuries. It was not a markedly efficient design, and doubtless had deteriorated under Roman influence. With her square canvas and excessive superstructure, she was markedly inferior to her Greek and Phoenician forebears, but almost certainly her capacity was greater, though that in itself spelled danger.

Driven by a storm, and far too heavily laden with a dead-weight of marble, this Mahdia ship sank rapidly, carrying with her at least one member of her crew, for a human fibula was recovered from the wreck. The animals on board also perished; there were bones of pigs and sheep scattered about the sea-bed.

Whence was the shipwrecked vessel sailing? Thanks to the extremely competent observations carried out by Monsieur A.

Merlin, this point has been elucidated. "One of the most spectacular discoveries in connection with the Mahdia wreck," he writes, "was that of a number of inscribed Greek slabs. These were probably shipped as ballast. Alternatively, they may have been curiosities intended for the collectors' market. They are especially welcome as furnishing us with the most valuable evidence about the port from which the vessel had sailed."

Two of these texts, engraved, one on a *stèle*, the other on a small marble column, are decrees issued by the *Paraloi*, those Athenian citizens who formed the crew of the trireme *Paralos*, which was one of the two Sacred Ships. It seems certain, therefore, that Athens was the port of registration. The works of art and the building materials found in this particular ship seem to have come from that city, and of some of them we can say for certain that they were taken on board at her port, the Piraeus. Doubtless it was in the arsenal that the monument in the form of a ship's prow stood, from which two cornices, adorned with the heads of *Dionysos* and *Ariadne*, had been wrenched away. It is from the Piraeus, too—we know that *Asklepios* had a temple there—that an ex-voto comes carrying the figure of the god reclining on a couch in front of a table laden with food, with his daughter, *Hygieia*, seated in front of him, and attended by a serving-man and a number of worshippers. The white, heavily-veined marble from which the columns, capitals and statues are cut could have come only from Hymettus.

So much for the port of origin. It remains to establish the date.

One of the objects recovered from the sea provides invaluable evidence on this point. It is a lamp with its charred wick still in position. It seems certain that this formed part of the ship's furniture. Its characteristic shape shows that it was made at the end of the second century B.C. It must, therefore, have been in use during the early years of the first.

There is one historical event which seems to fit in with the evidence here described—the sacking of Athens by Sulla in 86 B.C. Not only does the date coincide with what we know,

but we have textual proof that, at this period, the arsenal and storehouses of the Piraeus were looted and burned—which would explain the presence on the Mahdia ship of ex-voto figures from monuments in the Port of Athens.

This hypothesis is so plausible in the matter of the cargo as to seem almost certain. But the vessel's destination is more open to doubt. What was this consignment of Greek *objets d'art* doing in the Gulf of Gabes? Was it being taken to Rome? We must assume that it was, unless we can find some other place to which, at that period, a cargo of this nature was likely to be sent. If Italy was, in fact, its destination, then we are forced to the conclusion—far from impossible—that a storm had driven the ship very far off her course. The direct route from Athens to Ostia would have passed between Italy and Sicily, through the Strait of Messina. It must have been after doubling Cape Malea that she was driven towards the African coast.

It does seem, however, that the gale which sent the ship southwards must have veered suddenly in a very odd manner and been blowing in a northerly direction, because the way in which the anchors were lying round the wreck leads us to suppose that the vessel was being forced *out to sea* when the catastrophe occurred. The evidence goes to show that five anchors in all were dropped, including the heaviest, the sheet-anchor, which was used only in cases of extreme danger. Now, all were dropped in a straight line from the bows, along the side facing the coast. This, presumably, would have been done only if the ship had been making for Mahdia, and wanted to avoid being blown out to sea. It seems that this is a case of a ship bound for Mahdia and trying to prevent herself from being blown out to sea, rather than a ship blown towards the shore by the wind and letting go her anchors to avoid driving aground.

The extremely unequal value of the cargo leads one to the conclusion that the ship was *not* carrying a load of booty to Rome on Sulla's orders, for, had that been the case, the objects would, one assumes, have been chosen with greater care. It seems more likely that we have to deal with a contractor's consignment rather than a collection of spoil from

a conquered country. It is true that the Mahdia ship was carrying works of art of undoubted value, but these were in close juxtaposition with marble blocks, which clearly had been newly worked and, in some cases, were unfinished. "The statues had been loaded in sections waiting to be assembled on arrival. The capitals, decorated with griffin-heads, had their volutes supported on rough projections of solid marble. The candelabra and kraters, parts of which had not yet received their painted or gilded decoration, came, clearly, from workshops engaged in supplying goods for export. The drums of the columns are mere rough-hewn cylinders, without fluting or astragal, and must have been shipped straight from the quarry." All these things point to a commercial "order" rather than to a collection of war-booty.

"Surely," writes Monsieur Merlin, "Athens could have supplied the all-powerful Sulla with more magnificent trophies than these examples of routine commercial exploitation all made from commonplace materials."

Monsieur Carcopino, on the other hand, takes the view that the hypothesis put forward originally by Salomon Reinach, is the right one, and that the cargo almost certainly represents Sulla's booty, and may be taken as exemplifying his artistic taste.

Generous though the Mahdia wreck has been, there are reasons to suppose that the sum total of its secrets has not yet been revealed. That is why when, thirty-five years later, Monsieur Merlin was informed that the Groupe de Recherches de Toulon was proposing to devote one of its routine dives to a further examination of the site, he welcomed the idea with enthusiasm.

A team of nine free-divers proceeded to the spot on board the Sloop *Elie Monnier*. Harbor launch No. 8 was also pressed into service. Commandant Philippe Tailliez and Commandant J. Y. Cousteau were in charge of the operations. They took with them the report drawn up by Enseigne Tavera, who in 1908, as Commander of the tug *Cyclope*, had discovered the exact location of the wreck. Unfortunately, the points of reference chosen at that time—an isolated tree,

a thicket, a ruin—no longer existed. When she was five miles off-shore, the *Elie Monnier* began to make a series of reconnaissance sweeps. All the members of the team levelled their glasses on the desperately flat coastline where, at wide intervals, a number of ruins, each indistinguishable from its fellows, was visible, alternating with similar isolated trees. For five days the divers carried out an exhausting search at a depth of twenty fathoms. An area of approximately nine acres of sea-bed which had been "squared" by means of submerged lines was examined square yard by square yard, but all in vain. An all-over survey, carried out by a diver attached to a leaden weight and towed by launch No. 8, did at last reveal the whereabouts of the "big guns" on which so much depended. The wreck was found lying some two hundred and twenty yards from the spot mentioned in Tavera's report.

Next day a preliminary examination was made. "The sight," wrote Philippe Tailliez, "was a thrilling one. All that remained of the Mahdia 'Galley' after two thousand years, amounted to a collection of widely spaced lumps, with a number of columns arranged in four main rows. The general effect, in spite of the disturbance caused by the Greek divers, was overwhelmingly that of a ship, thirty-six feet wide by one hundred and twenty long, lying on a north-south axis. Fragments of the ribs of the hull, of the deck, and of the keel were visible beneath the columns, or in the intervals between them."

Five days had been spent in finding the wreck, and very little time was left in which to carry out a serious investigation. The free-divers and the *Elie Monnier* were due to report back at Toulon for naval duties. In order to enlarge the breach made by the helmet-divers in 1913, four columns, the heaviest of which weighed three tons, were secured by slings and hoisted on to the afterdeck of the *Elie Monnier*, whose derrick was hard put to it to lift them. Two anchors were also raised.

In all, only about eleven hours of these exploratory labors were productive. The main object, which was to mark the position of the wreck and to carry out a preliminary recon-

naissance, had been achieved, and Monsieur Merlin, in his comment on the operation, was able to say: "The first results obtained show that there is good reason to believe that the possibilities of the site have not been exhausted. It seems likely that important discoveries will be made when the search is resumed. It is certain that once the skeleton of the ship has been freed from the accumulated deposits of the sea much valuable information will be gained. . . ."

The men who carried out the diving operations at Mahdia, and who saw and touched the wreck, share this opinion, but they know, too, that this type of search can be brought to a successful issue only if the men on the job—whether archaeologists or not—can be assured of a supply of efficient technical equipment. Unfortunately, what they chiefly need is powerful lifting apparatus, a dredger, and a vessel specifically designed, as was the *Elie Monnier*, for assisting an organized diving programme. Such things are beyond the reach of our archaeological services with their limited financial resources. It must, however, be stressed that no attempt which cannot rely upon the necessary material means will succeed. Imperfect equipment will only break up still further what remains of the wreck, without any appreciable gain.

B. Egypt

The science of Egyptology was born with the invasion of Napoleon in 1798. He brought with him historians, engineers, and antiquarians who, while they did little digging, made extensive studies of the great monuments which were in plain sight. When the French evacuated the country in 1801, they were forced to surrender their antiquarian collections but kept their records, which were later published in the massive 'Description de l'Egypte.'

The most important of the surrendered objects was the

Rosetta Stone, which is still a prized exhibit at the British Museum. As E. A. Wallis Budge, formerly Keeper of the Egyptian and Assyrian Antiquities at the Museum, explains, the chief credit for deciphering the inscription goes to a Frenchman, Jean Champollion. Born in the southeastern part of France in 1790, Champollion was a phenomenon in philology. He began the serious study of Oriental languages at thirteen, and at sixteen read a paper to the Grenoble Academy attempting to prove that Coptic was the language of ancient Egypt. At seventeen he went to Paris to study at the School of Oriental Languages. He had already conceived the idea of translating the Rosetta Stone, an ambition he realized in 1822 and the years that followed. This was the greatest single accomplishment in Egyptology, providing the key to an understanding of innumerable documents in ancient Egyptian history.

THE ROSETTA STONE

E. A. WALLIS BUDGE

The Discovery of the Stone

THE FAMOUS SLAB of black basalt which stands at the southern end of the Egyptian Sculpture Gallery in the British Museum, and which has for more than a century been universally known as the "Rosetta Stone," was found in July, 1799, at a spot near the mouth of the great arm of the Nile that flows through the Western Delta to the sea, not far from the town of Rashid, or as Europeans call it "Rosetta." According to one account it was found lying on the ground, and according to another it was built into a very old wall, which a company of French soldiers had been ordered to remove in order to make way for the foundations of an addition to the fort, afterwards known as "Fort Julien."¹ The finder of the Stone,

1. This fort is marked on Napoleon's Map of Egypt, and it stood on the left or west bank of the Rosetta arm of the Nile.

a French Officer of Engineers named Bouchard, and his companions observed that it bore inscriptions in three different scripts, and rightly supposed that they represented three versions of the same text. Since the last of these inscriptions was written in Greek and could therefore be read, they realised the possible importance of the Stone for the decipherment of the hieroglyphics in the first inscription. News of the discovery soon reached Cairo, whither the Stone was removed and placed in the "Institut National" which had recently been founded in that city. On its arrival in Cairo it became at once an object of the deepest interest to the body of learned men whom Napoleon had taken with him on his expedition to Egypt, and the General himself exhibited the greatest curiosity in respect of the contents of the inscriptions cut upon it. The inscription placed between the hieroglyphic and Greek versions was soon identified by Jean-Joseph Marcel and Remi Raige as a cursive form of hieroglyphic writing, but no progress was made in the decipherment of either of the Egyptian versions. Napoleon subsequently ordered a number of copies of the Stone to be made for distribution among the scholars of Europe, and two skilled lithographers, "citizens Marcel and Galland," were specially brought to Cairo from Paris to make them. The plan which they followed was to cover the surface of the Stone with printer's ink, and then to lay upon it a sheet of paper which they rolled with india-rubber rollers until a good impression had been taken. Several of these ink impressions were sent to scholars of great repute in many parts of Europe, and in the autumn of 1800 General Dugua took two to Paris, where he committed them to the care of "citizen Du Theil" of the Institut National of Paris.

The Arrival of the Stone in England

After the successful operations of Sir Ralph Abercromby in Egypt in the spring of 1801, a Treaty of Capitulation was drawn up, and by Article XVI the Rosetta Stone and several other large and important Egyptian antiquities were surrendered to General Hutchinson at the end of August in that

year. Some of these he despatched at once to England in H.M.S. "Admiral," and others in H.M.S. "Madras," but the Rosetta Stone did not leave Egypt until later in the year. After the ink impressions had been taken from it, the Stone was transferred from Cairo to General Menou's house in Alexandria, where it was kept covered with cloth and under a double matting. In September, 1801, Major-General Turner claimed the Stone by virtue of the Treaty mentioned above, but as it was generally regarded as the French General's private property, the surrender of it was accompanied by some difficulty. In the following month Major-General Turner obtained possession of the Stone, and embarked with it on H.M.S. "L'Égyptienne," and arrived at Portsmouth in February, 1802. On March 11 it was deposited at the Rooms of the Society of Antiquaries of London, where it remained for a few months, and the writings upon it were submitted to a very careful examination by many Oriental and Greek scholars. In July the President of the Society caused four plaster casts of the Stone to be made for the Universities of Oxford, Cambridge, Edinburgh and Dublin, and had good copies of the Greek text engraved, and despatched to all the great Universities, Libraries, Academies and Societies in Europe. Towards the close of the year the Stone was removed from the Rooms of the Society of Antiquaries to the British Museum, where it was mounted and at once exhibited to the general public.

Description of the Stone

The Rosetta Stone in its present state is an irregularly-shaped slab of compact black basalt, which measures about 3 feet 9 inches in length, 2 feet 4½ inches in width, and 11 inches in thickness. The top right and left hand corners, and the right hand bottom corner, are wanting. It is not possible to say how much of the Stone is missing, but judging by the proportion which exists between the lengths of the inscriptions that are now upon it, we may assume that when it was complete it was at least 12 inches longer than it is now. The upper end of the Stone was probably rounded, and, if we

may judge from the reliefs found on stelæ of this class of the Ptolemaïc Period, the front of the rounded part was sculptured with a figure of the Winged Disk of Horus of Edfû, having pendent uræi, one wearing the Crown of the South, and the other the Crown of the North. Below the Winged Disk there may have been a relief, in which the king was seen standing, with his queen, in the presence of a series of gods, similar to that found on one of the copies mentioned below of the inscriptions on the Rosetta Stone. Whatever the sculptured decoration may have been, it is tolerably certain that, when the Stone was in a complete state, it must have been between five and six feet in height, and that when mounted upon a suitable plinth, and set up near the statue of the king in whose honor it was engraved, it formed a prominent monument in the temple in which it was set up.

The INSCRIPTION on the Rosetta Stone is written in two languages, that is to say, in EGYPTIAN and in GREEK. The EGYPTIAN portion of it is cut upon it in: I. the HIEROGLYPHIC CHARACTER, that is to say, in the old picture writing which was employed, from the earliest dynasties, for nearly all state and ceremonial documents that were intended to be seen by the public; and II. the DEMOTIC CHARACTER, that is to say, the conventional, abbreviated and modified form of the HIERATIC character, or cursive form of hieroglyphic writing, which was in use in the Ptolemaïc Period. The GREEK portion of the inscription is cut in ordinary uncials. The hieroglyphic text consists of 14 lines only, and these correspond to the last 28 lines of the Greek text. The Demotic text consists of 32 lines, the first 14 being imperfect at the beginnings, and the Greek text consists of 54 lines, the last 26 being imperfect at the ends. A large portion of the missing lines of the hieroglyphic text can be restored from a stele discovered in 1898 at Damanhûr in the Delta (Hermopolis Parva), and now in the Egyptian Museum in Cairo (No. 5576), and from the copy of a text of the Decree cut on the walls of a temple at Philæ.


The Earliest Decipherers of the Stone

An English translation of the Greek text was made by the Rev. Stephen Weston, and was read by him before the Society of Antiquaries of London in April, 1802, and a French translation was made by "citizen Du Theil," who declared that the Stone was "a monument of the gratitude of some priests of Alexandria, or some neighboring place, towards Ptolemy Epiphanes"; a Latin translation by "citizen Ameilhon" appeared in Paris at about the same time. The first studies of the Demotic text were those of Sylvestre de Sacy and Åkerblad, a Swedish diplomat, in 1802. The latter succeeded in identifying in the Demotic version the equivalents of all the proper names which occurred in the Greek text, and he also recognised the words for "temples," "Greeks," and the third person masculine pronoun. In all probability Åkerblad's contribution to the decipherment of the Demotic text would have been even more substantial if he had not assumed that the script was exclusively alphabetic. The credit for being the first to recognise that Egyptian writing consisted mainly of phonetic signs belongs to Thomas Young, the author of "*The Undulatory Theory of Light*," who obtained a copy of the Rosetta Stone in 1814; he also demonstrated a fact which had previously been suspected by Zoëga, de Guignes and others, that the ovals, or cartouches, in the hieroglyphic version contained royal names. Thomas Young's discoveries were not, however, limited to the Rosetta Stone, but included among many other achievements the decipherment of the names of Berenice and Cleopatra, the latter on a granite obelisk with a bilingual text in Greek and hieroglyphics which had been excavated at Philæ in 1815 by W. J. Bankes of Kingston Lacy. It is difficult to estimate the extent to which Young's discoveries assisted the French scholar Jean François Champollion (1790-1832), but it is likely that in many cases both these pioneers reached similar conclusions independently. In 1822 the list of alphabetic Egyptian characters that had been drawn up by Young was corrected and greatly enlarged by Champollion, who, between that date

and the year of his death, correctly deciphered the hieroglyphic forms of the names and titles of most of the Roman Emperors, and drew up a classified list of Egyptian hieroglyphs, and formulated a system of grammar and general decipherment which is the foundation whereon all later Egyptologists have worked.

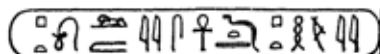
The decipherment of proper names, although providing a key to the system of writing, could not have led to an understanding of the Egyptian language without the assistance of Coptic. Christian descendants of the ancient Egyptians are called Copts, a name which is only a corruption of the Greek "Aiguptos," "Egypt"; the translations of the Holy Scriptures, liturgies and other sacred writings which they made from Greek into their native tongue are written in the Greek script supplemented by seven characters derived from Demotic. The knowledge of Coptic has never been lost, and its literature has always been available in manuscripts for study by scholars. Champollion, whilst still a youth in the early years of the nineteenth century, realized the great importance of Coptic for the purpose of Egyptian decipherment, and he studied it to such good purpose that he was able to identify very many of the Egyptian words which he could read with their Coptic equivalents. In his studies of the inscription on the Rosetta Stone, his knowledge of Coptic enabled him to deduce the phonetic values of many syllabic signs, and to assign correct readings to many pictorial characters, the meanings of which were made known to him by the Greek text on the Stone.

Method of Decipherment

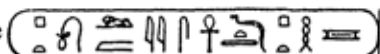
The method by which the greater part of the Egyptian alphabet was recovered is this: It was assumed correctly that the oval , or "cartouche" as it is called, always contained a royal name. There is only one cartouche (repeated six times with slight modifications) on the Rosetta Stone, and this was assumed to contain the name of Ptolemy, because it was certain from the Greek text that the inscription



concerned a Ptolemy. It was also assumed that if the cartouche did contain the name of Ptolemy, the characters in it would have the sounds of the Greek letters, and that all together they would represent the Greek form of the name of Ptolemy. Now on the obelisk which Mr. Bankes had brought from Philæ there is an inscription in two languages, Egyptian and Greek. In the Greek portion of it two royal names are mentioned, that is to say, Ptolemy and Cleopatra, and on the second face of the obelisk there are two cartouches, which occur close together, and are filled with hieroglyphs which, it was assumed, formed the Egyptian equivalents of these names. When these cartouches were compared with the cartouche on the Rosetta Stone it was found that one of them contained hieroglyphic characters that were almost identical with those which filled the cartouche on the Rosetta Stone. Thus there was good reason to believe that the cartouche on the Rosetta Stone contained the name of Ptolemy written in hieroglyphic characters. The forms of the cartouches are as follows:

On the Rosetta Stone



On the Obelisk from Philæ

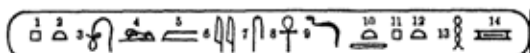


In the second of these cartouches the single sign  takes the place of the three signs  at the end of the first cartouche. Now it has already been said that the name of Cleopatra was found in Greek on the Philæ Obelisk, and the cartouche which was assumed to contain the Egyptian equivalent of this name appears in this form:

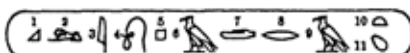



Taking the cartouches which were supposed to contain the names of Ptolemy and Cleopatra from the Philæ Obelisk, and numbering the signs we have:

Ptolemy, A.












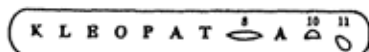
Cleopatra, B.





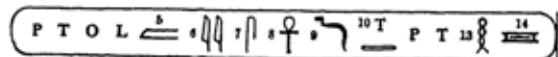
Now we see at a glance that No. 1 in A and No. 5 in B are identical, and judging by their position only in the names they must represent the letter P. No. 4 in A and No. 2 in B are identical, and arguing as before from their position they must represent the letter L. As L is the second letter in the name of Cleopatra, the sign No. 1  must represent K. Now in the cartouche of Cleopatra we know the values of Signs Nos. 1, 2 and 5, so we may write them down thus:

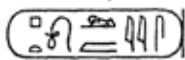









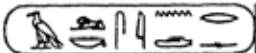
In the Greek form of the name of Cleopatra there are two vowels between the L and the P, and in the hieroglyphic form there are two hieroglyphs,  and , so we may assume that  = E and  = O. In some forms of the cartouche of Cleopatra No. 7  is replaced by , which is identical with No. 2 in A and No. 10 in B. As T follows P in the name Ptolemy and as there is a T in the Greek form of the name of Cleopatra, we may assume that  and  have substantially the same sound, and that that sound is T. In the Greek form of the name Cleopatra there are two a's, the positions of which agree with No. 6 and No. 9, and we may assume that  has the value of A. Substituting these values for the hieroglyphs in B we may write it thus:



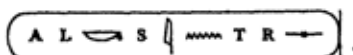
Thomas Young noticed that the two signs  always followed the name of a goddess, or queen, or princess, and the other early decipherers regarded the two signs as a mere feminine termination. The only sign for which we have no phonetic equivalent is No. 8  and it is obvious that this must represent R. Inserting this value in the cartouche we have the name of Cleopatra deciphered. Applying now the values which we have learned from the cartouche of Cleopatra to the cartouche of Ptolemy we may write it thus:






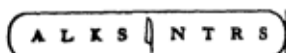
We now see that the cartouche must be that of Ptolemy, but it is also clear that there must be contained in it many other hieroglyphs which do not form part of his name. Other forms of the cartouche of Ptolemy are found, even on the stone, the simplest of them written thus: . It was therefore evident that the other signs     were royal titles corresponding to those found in the Greek text on the Rosetta Stone meaning "ever-living, beloved of Ptah." Now the Greek form of the name Ptolemy, i.e. Ptolemaios, ends with S. We may assume therefore that the last sign in the simplest form of the cartouche given above has the phonetic value of S. The only hieroglyphs now doubtful are  and , and their position in the name of Ptolemy suggests that their phonetic values must be M and some vowel sound in which the I sound predominates. These values, which were arrived at by guessing and deduction, were applied by the early decipherers to other cartouches, e.g.:

1.  2. 


Now, in No. 1, we can at once write down the values of all the signs, viz., P. I. L. A. T. R. A, which is obviously the Greek name Philotera. In No. 2 we know only some of the hieroglyphs, and we write the cartouche thus:





























It was known that  occurs in the name Berenice, and that it represents N, and that  is the last word of the transcript of the Greek title "Kaisaros," and that it therefore represents some S sound. Some of the forms of the cartouche of Cleopatra begin with , and it is clear that its phonetic value must be K. Inserting these values in the above cartouche we have:



which is clearly meant to represent the name "Alexandros,"

or Alexander. The position of the sign  shows that it represented some sound of E or A.

Returning to the signs    which we have assumed to represent the royal titles "ever-living, beloved of Ptah," we have to decide whether this assumption be correct or not. It was known by tradition and from Coptic that the old Egyptian word for "life" or "living," was "ākh," or "ōnh," and that it was represented by the symbol  which occurs several times in the inscriptions. It was therefore guessed that the next signs  meant "ever." Coptic again showed that one of the old Egyptian words for "ever, age, eternity," was Djēt, and as we already know that the phonetic value of the second sign in the word is T, we may assume that the value of  is DJ. The third sign  is a "determinative," and was not pronounced. Thus the first title   means "living ever," or "ever-living." Of the remaining signs    we know that the two first are P and T, i.e. the first two letters of the name of Ptah; the third sign  must then have the value of H or something like it. If the signs   form the name of Ptah, then the sign which follows them must mean "loving," or "loved." Here again the Coptic helped the early decipherers in assigning a phonetic value to , for the Coptic word for to love is "mere," *μερε*, and they assumed that the value of the sign was "mer." Now in the cartouche of Ptolemy on the Rosetta Stone after the name Ptah   , we have the signs   , and these are, clearly, a variant of . We already know that  = I, and therefore  must be the equivalent of  and have the value of "mer." By the comparison of texts containing variant forms, and by the skilful use of his knowledge of Coptic, Champollion succeeded in formulating the system of decipherment of Egyptian hieroglyphs that is, substantially, that in use at the present day.

The Contents of the Inscription on the Rosetta Stone

The inscription on the Rosetta Stone is a copy of the Decree passed by the General Council of Egyptian priests assembled at Memphis to celebrate the first commemoration of the

coronation of Ptolemy V, Epiphanes, king of all Egypt. The young king had been crowned in the eighth year of his reign, therefore the first commemoration took place in the ninth year, in the spring of the year B.C. 196. The original form of the Decree is given by the Greek section, and the Hieroglyphic and Demotic versions were made from it.

The inscription is dated on the fourth day of the Greek month Xandikos (April), corresponding to the eighteenth day of the Egyptian month Meshir, or Mekhir, of the ninth year of the reign of Ptolemy V, Epiphanes, the year in which Actus, the son of Actus, was chief priest and Pyrrha, the daughter of Philinus, and Areia, the daughter of Diogenes, and Irene, the daughter of Ptolemy, were chief priestesses. The opening lines are filled with a list of the titles of Ptolemy V, and a series of epithets which proclaim the king's piety towards the gods, and his love for the Egyptians and his country. In the second section of the inscription the priests enumerate the benefits which he had conferred upon Egypt, and which may be thus summarized:

1. Gifts of money and corn to the temples.
2. Gifts of endowments to temples.
3. Remission of taxes due to the Crown.
4. Forgiveness of debts owed by the people to the Crown.
5. Release of the prisoners who had been languishing in gaol for years.
6. Abolition of the press-gang for sailors.
7. Reduction of fees payable by candidates for the priesthood.
8. Reduction of the dues payable by the temples to the Crown.
9. Restoration of the services in the temples.
10. Forgiveness of rebels, who were permitted to return to Egypt and live there.
11. Despatch of troops by sea and land against the enemies of Egypt.
12. The siege and conquest of the town of Shekan (Lycopolis).

13. Forgiveness of the debts owed by the priests to the Crown.
14. Reduction of the tax on byssus.
15. Reduction of the tax on corn lands.
16. Restoration of the temples of the Apis and Mnevis Bulls, and of the other sacred animals.
17. Rebuilding of ruined shrines and sacred buildings, and providing them with endowments.

As a mark of the gratitude of the priesthood to the king for all these gracious acts of Ptolemy V, it was decided by the General Council of the priests of Egypt to "increase the ceremonial observances of honor which are paid to Ptolemy, the ever-living, in the temples." With this object in view it was decided:

1. To make statues of Ptolemy in his character of "Saviour of Egypt," and to set up one in every temple of Egypt for the priests and people to worship.
2. To make figures of Ptolemy [in gold], and to place them in gold shrines, which are to be set side by side with the shrines of the gods, and carried about in procession with them.
3. To distinguish the shrine of Ptolemy by means of ten double-crowns of gold which are to be placed upon it.
4. To make the anniversaries of the birthday and coronation days of Ptolemy, viz., the XXXth day of the month Mese and the XVIIth day of Paophi, festival days forever.
5. To make the first five days of the month of Thoth days of festival forever; offerings shall be made in the temples, and all the people shall wear garlands.
6. To add a new title to the titles of the priests, viz., "Priests of the beneficent god Ptolemy Epiphanes, who appeareth on earth," which is to be cut upon the ring of every priest of Ptolemy, and inserted in every formal document.
7. That private individuals may borrow the shrines with figures of Ptolemy inside them from the temples, and may take them to their houses, and carry them about in procession.

8. That copies of this Decree shall be cut upon slabs of basalt in the "writing of the speech of the god," i.e. hieroglyphs, and in the writing of the books, i.e. demotic, and in the writing of the Ueienin, i.e. Greek. "And a basalt slab on which a copy of this Decree is cut shall be set up in the temples of the first, second and third orders, side by side with the statue of Ptolemy, the ever-living god."

In one respect, the looting of antiquities, the archaeology of Egypt bears a strong resemblance to that of Greece. The Napoleonic studies were followed by other antiquarian expeditions which recorded surface remains and excavated a number of sites. On their heels came the despoilers, whose methods are typified by Giovanni Belzoni, a circus strong man turned antiquarian for profit. Describing a search for mummies in a rock tomb near Thebes, he wrote, "After the exertion of entering into such a place . . . I sought a resting place, found one, and contrived to sit; but when my weight bore on the body of an Egyptian, it crushed it like a bandbox . . . so that I sunk altogether among the broken mummies, with a crash of bones, rags and wooden cases . . . every step I took I crushed a mummy. . . . I could not avoid being covered with bones, legs, arms and heads rolling from above. . . . The purpose of my researches was to rob the Egyptians of their papyri; of which I found a few hidden in their breasts, under their arms, in the space above the knees, or on the legs. . . ."

Belzoni's business tactics were also highly suspect; yet unscrupulous as he was, he exhibited his finds and published accounts of his expeditions. The records of other depredations have been completely lost. Archaeological activity was in a state of chaos when Auguste Mariette was appointed Director of the Egyptian Service of Antiquities in 1858, a post he held until his death in 1881. He had come to Egypt in 1850 in search of Coptic manuscripts, but immediately became fascinated by Egyptian monuments. On assuming the directorship, he forbade the exportation of antiquarian objects. During

his long incumbency he brought order out of confusion, taking the necessary steps for preservation of Egyptian cultural remains. He was also instrumental in founding the Egyptian National Museum. He uncovered the great temple of the Sphinx at Gizeh and the cemetery at Sakkarah, and investigated many other important sites. However, his archaeological methods left something to be desired. He was interested primarily in spectacular finds, his digging was haphazard and destructive, and he often failed either to record or publish his results.

During his directorship, Mariette highhandedly forbade excavation by other Egyptologists. His successor, Gaston Maspero, lifted the ban and the French and British immediately organized archaeological expeditions. The British explorations were placed in charge of W. M. Flinders Petrie, who, as Stanley Casson explains, occupies a position in Egyptian archaeology comparable to that of Schliemann in Greek archaeology. Casson himself was a Reader in Classical Archaeology at Oxford and excavated in Macedonia and Thrace. He was the author of a number of books including *The Discovery of Man*, from which 'Flinders Petrie and Egyptology' has been taken. Although his view of both Schliemann and Petrie has been disputed by other historians of archaeology, it is widely held; and what he has to say about "the invariable fate of all pioneers" is unquestionably sound.

FLINDERS PETRIE AND EGYPTOLOGY

STANLEY CASSON

THE SAME URGENT need for exact observation and recording which had inspired Schliemann was felt by others. Search for the remains of the past in what might be called the "grand manner" of an Elgin or a Layard was becoming less popular. Intelligent archaeological workers began

to realise that the quantity of small and unimportant objects disregarded, lost or damaged in the course of these grandiose expeditions was bringing the study of antiquity into disrepute. The meticulous standards set early in the nineteenth century by the cave-diggers and the explorers of gravel pits, and the rigid accuracy of the geologists suggested that Archaeology should look to its methods.

Schliemann was perhaps the first to realise this. But, while he was working, another archaeologist was, in his own way, coming to the same conclusions and starting to work out for his own use a more methodical system on which excavators and archaeologists in general could proceed. In 1853 was born Flinders Petrie, the son of William Petrie and Anne Flinders. His parents met in the house of a remarkable man, Piazzi Smyth, who was profoundly interested in Egypt and its antiquities.

When Petrie was eight years old he heard from another little boy of the unearthing of a Roman villa in the Isle of Wight. He was horrified to hear how the contents were rudely shovelled out and he protested that the earth covering the villa should have been carefully pared away inch by inch to see what was in it and how it lay.

In 1866 young Petrie found on a bookstall a copy of the book entitled *Our Inheritance in the Great Pyramid* by Piazzi Smyth. Petrie's father, who had known Smyth so well, was strongly attracted by the strange and mystical views set forth in this wholly unscientific and remarkable work. For Smyth, like another Stukeley, was determined to detect religious and prophetic meanings in the Pyramids, and to see in their measurements and dimensions indications of the past and future. Petrie's father urged the boy to take an interest in Egypt and in due course it fell to the lot of the son to ascertain the true facts about the Pyramids some fifteen years later and to find, as he puts it, "the ugly little fact which killed the beautiful theory."

At the age of twenty-two Petrie began to train himself in archaeological method by surveying earthworks and stone circles in Britain. In a few years he had made over a hundred and fifty plans. He had spent his boyhood roaming

round the British Museum and had in his spare time made his own humble collection of coins. Petrie's father intended himself to go to Egypt to examine and survey the Pyramids and to take his son with him. In 1872 he and his father together made a survey of Stonehenge as a preliminary canter for the larger enterprise.

But his father did not, in the end, accompany him, and at last in 1880 he set off alone for Egypt. When he arrived there he had complete freedom and permission to carry out his measurements, but not to excavate. Nor was excavation his intention.

He carried out his close and accurate survey with skill and energy, and found himself also investigating that most interesting of all problems that concern the Pyramids—their method of construction. The book which he published in 1883, *The Pyramids and Temple of Gizeh*, was the first archaeological work in any land to concern itself with the technical processes by which ancient buildings are constructed. As such it has never been superseded.

While he was at Gizeh workmen were sent to remove broken stones from the pyramid to use for road-making. Near the Sphinx the Director of Antiquities, Mariette, had made excavations and had blasted with dynamite the fallen parts of a granite temple instead of removing them carefully and attempting to restore them. "Nothing," he noted, "was done with any uniform plan: work is begun and left unfinished: no regard is paid to future requirements of exploration and no civilised or labor-saving appliances are used. It is sickening to see the rate at which everything is being destroyed, and the little regard paid to preservation." So Petrie records his impressions in his diary. In the ruins of a temple at Khafra a man was employed by the authorities to dig for fragments of diorite statues. The digger usually sold his finds to tourists.

In 1883 Petrie was given instructions by the British learned society which he represented to look for sites suitable for excavation. He travelled throughout the Delta, and one of the most important sites he discovered proved to be that of the important Greek trading center known as Nau-

kratis, where by a treaty Greeks were allowed by the Egyptians to establish the equivalent of a trading post, and a city, and to build their own temples and public buildings. The site belonged mainly to the sixth century B.C. and contained a wealth of Greek objects. He identified the site as Naukratis by finding an inscription built into a village house, bearing the very name of the city itself.

About this time Petrie made the acquaintance in England of Francis Galton, the father of experimental Psychology. Galton was deeply interested in Ethnology and racial types, and arranged for Petrie to make copies and casts of any of the relief sculptures in Egypt which bore representations of races alien to Egypt. From an anthropological point of view this was a most important mission. Petrie was given a grant from the Royal Society for the purpose.

It was to Galton's credit that the enterprise was undertaken, and to Petrie is due the discovery that the Egyptians were the first people that we know of to be conscious of racial distinctions. Petrie had paper molds made of the reliefs and in due course castings from these molds were made and exhibited in London.

In excavations made later on at Memphis, Petrie augmented this early record of foreign peoples by a remarkable discovery of a large number of molded terracotta heads found in the foreign quarter of Memphis, and dating to the period of the Persian control of Egypt. Here were representations of Indians, Persians, Kurds, Scythians, Hebrews, Carians, Greeks of Asia Minor and of Macedonia, and a few identifiable possibly as Spaniards and Sardinians. Here indeed was an ethnographical gallery of the more historic period, a fruitful discovery and one to serve as an addition to the series of reliefs of alien people of the earlier Bronze Age. Clearly the Egyptians always had an eye for a strange type and an unusual race. But their curiosity never seems to have proceeded further.

The conditions of affairs in Egypt when Petrie first began to excavate was astonishing. We have already seen examples of destruction carried out by the authorities. There were many such. Frescoes were hacked at so that their finer

parts might be removed to the museum. In one case the authorities had made paper castings (in wet paper pulp) from painted relief sculptures, with the result that the paint was totally removed and destroyed in the process. In another instance, at Tel-el-Amarna, a superb series of wall paintings were found which for some time excited the interest of all visitors and tourists. The paintings were in an ancient building which stood in a farmer's field. But the authorities had refused to make a pathway to the building that held the paintings, so that the farmer's crops got badly trampled. The farmer consequently went one night and hacked the frescoes to pieces so that there should be no more incentive to tourists to trample his fields.

Petrie saw that excavations must be carried out methodically, with extreme care, and with an attention to detail which must be unrelenting. Petrie himself formulates the main outlines of his methods as follows: They are, he says:—

“(1) The fine art of collecting, of securing all the requisite information, of realising the importance of everything found and avoiding oversights, of proving and testing hypotheses constantly, as work goes on, of securing everything of interest not only to myself but to others.

(2) The weaving a history out of scattered evidence using all materials of inscriptions, objects, positions and probabilities.

(3) All details of material, colour, fabric and mechanical questions of tools.

(4) Archaeological surveying.”

No Egyptologist up to then had fixed such rigid standards for excavation nor insisted so firmly that they should be carried out. Petrie's systematic and careful methods of recording and searching set a standard in Egyptology which has continued and which, at the time when he began to work, was of paramount importance.

Petrie can claim credit for being the first person to call attention to the extent and spread of the Mycenaean civilisation. At Gurob in Egypt he had noted a large number of indications of foreign contacts. It was here in 1889 that

Mycenaean pottery was found for the first time, associated with Egyptian objects that belonged to the end of the eighteenth Dynasty. There, as has already been mentioned, was the first external dating point for the Mycenaean wares. Burials of foreigners were also found here, one being of a man who had yellow hair covered with a black wig. He was certainly no Egyptian. At Kahun in the same year, on the site of a complete Egyptian town, a different kind of apparently Aegean pottery was found associated with remains of the twelfth Dynasty. Petrie firmly maintained that it was comparable with the later Mycenaean wares and clearly imported from a similar region. Later, as Cnossos and other Minoan sites were excavated, the prototype of this alien pottery was found. It was a colored and beautiful ware, and in Crete was of the period when the first palaces were being built, about 2000 B.C.

Petrie was thus able to establish contacts between Greece and Egypt going back to fifteen hundred years before the time of Alexander the Great, under whose rule Greeks and Egyptians for the first time established a close relationship.

In 1891 Petrie went to Athens to examine the Mycenaean pottery which Schliemann had discovered, to see if it was identical with that found at Gurob. After considering the matter, Petrie came to the conclusion that

"the Mycenaean civilisation was widespread: the objects imitated from Egyptian sources (found on Mycenaean sites in Greece, showing a high civilisation there, capable of inlaying metals in several colors, and of glazing pottery with elaborate patterns. . . . We deal with a great widespread civilisation, and not a local culture."

Petrie then made an outline chronology which was based on his comparison of the Egyptian finds with those in Greece. In general that chronology has proved completely right, though in detail it has had to be modified and rearranged.

Here was one of the first fundamental pieces of comparative Archaeology. The discoveries of Schliemann were in

a state of suspended animation, so to speak, until some outside discovery could be produced to show that the Mycenaean world had relations with other civilised regions. If those outside discoveries could be independently dated, there was a fixed point from which a start could be made. Egypt gave two equations of date for Aegean pottery, one in the twelfth Dynasty, the pottery being Cretan, the other in the eighteenth Dynasty, the pottery being Mycenaean. The former date was about 2000 and the latter about 1400 to 1500 B.C. Here at last were guiders in what had been a very dark forest. Slowly, on the background of Egyptian chronology, the chronology both of Crete and of Mycenae was built up. The discovery of a new civilisation, previously not even guessed at, is always a grave problem for archaeologists. The culture of Mycenae was in clear contact with Egypt, as Schliemann had seen at the start, but most of the Egyptian imported objects found by him proved to be, as Petrie pointed out, made not in Egypt at all. Actually, though Petrie was not aware of it, the home of imitations of Egyptian objects was Cyprus. But as Cyprus itself was virtually a Mycenaean colony, it makes little difference. But the discovery of true Mycenaean and Cretan objects in Egypt was another matter. There was a genuine and datable contact.

Slowly the great pattern of Mediterranean history was unfolding. The evidence was gradually accumulating. Only by careful and rigorous methods could that evidence be found. Petrie, by preserving everything that was found during an excavation, saved from oblivion the few broken potsherds and unimportant unbroken vases which were Mycenaean and Cretan. Other excavators might have disregarded them or pigeonholed them as inexplicable oddments. Petrie saw at a glance that they were alien and imported, and his very first impression was that they were definitely Aegean in origin. Here was a good instance of scientific observation and foresight. These unimportant fragments helped to fix on the chart of time two mighty civilisations, the existence of which had been totally unknown before 1870.

Another instance of Petrie's scientific method is seen in

his handling of a minor problem which is continually pestering the archaeologist. How often is the excavator asked that dreary question about "mummy wheat"? Journalists and people of inquiring but not critical minds seem determined to believe that samples of seeds found in ancient tombs of remote antiquity will grow if planted. All the researches of the botanists do not seem able to eradicate this superstition from the popular mind even to-day. It is a constant silly-season topic in the newspapers, almost as recurrent as that of the Mysterious Mummy at the British Museum or the Fatal Tomb of Tutankhamen! Every careful excavator finds seeds of some sort, but none have ever been known to grow, even when planted in the most favorable conditions. Petrie made the experiment, as indeed have most Egyptologists; he found on one site some bushels of Roman corn. He picked out the largest and fattest grains and planted them carefully in soft and luxurious soil. The test was favorable, as the grain was planted the very moment it was found before it could have time to decay in the atmosphere, or be affected by the climate. He planted some ancient grape stones at the same time. Nothing at all resulted and no single seed germinated. Since then many similar experiments have been carried out, always with negative results.

Petrie's contributions to Egyptology are, of course, his main life's work. He made no sensational discoveries such as could rank with anything Schliemann found, nor with discoveries such as the Tutankhamen tomb, or the Royal Tombs of Ur in Mesopotamia. But in 1913 he opened a tomb at Lahun which contained one of the finest groups of gold and other treasures ever found in Egypt. It was ultimately acquired by the Metropolitan Museum at New York.

The importance of Petrie's work may, perhaps, have been largely forgotten by later generations of workers. That is the invariable fate of all pioneers. Since he started working, new methods and further refinements have come into the science of excavation. But Petrie laid the foundations of accurate excavation in Egypt. His width of interest also makes his work of deeper importance. He was able to take long views and to make wide comparisons. Archaeologists,

even to-day, are too prone to prefer to live in water-tight compartments. It is only in the last generation, for instance, that the prehistoric Archaeology of Europe as a whole has been brought into contact with that of the Mediterranean. Unlike either Schliemann or Evans, Petrie was a poor man and always worked with a minimum of funds. But he extracted from every penny its full archaeological value.

Flinders Petrie remained the dean of Egyptian archaeology until well into the twentieth century, but during this period increasing numbers of expeditions from half a dozen countries, including the United States, made important discoveries in both the history and prehistory of Egypt. The most spectacular of these finds was the tomb of Tut-ankh-Amen, the son-in-law of the great iconoclast Akhenaton, who reigned briefly and obscurely during the fourteenth century B.C. His tomb was small and relatively unimportant compared to those of the great kings. Its significance lay in the fact that unlike all but a handful of royal burials, in Egypt and elsewhere throughout the world, it had remained unlooted. It was the richest find of its sort that has yet been made. Archaeologically, the light it threw on the culture of the New Kingdom at a time when the Empire was declining was of the first importance. With Lord Carnarvon and A. C. Mace, Howard Carter headed the expedition, and it was he who made the actual find. He had studied archaeological surveying under Petrie. Later he had become inspector-in-chief under the Egyptian Antiquities Department and had uncovered a number of royal tombs. This however was his most important excavation. The excitement attendant on it is described in his own words.

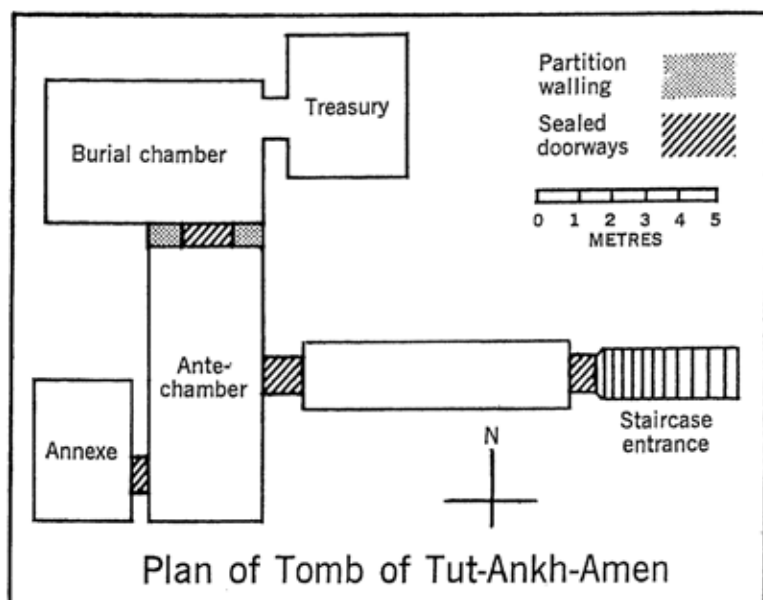
THE TOMB OF TUT-ANKH-AMEN

HOWARD CARTER AND A. C. MACE

THIS WAS TO BE our final season in The Valley. Six full seasons we had excavated there, and season after season had drawn a blank; we had worked for months at a stretch and found nothing, and only an excavator knows how desperately depressing that can be; we had almost made up our minds that we were beaten, and were preparing to leave The Valley and try our luck elsewhere; and then—hardly had we set hoe to ground in our last despairing effort than we made a discovery that far exceeded our wildest dreams. Surely, never before in the whole history of excavation has a full digging season been compressed within the space of five days.

Let me try and tell the story of it all. It will not be easy, for the dramatic suddenness of the initial discovery left me in a dazed condition, and the months that have followed have been so crowded with incident that I have hardly had time to think. Setting it down on paper will perhaps give me a chance to realize what has happened and all that it means.

I arrived in Luxor on 28th October, and by 1st November I had enrolled my workmen and was ready to begin. Our former excavations had stopped short at the north-east corner of the tomb of Rameses VI, and from this point I started trenching southwards. It will be remembered that in this area there were a number of roughly constructed workmen's huts, used probably by the laborers in the tomb of Rameses. These huts, built about three feet above bed-rock, covered the whole area in front of the Ramesside tomb, and continued in a southerly direction to join up with a similar group of huts on the opposite side of The Valley, discovered



IV-2.

by Davis in connection with his work on the Akh-en-Aten cache. By the evening of 3rd November we had laid bare a sufficient number of these huts for experimental purposes, so, after we had planned and noted them, they were removed, and we were ready to clear away the three feet of soil that lay beneath them.

Hardly had I arrived on the work next morning (4th November) than the unusual silence, due to the stoppage of the work, made me realize that something out of the ordinary had happened, and I was greeted by the announcement that a steep cut in the rock had been discovered underneath the very first hut to be attacked. This seemed too good to be true, but a short amount of extra clearing revealed the fact that we were actually in the entrance of a steep cut in the rock, some thirteen feet below the entrance to the tomb of Rameses VI, and a similar depth from the present bed level of The Valley. The manner of cutting was

that of the sunken stairway entrance so common in The Valley, and I almost dared to hope that we had found our tomb at last. Work continued feverishly throughout the whole of that day and the morning of the next, but it was not until the afternoon of 5th November that we succeeded in clearing away the masses of rubbish that overlay the cut, and were able to demarcate the upper edges of the stairway on all its four sides.

It was clear by now, beyond any question, that we actually had before us the entrance to a tomb, but doubts, born of previous disappointments, persisted in creeping in. There was always the horrible possibility, suggested by our experience in the Thotmes III Valley, that the tomb was an unfinished one, never completed and never used; if it had been finished there was the depressing probability that it had been completely plundered in ancient times. On the other hand, there was just the chance of an untouched or only partially plundered tomb, and it was with ill-suppressed excitement that I watched the descending steps of the staircase, as one by one they came to light. The cutting was excavated in the side of a small hillock, and, as the work progressed, its western edge receded under the slope of the rock until it was, first partially, and then completely, roofed in, and became a passage, ten feet high by six feet wide. Work progressed more rapidly now; step succeeded step, and at the level of the twelfth, towards sunset, there was disclosed the upper part of a doorway, blocked, plastered, and sealed.

A sealed doorway—it was actually true, then! Our years of patient labor were to be rewarded after all, and I think my first feeling was one of congratulation that my faith in The Valley had not been unjustified. With excitement growing to fever-heat I searched the seal impressions on the door for evidence of the identity of the owner, but could find no name: the only decipherable ones were those of the well-known royal necropolis seal, the jackal and nine captives. Two facts, however, were clear: first, the employment of this royal seal was certain evidence that the tomb had been constructed for a person of very high standing; and second,

that the sealed door was entirely screened from above by workmen's huts of the Twentieth Dynasty was sufficiently clear proof that at least from that date it had never been entered. With that for the moment I had to be content.

While examining the seals I noticed, at the top of the doorway, where some of the plaster had fallen away, a heavy wooden lintel. Under this, to assure myself of the method by which the doorway had been blocked, I made a small peephole, just large enough to insert an electric torch, and discovered that the passage beyond the door was filled completely from floor to ceiling with stones and rubble—additional proof, this, of the care with which the tomb had been protected.

It was a thrilling moment for an excavator. Alone, save for my native workmen, I found myself, after years of comparatively unproductive labor, on the threshold of what might prove to be a magnificent discovery. Anything, literally anything, might lie beyond that passage, and it needed all my self-control to keep from breaking down the doorway, and investigating then and there.

One thing puzzled me, and that was the smallness of the opening in comparison with the ordinary Valley tombs. The design was certainly of the Eighteenth Dynasty. Could it be the tomb of a noble buried here by royal consent? Was it a royal cache, a hiding-place to which a mummy and its equipment had been removed for safety? Or was it actually the tomb of the king for whom I had spent so many years in search?

Once more I examined the seal impression for a clue, but on the part of the door so far laid bare only those of the royal necropolis seal already mentioned were clear enough to read. Had I but known that a few inches lower down there was a perfectly clear and distinct impression of the seal of Tut-ankh-Amen, the King I most desired to find, I would have cleared on, had a much better night's rest in consequence, and saved myself nearly three weeks of uncertainty. It was late, however, and darkness was already upon us. With some reluctance I reclosed the small hole that I made, filled in our excavation for protection during

the night, selected the most trustworthy of my workmen—themselves almost as excited as I was—to watch all night above the tomb, and so home by moonlight, riding down The Valley.

Naturally my wish was to go straight ahead with our clearing to find the full extent of the discovery, but Lord Carnarvon was in England, and in fairness to him I had to delay matters until he could come. Accordingly, on the morning of 6th November, I sent him the following cable: "At last have made wonderful discovery in Valley; a magnificent tomb with seals intact; re-covered same for your arrival; congratulations."

My next task was to secure the doorway against interference until such time as it could finally be reopened. This we did by filling our excavation up again to surface level, and rolling on top of it the large flint boulders of which the workmen's huts had been composed. By the evening of the same day, exactly forty-eight hours after we had discovered the first step of the staircase, this was accomplished. The tomb had vanished. So far as the appearance of the ground was concerned there never had been any tomb, and I found it hard to persuade myself at times that the whole episode had not been a dream.

I was soon to be reassured on this point. News travels fast in Egypt, and within two days of the discovery congratulations, inquiries, and offers of help descended upon me in a steady stream from all directions. It became clear, even at this early stage, that I was in for a job that could not be tackled single-handed, so I wired to Callender, who had helped me on various previous occasions, asking him if possible to join me without delay, and to my relief he arrived on the very next day. On the 8th I had received two messages from Lord Carnarvon in answer to my cable, the first of which read: "Possibly come soon," and the second, received a little later: "Propose arrive Alexandria 20th."

We had thus nearly a fortnight's grace, and we devoted it to making preparations of various kinds, so that when the time of reopening came, we should be able, with the least possible delay, to handle any situation that might arise. On

the night of the 18th I went to Cairo for three days, to meet Lord Carnarvon and make a number of necessary purchases, returning to Luxor on the 21st. On the 23rd Lord Carnarvon arrived in Luxor with his daughter, Lady Evelyn Herbert, his devoted companion in all his Egyptian work, and everything was in hand for the beginning of the second chapter of the discovery of the tomb. Callender had been busy all day clearing away the upper layer of rubbish, so that by morning we should be able to get into the staircase without any delay.

By the afternoon of the 24th the whole staircase was clear, sixteen steps in all, and we were able to make a proper examination of the sealed doorway. On the lower part the seal impressions were much clearer, and we were able without any difficulty to make out on several of them the name of Tut-ankh-Amen. This added enormously to the interest of the discovery. If we had found, as seemed almost certain, the tomb of that shadowy monarch, whose tenure of the throne coincided with one of the most interesting periods in the whole of Egyptian history, we should indeed have reason to congratulate ourselves.

With heightened interest, if that were possible, we renewed our investigation of the doorway. Here for the first time a disquieting element made its appearance. Now that the whole door was exposed to light it was possible to discern a fact that had hitherto escaped notice—that there had been two successive openings and reclosings of a part of its surface: furthermore, that the sealing originally discovered, the jackal and nine captives, had been applied to the re-closed portions, whereas the sealings of Tut-ankh-Amen covered the untouched part of the doorway, and were therefore those with which the tomb had been originally secured. The tomb then was not absolutely intact, as we had hoped. Plunderers had entered it, and entered it more than once—from the evidence of the huts above, plunderers of a date not later than the reign of Rameses VI—but that they had not rifled it completely was evident from the fact that it had been re-sealed.

Then came another puzzle. In the lower strata of rubbish

that filled the staircase we found masses of broken potsherds and boxes, the latter bearing the names of Akh-en-Aten, Smenkh-ka-Re and Tut-ankh-Amen, and, what was much more upsetting, a scarab of Thotmes III and a fragment with the name of Amen-hetep III. Why this mixture of names? The balance of evidence so far would seem to indicate a cache rather than a tomb, and at this stage in the proceedings we inclined more and more to the opinion that we were about to find a miscellaneous collection of objects of the Eighteenth Dynasty kings, brought from Tell el Amarna by Tut-ankh-Amen and deposited here for safety.

So matters stood on the evening of the 24th. On the following day the sealed doorway was to be removed, so Callender set carpenters to work making a heavy wooden grille to be set up in its place. Mr. Engelbach, Chief Inspector of the Antiquities Department, paid us a visit during the afternoon, and witnessed part of the final clearing of rubbish from the doorway.

On the morning of the 25th the seal impressions on the doorway were carefully noted and photographed, and then we removed the actual blocking of the door, consisting of rough stones carefully built from floor to lintel, and heavily plastered on their outer faces to take the seal impressions.

This disclosed the beginning of a descending passage (not a staircase), the same width as the entrance stairway, and nearly seven feet high. As I had already discovered from my hole in the doorway, it was filled completely with stone and rubble, probably the chip from its own excavation. This filling, like the doorway, showed distinct signs of more than one opening and reclosing of the tomb, the untouched part consisting of clean white chip, mingled with dust, whereas the disturbed part was composed mainly of dark flint. It was clear that an irregular tunnel had been cut through the original filling at the upper corner on the left side, a tunnel corresponding in position with that of the hole in the doorway.

As we cleared the passage we found, mixed with the rubble of the lower levels, broken potsherds, jar sealings, alabaster jars, whole and broken, vases of painted pottery,

numerous fragments of smaller articles, and water-skins, these last having obviously been used to bring up the water needed for the plastering of the doorways. These were clear evidence of plundering, and we eyed them askance. By night we had cleared a considerable distance down the passage, but as yet saw no sign of a second doorway or of a chamber.

The day following (26th November) was the day of days, the most wonderful that I have ever lived through, and certainly one whose like I can never hope to see again. Throughout the morning the work of clearing continued, slowly perforce, on account of the delicate objects that were mixed with the filling. Then, in the middle of the afternoon, thirty feet down from the outer door, we came upon a second sealed doorway, almost an exact replica of the first. The seal impressions in this case were less distinct, but still recognizable as those of Tut-ankh-Amen and of the royal necropolis. Here again the signs of opening and reclosing were clearly marked upon the plaster. We were firmly convinced by this time that it was a cache that we were about to open, and not a tomb. The arrangement of stairway, entrance passage, and doors reminded us very forcibly of the cache of Akhen-Aten and Tyl material found in the very near vicinity of the present excavation by Davis, and the fact that Tut-ankh-Amen's seals occurred there likewise seemed almost certain proof that we were right in our conjecture. We were soon to know. There lay the sealed doorway, and behind it was the answer to the question.

Slowly, desperately slowly it seemed to us as we watched, the remains of passage debris that encumbered the lower part of the doorway were removed, until at last we had the whole door clear before us. The decisive moment had arrived. With trembling hands I made a tiny breach in the upper left-hand corner. Darkness and blank space, as far as an iron testing-rod could reach, showed that whatever lay beyond was empty and not filled like the passage we had just cleared. Candle tests were applied as a precaution against possible foul gases, and then, widening the hole a little, I inserted the candle and peered in, Lord

Carnarvon, Lady Evelyn, and Callender standing anxiously beside me to hear the verdict. At first I could see nothing, the hot air escaping from the chamber causing the candle flame to flicker, but presently, as my eyes grew accustomed to the light, details of the room within emerged slowly from the mist, strange animals, statues, and gold—everywhere the glint of gold. For the moment—an eternity it must have seemed to the others standing by—I was struck dumb with amazement, and when Lord Carnarvon, unable to stand the suspense any longer, inquired anxiously, "Can you see anything?" it was all I could do to get out the words, "Yes, wonderful things." Then widening the hole a little further, so that we both could see, we inserted an electric torch.

I suppose most excavators would confess to a feeling of awe—embarrassment almost—when they break into a chamber closed and sealed by pious hands so many centuries ago. For the moment, time as a factor in human life has lost its meaning. Three thousand, four thousand years maybe, have passed and gone since human feet last trod the floor on which you stand, and yet, as you note the signs of recent life around you—the half-filled bowl of mortar for the door, the blackened lamp, the finger-mark upon the freshly painted surface, the farewell garland dropped upon the threshold—you feel it might have been but yesterday. The very air you breathe, unchanged throughout the centuries, you share with those who laid the mummy to its rest. Time is annihilated by little intimate details such as these, and you feel an intruder.

That is perhaps the first and dominant sensation, but others follow thick and fast—the exhilaration of discovery, the fever of suspense, the almost overmastering impulse, born of curiosity, to break down seals and lift the lids of boxes, the thought—pure joy to the investigator—that you are about to add a page to history, or solve some problem of research, the strained expectancy—why not confess it?—of the treasure-seeker. Did these thoughts actually pass through our minds at the time, or have I imagined them since? I cannot tell. It was the discovery that my memory was blank, and not the mere desire for dramatic chapter-ending, that occasioned this digression.

Surely never before in the whole history of excavation had such an amazing sight been seen as the light of our torch revealed to us. Let [the reader] imagine how they appeared to us as we looked down upon them from our spy-hole in the blocked doorway, casting the beam of light from our torch—the first light that had pierced the darkness of the chamber for three thousand years—from one group of objects to another, in a vain attempt to interpret the treasure that lay before us. The effect was bewildering, overwhelming. I suppose we had never formulated exactly in our minds just what we had expected or hoped to see, but certainly we had never dreamed of anything like this, a roomful—a whole museumful it seemed—of objects, some familiar, but some the like of which we had never seen, piled one upon another in seemingly endless profusion.

Gradually the scene grew clearer, and we could pick out individual objects. First, right opposite to us—we had been conscious of them all the while, but refused to believe in them—were three gilt couches, their sides carved in the form of monstrous animals, curiously attenuated in body, as they had to be to serve their purpose, but with heads of startling realism. Uncanny beasts enough to look upon at any time: seen as we saw them, their brilliant gilded surfaces picked out of the darkness by our electric torch, as though by limelight, their heads throwing grotesque distorted shadows on the wall behind them, they were almost terrifying. Next, on the right, two statues caught and held our attention; two life-sized figures of a king in black, facing each other like sentinels, gold kilted, gold sandalled, armed with mace and staff, the protective sacred cobra upon their foreheads.

These were the dominant objects that caught the eye at first. Between them, around them, piled on top of them, there were countless others—exquisitely painted and inlaid caskets; alabaster vases, some beautifully carved in open-work designs; strange black shrines, from the open door of one a great gilt snake peeping out; bouquets of flowers or leaves; beds; chairs beautifully carved; a golden inlaid throne; a heap of curious white oviform boxes; staves of all shapes and designs; beneath our eyes, on the very threshold of the

chamber, a beautiful lotiform cup of translucent alabaster; on the left a confused pile of overturned chariots, glistening with gold and inlay; and peeping from behind them another portrait of the king.

Such were some of the objects that lay before us. Whether we noted them all at the time I cannot say for certain, as our minds were in much too excited and confused a state to register accurately. Presently it dawned upon our bewildered brains that in all this medley of objects before us there was no coffin or trace of a mummy, and the much-debated question of tomb or cache began to intrigue us afresh. With this question in view we re-examined the scene before us, and noticed for the first time that between the two black sentinel statues on the right there was another sealed doorway. The explanation gradually dawned upon us. We were but on the threshold of our discovery. What we saw was merely an antechamber. Behind the guarded door there were to be other chambers, possibly a succession of them, and in one of them, beyond any shadow of doubt, in all his magnificent panoply of death, we should find the Pharaoh lying.

We had seen enough, and our brains began to reel at the thought of the task in front of us. We reclosed the door, locked the wooden grille that had been placed upon the first doorway, left our native staff on guard, mounted our donkeys and rode home down The Valley, strangely silent and subdued.

It was curious, as we talked things over in the evening, to find how conflicting our ideas were as to what we had seen. Each of us had noted something that the others had not, and it amazed us next day to discover how many and how obvious were the things that we had missed. Naturally, it was the sealed door between the statues that intrigued us most, and we debated far into the night the possibilities of what might lie behind it. A single chamber with the king's sarcophagus? That was the least we might expect. But why one chamber only? Why not a succession of passages and chambers, leading, in true Valley style, to an innermost shrine of all, the burial chamber? It might be so, and yet in

plan the tomb was quite unlike the others. Visions of chamber after chamber, each crowded with objects like the one we had seen, passed through our minds and left us gasping for breath. Then came the thought of the plunderers again. Had they succeeded in penetrating this third doorway—seen from a distance it looked absolutely untouched—and, if so, what were our chances of finding the king's mummy intact? I think we slept but little, all of us, that night.

Next morning (27th November) we were early on the field, for there was much to be done. It was essential, before proceeding further with our examination, that we should have some more adequate means of illumination, so Callender began laying wires to connect us up with the main lighting system of The Valley. While this was in preparation we made careful notes of the seal-impressions upon the inner doorway and then removed its entire blocking. By noon everything was ready and Lord Carnarvon, Lady Evelyn, Callender and I entered the tomb and made a careful inspection of the first chamber (afterwards called the Ante-chamber). The evening before, I had written to Mr. Engelbach, the Chief Inspector of the Antiquities Department, advising him of the progress of clearing, and asking him to come over and make an official inspection. Unfortunately he was at the moment in Kena on official business, so the local Antiquities Inspector, Ibrahim Effendi, came in his stead.

By the aid of our powerful electric lamps many things that had been obscure to us on the previous day became clear, and we were able to make a more accurate estimate of the extent of our discovery. Our first objective was naturally the sealed door between the statues, and here a disappointment awaited us. Seen from a distance it presented all the appearance of an absolutely intact blocking, but close examination revealed the fact that a small breach had been made near the bottom, just wide enough to admit a boy or a slightly built man, and that the hole made had subsequently been filled up and re-sealed. We were not then to be the first. Here, too, the thieves had forestalled us, and

it only remained to be seen how much damage they had had the opportunity or the time to effect.

Our natural impulse was to break down the door, and get to the bottom of the matter at once, but to do so would have entailed serious risk of damage to many of the objects in the Antechamber, a risk which we were by no means prepared to face. Nor could we move the objects in question out of the way, for it was imperative that a plan and complete photographic record should be made before anything was touched, and this was a task involving a considerable amount of time, even if we had had sufficient plant available—which we had not—to carry it through immediately. Reluctantly we decided to abandon the opening of this inner sealed door until we had cleared the Antechamber of all its contents. By doing this we should not only ensure the complete scientific record of the outer chamber which it was our duty to make, but should have a clear field for the removal of the door-blocking, a ticklish operation at best.

The above selection is taken from the first volume of The Tomb of Tut-ankh-Amen by Howard Carter and A. C. Mace, which was published in 1923. The selection below is taken from the second volume, written by Howard Carter and published in 1927.—Eds.

WE NOW turn to the contents of the Burial Chamber. When we entered it we found, lying beside a small hole made by the robbers through the masonry of the door which had been subsequently reclosed by the ancient Egyptian officials, portions of two necklaces dropped by a thief. Around the four sides of the great shrine which occupied almost the entire area of the chamber, were divers objects and emblems. A brief examination of the shrine and the objects surrounding it showed that little damage had been done in this chamber by the predatory intruders, except that the folding doors of the great shrine had been opened for the purpose of peering in, and that the sealings of the wine-jars, placed between the shrine and the walls of the chamber, had been broken. But although the Burial Chamber

had suffered little from the activities of the thieves, many objects had been stolen from the small Store-room beyond. Standing in the south-east corner was a lamp resting upon a trellis-work pedestal, carved out of pure translucent calcite. This lamp of chalice form, flanked with fretwork-ornament symbolizing "Unity" and "Eternity," ranks among the most interesting objects we had so far discovered.

Beneath this unique lamp, wrapped in reeds, was a silver trumpet, which, though tarnished with age, were it blown would still fill the Valley with a resounding blast. Neatly engraved upon it is a whorl of calices and sepals, the prenomens and nomen of Tut-ankh-Amen, and representations of the gods Re, Amen and Ptah.

At the eastern end of the shrine were two massive folding doors, closed with ebony bolts shot into copper staples, their panels decorated with strange figures—headless demon guardians of the caverns of the Underworld. Before these doors stood an exquisite triple-lamp of floral-form, carved out of a single block of translucent calcite, in shape three lotiform cups, with stems and leaves springing from a single circular base.

Resting upon the ground, between the shrine and the north wall, were magic oars to ferry the king's barque across the waters of the Nether World.

When we drew back those ebony bolts of the great shrine, the doors swung back as if only closed yesterday, and revealed within yet another shrine, in type like the first, save for the blue inlay. It has similar bolted doors, but upon them was a seal intact, bearing the name of Tut-ankh-Amen and a recumbent jackal over Egypt's nine foes. Above the shrine drooped a linen pall. This bespangled linen pall brown with age, still hanging on its curious wooden supports, was rent by the weight of the gilt bronze marguerites sewn to its fabric. The shrine, dazzling from the brilliance of its gold, was decorated with scenes wrought, in beautiful incised-relief, from the book *Of that which is in the Underworld*—that guide to the Hereafter, which points out to the deceased the road he should take, and explains to him the various malefic powers he must meet during his subterranean

journey. According to this book two routes led him to the land of the blessed, one by water, the other by land, and it further shows that there were by-ways leading to seething rivers of fire by which he must not travel.

The pall made us realize that we were in the presence of a dead king of past ages. The unbroken seal upon the closed doors of the second shrine gave us the data we were seeking. Had the tomb-robbers, who had entered the Ante-chamber, its Annexe, the Burial Chamber and its Store-room, by any chance reached the king? The shrine was intact, its doors bore their original seal uninjured, indicating that the robbers had not reached him. Henceforth, we knew that, within the shrine, we should be treading where no one had entered, and that we should be dealing with material untouched and unharmed since the boy king was laid to rest nearly three thousand three hundred years ago. We had at last found what we never dreamed of attaining—an absolute insight into the funerary customs followed in the burial of an ancient Pharaoh. Ten years of toil had not been wasted and our hopes were to be realized with a result far exceeding our expectations.

On either side, between the two shrines, stacked in the right and left corners, were numerous ceremonial maces, sticks, staves and bows, some carefully wrapped in linen. Perhaps the choicest of them all are the gold and silver sticks, made of two thin tubular shafts supporting tiny statuettes of the youthful monarch, cast and chased in their respective metals. It would be almost impossible to describe the refinement of these graceful figures of sedate but youthful bearing. Chubby little figures are here represented very subtly modelled. Their crowns and skirts are chased. The gesture of their hands is of youthful simplicity. Both are exactly alike save for their metals. They are clearly the production of a master hand.

The doors of this second shrine were bolted top and bottom, carefully fastened with cord tied to metal staples, and sealed. The clay seal upon this cord was intact. It bore impressions of two distinct seals, one bearing Tut-ankh-Amen's prenomen, Kheperu-neb-Re, surmounting "A Jackal over

nine Foes," the second bearing the device of the Royal Necropolis Seal, "The Jackal over nine Foes," without other distinguishing marks or royal insignia. Here was a great piece of luck, as manifestly behind those two seals we should be dealing with material unharmed since the burial of the king. It was with great care that the cords were severed and those folding doors opened, which, when swung back, revealed yet a third shrine, also sealed and intact—the seal impressions upon this third shrine being identical to those on the second.

At this point of our undertaking we realized that it would now be possible, by opening those further doors, to solve the secret the shrines had so jealously guarded throughout the centuries. I therefore decided before any other procedure to make the experiment. It was an exciting moment in our arduous task that cannot easily be forgotten. We were to witness a spectacle such as no other man in our times has been privileged to see. With suppressed excitement I carefully cut the cord, removed the precious seal, drew back the bolts, and opened the doors, when a fourth shrine was revealed, similar in design and even more brilliant in workmanship than the last. The decisive moment was at hand! An indescribable moment for an archaeologist! What was beneath and what did that fourth shrine contain? With intense excitement I drew back the bolts of the last and unsealed doors; they slowly swung open, and there, filling the entire area within, effectually barring any further progress, stood an immense yellow quartzite sarcophagus, intact, with the lid still firmly fixed in its place, just as the pious hands had left it. It was certainly a thrilling moment, as we gazed upon the spectacle enhanced by the striking contrast—the glitter of metal—of the golden shrines shielding it. Especially striking were the outstretched hand and wing of a goddess sculptured on the end of the sarcophagus, as if to ward off an intruder.

We were now able to profit by the experience we had acquired and had a much clearer conception of the operation immediately before us: the three remaining shrines would have to be taken to pieces and removed before the problem

of the sarcophagus could be contemplated. And thus it was that we labored for another month, first dismantling the second shrine, then the third, until the fourth (innermost) shrine, the last and smallest, was completely freed.

It was on February 3 that we first had a clear view of this sepulchral masterpiece, ranking as it does among the finest specimens of its kind the world possesses.

With the profound silence that reigned the emotion deepened, the past and present seemed to meet—time to stand and wait, and one asked oneself, was it not yesterday that, with pomp and ceremony, they had laid the young king in that casket?—so fresh, so seemingly recent were those touching claims on our pity that, the more we gazed on them, the more the illusion gathered strength. It made one wish that his journey through those grim tunnels of the Underworld might be unperturbed until he attained complete felicity!—as those four goddesses, sculptured in high relief at the corners, seemed to plead as they shielded their charge. For in them had we not a perfect Egyptian elegy in stone?

The lid, made of rose granite tinted to match the quartzite sarcophagus, was cracked in the middle and firmly embedded in the rebated top edges. The cracks had been carefully cemented and painted over to match the rest, in such a way as to leave no doubt that it had not been tampered with. Undoubtedly the original intention must have been to provide a quartzite lid in keeping with the sarcophagus itself; it would therefore appear that some accident had occurred. It may be that the intended lid was not ready in time for the burial of the king, and that this crudely made granite slab was substituted in its place.

The crack greatly complicated our final effort, the raising of this lid, for had it been intact the operation would have been far easier. The difficulty, however, was overcome by passing angle irons along and closely fitting the sides of the slab, which permitted it to be raised by differential pulleys as one piece.

Many strange scenes must have happened in the Valley of the Tombs of the Kings since it became the royal burial

ground of the Theban New Empire, but one may be pardoned for thinking that the present scene was not the least interesting or dramatic. For ourselves it was the one supreme and culminating moment—a moment looked forward to ever since it became evident that the chambers discovered, in November, 1922, must be the tomb of Tut-anekh-Amen, and not a cache of his furniture as had been claimed. None of us but felt the solemnity of the occasion, none of us but was affected by the prospect of what we were about to see—the burial custom of a king of ancient Egypt of thirty-three centuries ago. How would the king be found? Such were the anticipatory speculations running in our minds during the silence maintained.

The tackle for raising the lid was in position. I gave the word. Amid intense silence the huge slab, broken in two, weighing over a ton and a quarter, rose from its bed. The light shone into the sarcophagus. A sight met our eyes that at first puzzled us. It was a little disappointing. The contents were completely covered by fine linen shrouds. The lid being suspended in mid-air, we rolled back those covering shrouds, one by one, and as the last was removed a gasp of wonderment escaped our lips, so gorgeous was the sight that met our eyes: a golden effigy of the young boy king, of most magnificent workmanship, filled the whole of the interior of the sarcophagus. This was the lid of a wonderful anthropoid coffin, some 7 feet in length, resting upon a low bier in the form of a lion, and no doubt the outermost coffin of a series of coffins, nested one within the other, enclosing the mortal remains of the king. Enclasping the body of this magnificent monument are two winged goddesses, Isis and Neith, wrought in rich gold-work upon gesso, as brilliant as the day the coffin was made. To it an additional charm was added by the fact that, while this decoration was rendered in fine low bas-relief, the head and hands of the king were in the round, in massive gold of the finest sculpture, surpassing anything we could have imagined. The hands, crossed over the breast, held the royal emblems—the Crook and the Flail—encrusted with deep blue faience. The face and features were wonderfully wrought in sheet-gold. The

eyes were of aragonite and obsidian, the eyebrows and eyelids inlaid with lapis lazuli glass. There was a touch of realism, for while the rest of this anthropoid coffin, covered with feathered ornament, was of brilliant gold, that of the bare face and hands seemed different, the gold of the flesh being of different alloy, thus conveying an impression of the greyiness of death. Upon the forehead of this recumbent figure of the young boy king were two emblems delicately worked in brilliant inlay—the Cobra and the Vulture—symbols of Upper and Lower Egypt, but perhaps the most touching by its human simplicity was the tiny wreath of flowers around these symbols, as it pleased us to think, the last farewell offering of the widowed girl queen to her husband, the youthful representative of the "Two Kingdoms."

Among all that regal splendor, that royal magnificence—everywhere the glint of gold—there was nothing so beautiful as those few withered flowers, still retaining their tinge of color. They told us what a short period three thousand three hundred years really was—but Yesterday and the Morrow. In fact, that little touch of nature made that ancient and our modern civilization kin.

Thus from stairway, steep descending passage, Ante-chamber and Burial Chamber, from those golden shrines and from that noble sarcophagus, our eyes were now turned to its contents—a gold encased coffin, in form a recumbent figure of the young king, symbolizing Osiris or, it would seem by its fearless gaze, man's ancient trust in immortality. Many and disturbing were our emotions awakened by that Osiride form. Most of them voiceless. But, in that silence, to listen—you could almost hear the ghostly footsteps of the departing mourners.

Our lights were lowered, once more we mounted those sixteen steps, once more we beheld the blue vault of the heavens, where the Sun is Lord, but our inner thoughts still lingered over the splendor of that vanished Pharaoh, with his last appeal upon his coffin written upon our minds: "Oh Mother Nût! spread thy wings over me as the Imperishable Stars."

c. Palestine and Mesopotamia

In the book of Joshua it is related that the Israelites attacked Jericho, that the walls fell down flat, and that the city was utterly destroyed. In the nineteenth and twentieth centuries, archaeologists investigating the story explored the ancient site, a tell or mound about a mile from the present town. They found no trace of the walls and did not suspect that a more interesting find lay far beneath their spades. From 1930 to 1936 the Englishman John Garstang dug deeper. He was able to date the Biblical siege around 1400–1250 B.C., and also uncovered an earlier Neolithic culture with a settled community life; but World War II prevented further investigation. Beginning in 1952, a joint Anglo-American expedition under the direction of Dr. Kathleen Kenyon dug still deeper and discovered one of the oldest towns of which we have any evidence—an urban site which was in existence when the last Ice Age had barely released its grip on Scandinavia and when the Star Carr people were still hunting their food with Mesolithic weapons. Archaeologists have long believed that the change from a nomadic life to a settled pastoral and agricultural economy took place in the near and middle East. The find at Jericho supports the theory. If this early town was not strictly speaking a “civilization,” it was but a step removed.

Paul Johnstone, author of ‘The Walls of Jericho’ and producer of a successful British television series entitled “Buried Treasure,” went to Jericho to film a show. His article reveals a sensitive awareness of his surroundings and gives a vivid impression of the life of archaeologists in the field.

THE WALLS OF JERICO

PAUL JOHNSTONE

NO ONE KNOWS how man began to speak. Even the most primitive known modern people, the Tasmanian aborigines, had a complicated grammar and large vocabulary. It is a far cry from that to the varying emotions expressed by the chattering of monkeys, or the different notes by which a cock calls attention to an enemy or a mouthful of food. How the gap was bridged we can only guess.

Both gestures and onomatopoeia, that is, calling a dog a bow-wow in imitation of the sound he makes, have been ruled out, because neither explain how man became able to express thought, or ideas, by a sound. You can express a situation like hunger or danger by a gesture, but not an idea or an object. Language developed, how or when remains a mystery, to control behavior, and pass on ideas and concepts.

The first use of fire has been imagined often enough by writers from Lucretius onwards, the timely flash of lightning, the tamed forest fire, the cast-aside chunk of meat rescued from the ashes, but again no one knows for certain when this happened. All that can be said is that one moment there is no trace of it and the next there is. Pekin man used fire. Whether he could make it is uncertain. Only the Andamanese, of modern primitive people, cannot light it in any way and so perpetually treasure a naturally kindled flame.

What is known is how and when man became a settled being. From being a wanderer, living by catching or collecting what he could, dependent on the fluctuating bounty of nature, he became a farmer and a stock-breeder. This was the most significant moment in man's history. It made civilization possible. In technical terms this is the change from the Palaeolithic, or Old Stone Age, and Mesolithic, or Middle

Stone Age, to the Neolithic, or New Stone Age. From being a savage, man is promoted to being a barbarian.

In the savage, food-gathering stage, man hardly differed from a pack of wolves in the skill on which his life depended, and he was as much a parasite on nature as a fungus on an ivy plant. Only control of fire, which gave him a wider choice of food, and tools, which increased his adaptability, reduced very slightly his utter dependence on what nature provided ready to eat.

It was normal in these circumstances to face the constant threat of starvation. All who could had to hunt or collect food. All that was found was eaten. No one could live mainly by making tools, because there was no guarantee that the others would find enough food above their own needs to barter for the specialist's handiwork.

There were, of course, times when this was not so. The buffalo hunters of America, before Columbus' arrival, could put aside a surplus of pemmican for lean months or barter. The Eskimos did the same with dried fish. The cave art of the Old Stone Age was made possible by a local abundance of game. The mammoth-hunters of the Ukraine probably had the same good fortune at the same time.

But it was the Neolithic revolution that made feasible a reasonably dependable surplus of food, and its resulting possibilities. It has been calculated that nine city families can be fed by one Middle Western American farming family. Neolithic man obviously did not do as well as that. Often, if he was unsuccessful at hunting too, he must have gone very hungry by the tenth or eleventh month after harvest. But at least he could now remain in one place, share ideas between larger groups, and support a few specialists.

The first signs of this vital change are therefore particularly fascinating.

One is found amongst the Natufians, the cave-dwellers of Mount Carmel in Palestine. It is a grooved bone sickle, set with flint teeth which have the peculiar gloss that comes from constant brushing against plant stalks. This is one of the earliest known agricultural implements, and was used about 5,500 B.C. to cut wild barley and emmer, a rough

form of wheat. Whether some intelligent Natufian woman realized what would happen if a handful of seeds from these were dropped in the ground is not known, but obviously it was only a step to agriculture proper.

For one of the earliest agricultural settlements, where we know this actually happened, you must go to Jarmo, east of the Tigris in the foothills of north-eastern Iraq. Here, peasant farmers living in simple clay houses with floors of reeds cultivated the most primitive type of wheat and barley at a date given by a carbon 14 test as between 5,270 and 4,630 B.C. They used sickles and weighted digging sticks in the fields and saddle querns, hollow stones with a movable top, to grind the grain. Their women, no longer limited to possessions which they could carry on them, made equally important changes inside the home.

Clay-lined pits in their floors which had been hardened by fire give a clue to the possible origin of the pottery that appears later, and impressions in mud tell of the use of the earliest known plain-weave mats. In the Egyptian sites of Fayum and Badari, only a little later than Jarmo, these mats are accompanied by linen, the earliest known example of weaving. [This] explains why I was so excited when I heard that all these sites had been surpassed by some excavations which seemed to show that the Neolithic revolution, the start of civilization, had in fact happened some two thousand years earlier than the previously accepted date. Here was a most important opportunity for "Buried Treasure."

The trouble was that these excavations were a long and expensive journey away for a camera team. They had been going on every season since 1951 at Jericho in the Hashemite kingdom of Jordan. However, the Director of the excavations, Dr. Kathleen Kenyon, was very willing to co-operate in a programme, Sir Mortimer Wheeler declared they were the most important excavations anywhere since the war, which coming from the President of the Society of Antiquaries was no light judgment, and "Buried Treasure" had now been running for two years with apparently unaltered popularity. I therefore decided to suggest Jericho as a programme subject. The BBC authorities approved and in

February 1956 I found myself in the Middle East for the first time, in a state of considerable excitement as Damascus, Jordan, Abana and Pharphar and Jerusalem changed before one's eyes from legend to reality.

We landed at Jerusalem airport, met Dr. Kenyon and Lady Wheeler, who was one of her assistants, and drove past the scarlet anemones that sprinkled the rocky hill-sides, the wild lupins and olive trees, down fifteen hairpin bends skilfully engineered by the Arab Legion in one half mile, to the valley of the Jordan. The mound that covers the remains of the twenty-two ancient cities of Jericho is less impressive than its surroundings. To the west, the Mount of Temptation, a smooth, barren brown, towers over the tell. To the north lies the refugee village where 20,000 refugees from the part of Palestine which is now Israel are housed in little flat-roofed mud huts. To the east the clouds chase soft purple, green, and grey patches across the valley of the Jordan. To the south, a leaden rim of the Dead Sea lies between the oasis which contains modern Jericho and the distant mountains.

But the brown, untidy tell, as they call these mounds made up of the layered remains of ancient towns, contains a remarkable core. At the bottom of a 50-foot trench, impressive in itself, stands a rough stone wall with a circular tower set into it, guarded by a 30-foot wide ditch cut into the bedrock. This belongs to the earliest known town in history. Piled above are many, many layers that yielded no pottery, and so apparently belong to that mouthful of a period, "the pre-pottery Neolithic." At Jarmo, there are far fewer comparable layers. It does not necessarily follow that Jericho is that much earlier, but a carbon 14 dating seems to confirm that the rough stone wall, the tower with its amazing stairway inside, and the ditch that alone must have been a mighty labor, move the known beginnings of civilization back possibly two thousand years.

There were many other exciting things at Jericho, the early Bronze Age walls of mud bricks made by the same methods as those we filmed in use in the refugee village, the great Middle Bronze Age wall and smooth-plastered slope

that further hampered its attackers, and the Bronze Age tombs whose contents were so well preserved that from the bodies lying amongst the profuse furnishings of still-surviving wood, mats, and food, the excavators were able to collect actual flesh, 3,500 years old, which I brought back for them to London for analysis and study of the blood groups at Westminster hospital.

We had other excitements too. Our filming visit coincided with the dismissal of Glubb Pasha. The day after this happened, the Palestinian refugees, who had been celebrating as though it were a great victory, started to break up the party which the excavators were giving the workmen on the dig. Their excuse was our filming of an Arabic charade in which there were some men dressed as women. We stopped the filming, but for an unpleasant quarter of an hour one began to get the feel of what mob violence might be like, as a band of two hundred or so stood in an undecided group just beyond the range of the lights of the house, occasionally hurling a stone in the direction of the excavation headquarters. Then they went home and left Dr. Kenyon and her helpers to their pre-pottery Neolithic and us to our filming.

This involved two problems and a disappointment. The disappointment was that hardly anything survived that could definitely be called Joshua's Jericho. Though the mound was still over 70 feet high, nearly all the buildings of the later occupations had collapsed and been washed away, as the rain dissolved their mud bricks. The two difficulties were that the sharp contrast between the heavy shadows of the deep trenches and the bright sunlight made filming difficult, and none of the excavations, apart from the tombs, were very exciting to look at.

However, an answer was all around, particularly in our ears. The life of the dig seemed to me much more Victorian than modern in its epic character. The constant strangeness of the sounds, the Arabic chatter, the singing of the basket boys, the monkey and camel cries, underlined to me Dr. Kenyon's achievement in running this enterprise.

The dig itself was large in physical size. After the sparse pickings of an English excavation, the finds were enormous-

ly prolific. Its impact on archaeology was likely to be far-reaching. English, Canadians, Americans, Danes, Dutch, and Germans were involved. There were four hundred Arab workmen to recruit, train and handle. The local situation had all sorts of complexities. The organization of food, accommodation, materials, and storage alone was a feat. And all this was run, and very happily too, by a woman.

It seemed, therefore, quite legitimate to me to concentrate as much on the circumstances of the dig as on the results. We filmed Fatmeh doing the washing and the vast grey tea-pot in the middle of the breakfast table as well as the plastered skulls, the astonishing portrait pieces of clay modelled into features, with shells as eyes, over actual skulls which the ancient Jerichoans buried under their houses. We recorded on tape Lady Wheeler playing an Arab drum after dinner, as well as the singing of the workmen as they cleared the burnished plaster floors with the rounded corners with which the late Stone Age inhabitants of the tell made housekeeping easier. The pay parade, as the pick and shovel men and the basket boys advanced one by one out of the darkness by Elisha's spring to add their thumb marks or signatures to the list on the brightly lit desk where the director and assistant sat, seemed to me almost as dramatic a subject for the camera as looking down a 15-foot shaft in the refugee village when the round stone at the bottom was hauled away to reveal yet another Bronze Age burial.

But amongst all this harsh but rich mixture of events which we were trying to translate onto film, I found myself constantly going back to that town wall, tower, and ditch at the bottom of the big trench. To see and know about this new evidence of the start of civilization before the rest of the world was very much an experience to hoard and enjoy.

Sir Mortimer Wheeler, who was with us part of the time, told me he thinks the domestication of animals may also have started at somewhere like Jericho. Animals, like humans, would have been attracted to an oasis, thus providing opportunities for their capture. The same conditions applied before that to the scavenging wild dogs who were attracted to the camps of Stone Age man and so became the first domesti-

cated beasts. Reindeer, too, were apparently first tamed through their eagerness for salty matter, particularly human urine. This craving comes from the lack of salt in melted snow, the only available water, and attracted them to human camps, where it was fairly easy to catch the young ones. Like sheep and goats, reindeer could wander with their nomadic owners.

To sum up what I learnt from Dr. Kenyon and Sir Mortimer, the Neolithic revolution saw in about 7,000 B.C. the start of agriculture and the breeding of domestic animals. This occurred in the "fertile crescent" stretching between Persia and Egypt. The resulting food surplus, increased population, and greater chances of social life and interchange of ideas in a settled state led to much progress. Pottery, spinning, weaving, and the polishing of stone tools were practised by part-time specialists. The progress of man had made a most significant step. By altering the face of the earth and developing special characteristics in animals and plants he had begun to alter the forces of nature.

The next great advance after that was brought about by intensification of what already went on rather than by any revolutionary change, such as from hunting to farming. Gordon Childe has called it "the Urban Revolution," the change from barbarism to civilization. This was based on a more intensive use of farming land. The plough, by harnessing animal power, increased the area one man could cultivate. That man could now support more people, including full-time specialists. These would live in groups because it was easier then to distribute their handiwork and store the food which the scattered farms sent in to support them. In this way formerly self-sufficient villages became cities, like Jericho, of people who lived not by what they grew or bred but by barter for their services or skills. Once it became possible to live in a non self-sufficient group it was as easy to barter for luxuries as for essentials, so trade increased.

The discovery of metal accentuated this. Copper and tin were not found near any of the great cities, and their finding, transport, and working involved long distances and careful organization.

It also involved a new development, war. As barbarism turned into civilization, war became a practical proposition, and Jericho had to have its walls. The first farmers, scraping a living from the soil with their primitive hoes, had no time for it. Cities made it possible. The pressure of expanding populations on the available land and trade rivalries provided one cause. The tempting richness, to poorer peoples outside, of the cities was another. Copper changed from a luxury to a necessity very quickly because it made so much more effective weapons than stone. Battle-axes are found more and more frequently as the Stone Age turns into the Bronze Age.

All this needed a quite different sort of organization from that of a farming village. Some records, for instance, had to be made of the goods brought in from the surrounding farms, so writing developed. The earliest known example is on some clay tablets from the temple of Inana at Erech, on which the Sumerian priests about 3,500 B.C. had scratched signs, thought to be numbers, opposite pictures of objects like animals, fishes, plants, and so on. Calendars, and astronomy and mathematics on which to base them, would obviously be essential too, and they developed in the same way. At Jericho, a stone was found carved with a doodle which some people thought might be an illustration of Pythagoras' theorem. Mathematics would be necessary for the planning of community projects like irrigation canals and granaries, which provided food for city populations. Babylonian school-boys had to solve problems about the area that could be flooded by the water in a cistern of given size, and there were formulas to calculate the work-quotas of the men digging the irrigation canals and the amount of barley needed to feed them. The experts who practised these new skills were the kings and priests. Thereby they added to their prestige as intermediaries with the incalculable deities, who regulated the weather, the harvest, good health, and the other imponderables of man's life. The more complicated life grew, the more urgent it was to have the unseen forces on one's side.

This change from village farming to a literate city exist-

ence was thought to have first occurred shortly after 3,500 B.C. in Mesopotamia, and then in the Nile and Indus valleys. The evidence at Jericho may now move this date back three thousand years, though there is no evidence that the culminating invention of writing occurred then. The same process also happened much later in the New World, in central America, and in Peru. These areas were all in nearly tropical lands where intensive farming could produce enough food from a small area to support quite a large population. The Tigris and Euphrates, Nile and Indus also enabled large quantities of bulky foodstuffs to be moved a considerable way to the various cities. From there expanding populations, the search for metals, and the need for new farming land gradually spread wheels, sails, money, measures, and the other ideas and influences of civilization across the world.

Halfway between Baghdad and the Persian Gulf lies a group of mounds which was once the site of Ur, the capital of a Sumerian kingdom whose First Dynasty is dated about 2900 B.C. It was first excavated in 1854 by J. E. Taylor, the British Consul at Basra, who discovered inscriptions revealing its name, that of the city identified in the Bible as the home of Abraham. Other excavations followed, but the startling possibilities of the site were not fully recognized. In 1922 a joint expedition of the British Museum and the University of Pennsylvania Museum began a more detailed exploration under the direction of Sir Leonard Woolley. The work continued for seven years and unearthed new evidence of a great flood, the graves of the kings of Ur, and the remains of a lost civilization of Mesopotamia which continued with varying fortunes for thousands of years. In 'Ur of the Chaldees' Woolley describes two of his most noteworthy finds. His article is taken from a book of the same name which has gone through numerous printings and is a classic in popular archaeological literature.

UR OF THE CHALDEES

SIR LEONARD WOOLLEY

THE HISTORY of Ur goes back far beyond the flood into those dim days when the Euphrates Valley, at least at its lower end, was still a great marsh through which the waters of the two rivers made their sluggish way to the sea. Gradually, as the streams brought down more and more silt from the north, the marsh land began to shrink, "the waters were gathered together into one place, and the dry land appeared," and from the uplands of Arabia or from the higher reaches of the middle Euphrates settlers drifted down to occupy such islands as gave a chance for men to live and cultivate the earth, that rich alluvial soil which as soon as it was free from the water would "bring forth grass, the herb yielding seed, and the fruit tree yielding fruit after this kind, whose seed is in itself."

One of these islands was Ur. At Ur a settlement must have endured for a very long time; and as the frail mud huts fell into decay and over the ruins of them new huts were built, only to collapse and be built over in their turn, the ground-level rose, just as it does in any modern mud-built village of the Near East, and what had been an island became a low hill. Generations passed, and the acropolis of Ur rose higher and higher into the air as the refuse of its houses was piled in the streets or flung out over its walls—and then came the Flood.

It has long been agreed that the story of the Flood as told in Genesis is based on the Sumerian legend, of which the oldest written versions that we possess go back more than two thousand years before Christ and are therefore some centuries older than Abraham, but many authorities have doubted whether either story had any basis in historical fact. That the Sumerians had no such doubt is clear, for, apart

from the legend, overlaid as it is with mythology and miracle, the annalists in their sober table of the reigns of kings made mention of it as an event which interrupted the course of history: they vouchsafe us no details about it—"then came the Flood, and after the Flood kingship again descended from heaven."

During the seasons 1927-8 and 1928-9 our work on the prehistoric graveyard had resulted in the excavation of a huge pit some 200 feet across and between 30 and 40 feet deep. Now, practically the whole of the soil which we had removed consisted of household rubbish—the grey ashes from hearth fires, black soot and half-burnt wood, grey mud bricks decomposed and returned to their original clay, burnt bricks broken or by the action of organic salts reduced to red and yellow dust, masses of potsherds, all in well-defined layers. It was into this rubbish that the royal and other graves had been dug, and the rubbish extended down below the graves.

There was only one explanation which would meet the case. The rubbish was of course older, probably much older, than the royal graves dug down into it, ancient as they were.

Rubbish mounds 40 feet high must represent a long period of time, a period certainly to be reckoned in centuries, and with the excavation of the lowest graves we were not yet at the bottom of the rubbish. In the early spring of 1929, in the hopes of getting some chronological evidence, we began sinking shafts below the level of the deepest graves. Almost at once discoveries were made which confirmed our previous views, if such confirmation were necessary: just below the floor of one of the royal tombs, in a layer of burnt wood ash, there were found numerous clay tablets inscribed with characters of a much more archaic type than those of the inscriptions in the graves. The discovery was made in the north-east end of the excavated area, where even the lowest rubbish would belong to a comparatively late period in the formation of the mound; but as on the evidence of the writing the tablets could safely be reckoned as older than the tombs by two or three hundred years, the chronology of this particular stratum was satisfactorily fixed, and of course the

farther we dug at the same level towards the south-west the older would be the material we should encounter.

The shafts went deeper, and suddenly the character of the soil changed. Instead of the stratified pottery and rubbish we were in perfectly clean clay, uniform throughout, the texture of which showed that it had been laid there by water. The workmen declared that we had come to the bottom of everything, to the river silt of which the original delta was formed, and at first, looking at the sides of the shaft, I was disposed to agree with them, but then I saw that we were too high up. It was difficult to believe that the island on which the first settlement was built stood up so much above what must have been the level of the marsh, and after working out the measurements I sent the men back to work to deepen the hole. The clean clay continued without change—the sole object found in it was a fragment of fossilised bone which must have been brought down with the clay from the upper reaches of the river—until it had attained a thickness of a little over 8 feet. Then, as suddenly as it had begun, it stopped, and we were once more in layers of rubbish full of stone implements, flint cores from which the implements had been flaked off, and pottery.

But here there was a remarkable change. Instead of the pottery that we had found above the clay and in the tombs there now appeared fragments of the hand-made painted ware which distinguishes the pre-Sumerian village of al 'Ubaid, while the numerous flint implements further differentiated this from the higher strata wherein flints were very rarely to be found. The great bed of clay marked, if it did not cause, a break in the continuity of history.

One object which lay with the flints and potsherds under the clay was of prime importance. It was a brick of burnt clay. But this brick was different from any we had ever seen. Certainly it belonged to a period of which we had had no experience hitherto, and in a curious way it gave the impression of being older than any brick we had seen; but what it did conclusively prove was that in this age of mixed culture Ur contained permanent buildings solidly constructed, the town of a civilised people.

We had long before this seen the meaning of our discovery. The bed of water-laid clay deposited against the sloping face of the mound, which extended from the town to the stream or canal at the north-east end, could only have been the result of a flood; no other agency could possibly account for it. Inundations are of normal occurrence in Lower Mesopotamia, but no ordinary rising of the rivers would leave behind it anything approaching the bulk of this clay bank: 8 feet of sediment imply a very great depth of water, and the flood which deposited it must have been of a magnitude unparalleled in local history. That it was so is further proved by the fact that the clay bank marks a definite break in the continuity of the local culture; a whole civilisation which existed before it is lacking above it and seems to have been submerged by the waters.

Taking into consideration all the facts, there could be no doubt that the flood of which we had thus found the only possible evidence was the Flood of Sumerian history and legend, the Flood on which is based the story of Noah.

So much for the facts. What then is to be built up on them? The discovery that there was a real deluge to which the Sumerian and the Hebrew stories of the Flood alike go back does not of course prove any single detail in either of those stories. This deluge was not universal, but a local disaster confined to the lower valley of the Tigris and Euphrates, affecting an area perhaps 400 miles long and 100 miles across; but for the inhabitants of the valley that was the whole world. And the devastation that it caused was immense. A flood great enough to throw up an eight-foot bank of clay must have been deep enough to drown every one of the mud-built villages scattered over the delta plain;¹ some of the cities, perched high on their mounds and protected by walls, might hold out, but the bulk of the inhabitants of the land must have perished. According to the Sumerian annals some of the cities did survive, and though Ur is not mentioned by them it certainly was one of those cities. But although a remnant was left, it was an enfeebled and a disheartened remnant. When the Flood waters subsided the

1. The Hebrew story puts the depth of the waters at 26 feet.

fertile delta was once more a virtually empty land inviting settlement by anyone strong enough to take possession of it. Answering the call, a fresh wave of immigrants took over; they mixed freely with the survivors of the old stock and adopted all those elements of their culture which were best suited to the conditions of life in the delta, while at the same time they brought with them from their home somewhere in the north new arts and new fashions—in particular they introduced the use of the wheel. Later, another stock was to come in and eventually acquire mastery of the land, this time perhaps seafarers from the Persian Gulf, if we may attach any weight to legends, and from the union of these three peoples was born that Sumerian race whose art and civilisation is one of the glories of the ancient world.

I have said that the discovery of the evidence of the Flood was a result of the excavation of the royal tombs. The greater part of three seasons' work has been devoted to the clearing of the great cemetery which lay outside the walls of the old town and occupied the rubbish heaps piled up between them and the water-channel, and the treasures which have been unearthed from the graves during that time have revolutionised our ideas of the early civilisation of the world.

The cemetery (there are really two cemeteries, one above the other, but I am speaking now only of the lower and older) consists of burials of two sorts, the graves of commoners and the tombs of kings. Because the latter have yielded the richest works of art one is inclined to think of them alone, but the graves of the common folk, as well as being a hundred-fold as many in number, have also produced very fine objects, and have afforded precious evidence for the dating of the cemetery.

Often the first sign that the workmen have of a grave as they dig down into the mixed soil of the cemetery is a paper-thin wavy line of white powder or else a few small holes set in a line and running vertically into the earth; either of these means the abandonment of pick and spade and the careful use of excavating knives. The holes are left by the decay of the wooden staves which strengthened the sides of a wooden

or wickerwork coffin, the wavy white line is the edge of the reed mat which lined the grave or in which the bodies of poorer folk were wrapped. It is an astonishing thing that in soil wherein so much that seems enduring decays entirely, a fragile thing like a piece of matting, though it lose all its substance and can be blown away with a breath, yet retains its appearance and its texture and can with care be exposed in such condition that a photograph of it looks like one of the real matting which perished 5,000 years ago.

The provision made for the dead seems clearly to prove a belief in a future life of some sort, but there is nothing found which expressly defines such belief; in no single grave has there been any figure of a god, any symbol or ornament that strikes one as being of a religious nature; the dead man took with him what he might require for a journey to or for a sojourn in another world, but what he thought about the world to which he was going nothing tells us. On the other hand, the material life of the people is illustrated to a wonderful degree by the contents of their graves.

At the very end of the season 1926-7, at the bottom of an earth shaft, amongst masses of copper weapons, there was found the famous gold dagger of Ur, a wonderful weapon whose blade was of gold, its hilt of lapis lazuli decorated with gold studs, and its sheath of gold beautifully worked with an openwork pattern derived from plaited grass; with it was another object scarcely less remarkable, a cone-shaped reticule of gold ornamented with a spiral pattern and containing a set of little toilet instruments, tweezers, lancet, and pencil, also of gold. Nothing like these things had ever before come from the soil of Mesopotamia; they revealed an art hitherto unsuspected and they gave promise of future discoveries outstripping all our hopes.

It was with high hopes that we resumed work in the following autumn and very soon we found a stone-built underground structure which had indeed been the tomb of a king, but a rubbish-filled tunnel led from near the surface to the broken roof, robbers had been there before us, and except for a few scattered fragments of a gold diadem and some decayed copper pots there was nothing left for us to find.

Soon after our disappointment with the plundered stone tomb, we found, in another part of the field, five bodies lying side by side in a shallow sloping trench; except for the copper daggers at their waists and one or two small clay cups they had none of the normal furniture of a grave, and the mere fact of there being a number thus together was unusual. Then, below them, a layer of matting was found, and tracing this along we came to another group of bodies, those of ten women carefully arranged in two rows; they wore head-dresses of gold, lapis lazuli, and carnelian, and elaborate bead necklaces, but they too possessed no regular tomb furnishings. At the end of the row lay the remains of a wonderful harp, the wood of it decayed but its decoration intact, making its reconstruction only a matter of care; across the ruins of the harp lay the bones of the gold-crowned harpist.

By this time we had found the earth sides of the pit in which the women's bodies lay and could see that the bodies of the five men were on the ramp which led down to it. Following the pit along, we came upon more bones which at first puzzled us by being other than human, but the meaning of them soon became clear. A little way inside the entrance to the pit stood a wooden sledge chariot decorated with red, white, and blue mosaic along the edges of the framework and with golden heads of lions having manes of lapis lazuli and shell on its side panels. In front of the chariot lay the crushed skeletons of two asses with the bodies of the grooms by their heads.

Close to the chariot were an inlaid gaming-board and a collection of tools and weapons, including a set of chisels and a saw made of gold, and then the wreckage of a large wooden chest adorned with a figured mosaic in lapis lazuli and shell which was found empty but had perhaps contained such perishable things as clothes. Behind this box were more offerings, masses of vessels in copper, silver, stone (including exquisite examples in volcanic glass, lapis lazuli, alabaster, and marble), and gold. The perplexing thing was that with all this wealth of objects we had found no body so far distinguished from the rest as to be that of the person to whom

all were dedicated; logically our discovery, however great, was incomplete.

The objects were removed and we started to clear away the remains of the wooden box, a chest some 6 feet long and 3 feet across, when under it we found burnt bricks. They were fallen, but at one end some were still in place and formed the ring-vault of a stone chamber. The first and natural supposition was that here we had the tomb to which all the offerings belonged, but further search proved that the chamber was plundered, the roof had not fallen from decay but had been broken through, and the wooden box had been placed over the hole as if deliberately to hide it. Then, digging round the outside of the chamber, we found just such another pit as that 6 feet above. At the foot of the ramp lay six soldiers, orderly in two ranks, with copper spears by their sides and copper helmets crushed flat on the broken skulls; just inside, having evidently been backed down the slope, were two wooden four-wheeled waggons each drawn by three oxen—one of the latter so well preserved that we were able to lift the skeleton entire; the grooms lay at the oxen's heads and the drivers in the bodies of the cars; of the cars themselves only the impression of the decayed wood remained in the soil, but so clear was this that a photograph showed the grain of the solid wooden wheel and the grey-white circle which had been the leather tyre.

Against the end wall of the stone chamber lay the bodies of nine women wearing the gala head-dress of lapis and carnelian beads; their heads were leaned against the masonry, their bodies extended on to the floor of the pit, and the whole space between them and the waggons was crowded with other dead, women and men, while the passage which led along the side of the chamber to its arched door was lined with soldiers carrying daggers, and with women.

Inside the tomb the robbers had left enough to show that it had contained bodies of several minor people as well as that of the chief person, whose name, if we can trust the inscription on a cylinder seal, was A-bar-gi.

The king's tomb-chamber lay at the far end of his open pit; continuing our search behind it we found a second stone

chamber built up against it either at the same time or, more probably, at a later period. This chamber, roofed like the king's with a vault of ring arches in burnt brick, was the tomb of the queen to whom belonged the upper pit with its ass chariot and other offerings: her name, Shub-ad, was given us by a fine cylinder seal of lapis lazuli.

At one end, on the remains of a wooden bier, lay the body of the queen, a gold cup near her hand; the upper part of the body was entirely hidden by a mass of beads of gold, silver, lapis lazuli, carnelian, agate, and chalcedony, long strings of which, hanging from a collar, had formed a cloak reaching to the waist and bordered below with a broad band of tubular beads of lapis, carnelian, and gold.

The head-dress whose remains covered the crushed skull was a more elaborate edition of that worn by the court ladies. Fixed into the back of the hair was a golden "Spanish comb" with five points ending in lapis-centered gold flowers. Heavy spiral rings of gold wire were twisted into the side curls of the wig, huge lunate ear-rings of gold hung down to the shoulders, and apparently from the hair also hung on each side a string of large square stone beads with, at the end of each, a lapis amulet, one shaped as a seated bull and the other as a calf. Complicated as the head-dress was, its different parts lay in such good order that it was possible to reconstruct the whole and exhibit the likeness of the queen with all her original finery in place.

For the purposes of exhibition a plaster cast was made from a well-preserved female skull of the period (the Queen's own skull was too fragmentary to be used), and over this my wife modelled the features in wax, making this as thin as possible so as not to obliterate the bone structure. On this head was put a wig of the correct dimensions dressed in the fashion illustrated by terra-cotta figures which, though later in date, probably represent an old tradition. Though the face is not an actual portrait of the queen, it gives at least the type to which she must have conformed, and the whole reconstructed head presents us with the most accurate picture we are likely ever to possess of what she looked like in her lifetime.

The bodies of two women attendants were crouched against the bier, one at its head and one at its foot, and all about the chamber lay strewn offerings of all sorts, another gold bowl, vessels of silver and copper, stone bowls and clay jars for food, the head of a cow in silver, two silver tables for offerings, silver lamps, and a number of large cockle-shells.

The discovery was now complete and our earlier difficulty was explained: King A-bar-gi's grave and Queen Shub-ad's were exactly alike, but whereas the former was all on one plane, the queen's tomb-chamber had been sunk below the general level of her grave-pit. Probably they were husband and wife: the king had died first and been buried, and it had been the queen's wish to lie as close to him as might be; for this end the grave-diggers had reopened the king's shaft, going down in it until the top of the chamber vault appeared; then they had stopped work in the main shaft but had dug down at the back of the chamber a pit in which the queen's stone tomb could be built. But the treasures known to lie in the king's grave were too great a temptation for the workmen; the outer pit where the bodies of the court ladies lay was protected by 6 feet of earth which they could not disturb without being detected, but the richer plunder in the royal chamber itself was separated from them only by the bricks of the vault; they broke through the arch, carried off their spoil, and placed the great clothes-chest of the queen over the hole to hide their sacrilege.

Nothing else would account for the plundered vault lying immediately below the untouched grave of the queen. Clearly, when a royal person died, he or she was accompanied to the grave by all the members of the court: the king had at least three people with him in his chamber and sixty-two in the death-pit; the queen was content with some twenty-five in all.

On the subject of human sacrifice more light was thrown by the discovery of the largest death-pit that the cemetery has yet produced. In it lay the bodies of six men-servants and sixty-eight women; the men lay along the side by the door, the bodies of the women were disposed in regular rows across the floor, every one lying on her side with legs slightly

bent and hands brought up near the face, so close together that the heads of those in one row rested on the legs of those in the row above. Here was to be observed even more clearly what had been fairly obvious in the graves of Shub-ad and her husband, the neatness with which the bodies were laid out, the entire absence of any signs of violence or terror.

We have often been asked how the victims in the royal graves met their death, and it is impossible to give a decisive answer. The bones are too crushed and too decayed to show any cause of death, supposing that violence had been used, but the general condition of the bodies does supply a strong argument. Very many of these women wear head-dresses which are delicate in themselves and would easily be disarranged, yet such are always found in good order, undisturbed except by the pressure of the earth; this would be impossible if the wearers had been knocked on the head, improbable if they had fallen to the ground after being stabbed, and it is equally unlikely that they could have been killed outside the grave and carried down the ramp and laid in their places with all their ornaments intact; certainly the animals must have been alive when they dragged the chariots down the ramps, and if so, the grooms who led them and the drivers in the cars must have been alive also: it is safe to assume that those who were to be sacrificed went down alive into the pit.

That they were dead, or at least unconscious, when the earth was flung in and trampled down on the top of them is an equally safe assumption, for in any other case there must have been some struggle which would have left its traces in the attitude of the bodies, but these are always decently composed; indeed, they are in such good order and alignment that we are driven to suppose that after they were lying unconscious someone entered the pit and gave the final touches to their arrangement. It is most probable that the victims walked to their places, took some kind of drug—opium or hashish would serve—and lay down in order; after the drug had worked, whether it produced sleep or death, the last touches were given to their bodies and the pit was

filled in. There does not seem to have been anything brutal in the manner of their deaths.

None the less, the sight of the remains of the victims is gruesome enough with the gold leaves and the colored beads lying thick on the crushed and broken skulls.

Of the sixty-eight women in the pit, twenty-eight wore hair-ribbons of gold. At first sight it looked as if the others had nothing of the kind, but closer examination showed that many, if not all, had originally worn exactly similar ribbons of silver. Unfortunately silver is a metal which ill resists the action of the acids in the soil, and where it was but a thin strip and, being worn on the head, was directly affected by the corruption of the flesh, it generally disappears altogether, and at most there may be detected on the bone of the skull slight traces of a purplish color which is silver chloride in a minutely powdered state: we could be certain that the ribbons were worn, but we could not produce material evidence of them.

But in one case we had better luck. The great gold earrings were in place, but not a sign of discoloration betrayed the existence of any silver head-dress, and this negative evidence was duly noted: then, as the body was cleared, there was found against it, about on the level of the waist, a flat disk a little more than 3 inches across of a grey substance which was certainly silver; it might have been a small circular box. Only when I was cleaning it in the house that evening, hoping to find something which would enable me to catalogue it more in detail, did its real nature come to light: it was the silver hair-ribbon, but it had never been worn—carried apparently in the woman's pocket, it was just as she had taken it from her room, done up in a tight coil with the ends brought over to prevent its coming undone; and since it formed thus a comparatively solid mass of metal and had been protected by the cloth of her dress, it was very well preserved and even the delicate edges of the ribbon were sharply distinct. Why the owner had not put it on one could not say; perhaps she was late for the ceremony and had not time to dress properly, but her haste has in any case afforded

us the only example of a silver hair-ribbon which we are likely ever to find.

Another thing that perishes utterly in the earth is cloth, but occasionally on lifting a stone bowl which has lain inverted over a bit of stuff and has protected it from the soil one sees traces which, although only of fine dust, keep the texture of the material, or a copper vessel may by its corrosion preserve some fragment which was in contact with it. By such evidence we were able to prove that the women in the death-pit wore garments of bright red woollen stuff; and as many of them had at the wrists one or two cuffs made of beads which had been sewn on to cloth, it was tolerably certain that these were sleeved coats rather than cloaks. It must have been a very gaily dressed crowd that assembled in the open mat-lined pit for the royal obsequies, a blaze of color with the crimson coats, the silver, and the gold; clearly these people were not wretched slaves killed as oxen might be killed, but persons held in honor, wearing their robes of office, and coming, one hopes, voluntarily to a rite which would in their belief be but a passing from one world to another, from the service of a god on earth to that of the same god in another sphere.

This much I think we can safely assume. Human sacrifice was confined exclusively to the funerals of royal persons, and in the graves of commoners, however rich, there is no sign of anything of the sort, not even such substitutes, clay figurines, etc., as are so common in Egyptian tombs and appear there to be a reminiscence of an ancient and more bloody rite. In much later times Sumerian kings were deified in their lifetime and honored as gods after their death: the prehistoric kings of Ur were in their obsequies so distinguished from their subjects because they too were looked upon as superhuman, earthly deities; and when the chroniclers wrote in the annals of Sumer that "after the Flood kingship again descended from the gods," they meant no less than this. If the king, then, was a god, he did not die as men die, but was translated; and it might therefore be not a hardship but a privilege for those of his court to accompany their master and continue in his service.

Shortly after the middle of the second century B.C., a Jewish sect known as Essenes revolted against the usurpation of the priesthood by Jonathan in 152 B.C., seceded from the main body of Judaism and established a settlement at Qumran in the arid wastes bordering on the Dead Sea. They erected buildings, set up a rigid ethical and religious code, and lived in preparation for the imminent coming of the Messiah. With one break of about forty years, their community existed until 68 A.D., when it was destroyed by Roman legions. For archaeological purposes, the most significant feature of this settlement was an extensive library containing the oldest Old Testament manuscripts yet discovered, as well as historical documents on the political and religious life of the period. They are thus of unique importance in the study of both the Christian and Jewish religions.

These documents, now called the Dead Sea Scrolls, were found under melodramatic circumstances, laden with mystery, danger, and intrigue. The method of their discovery is here described with professional skill by J. M. Allegro. Mr. Allegro was born in London in 1923 and received a first-class Honors degree in Oriental studies at the University of Manchester. In 1952 he was invited to fly to Jerusalem to join the international team which was laboriously piecing together the fragments of the Scrolls, and since then he has been active in their editing and publication.

THE DISCOVERY AND PURCHASE OF THE DEAD SEA SCROLLS

J. M. ALLEGRO

THE DUST had hardly settled over the battlefields of the world, when newspapers began to carry reports of a sensational new discovery in the field of biblical archaeology. It was announced that, in the summer of 1947, a cave had

been found near the Dead Sea which had produced manuscripts of the book of Isaiah older by something like a thousand years than any previously known Hebrew copy of the Old Testament. Later examination was to show that of the scrolls found in this cave, the biblical manuscripts were probably the least important of what appeared to be the remains of a Jewish sectarian library dating from shortly after the time of Jesus Christ. More discoveries in this region followed in the ensuing years, and before long the world was in possession of the remains of hundreds of scrolls covering a period which had hitherto been one of the most sparsely documented, yet important, periods in Man's history. Questions which had been hammering at the door of scholarship since the beginning of critical research into Christian origins could now be answered.

Muhammad Adh-Dhib had lost a goat. The lad was a member of the Ta'amireh tribe of semi-Bedouin who range the wilderness between Bethlehem and the Dead Sea, and he had been out all this summer's day tending the animals entrusted to his care. Now one of them had wandered, skipping into the craggy rocks above. Muhammad pulled himself wearily up the limestone cliffs, calling the animal as it went higher and higher in search of food. The sun became hotter, and finally the lad threw himself into the shade of an overhanging crag to rest awhile. His eye wandered listlessly over the glaring rocks and was suddenly arrested by a rather queerly placed hole in the cliff face, hardly larger than a man's head. It appeared to lead inwards to a cave, and yet was too high for an ordinary cave entrance, of which there were hundreds round about. Muhammad picked up a stone and threw it through the hole, listening for the sound as it struck home. What he heard brought him sharply to his feet. Instead of the expected thud against solid rock, his sharp ears had detected the metallic ring of pottery. He listened a moment, and then tried again, and again there could be no doubt that his stone had crashed among potsherds. A little fearfully the Bedouin youth pulled himself up to the hole, and peered in.

His eyes were hardly becoming used to the gloom when he had to let himself drop to the ground. But what he had seen in those few moments made him catch his breath in amazement. On the floor of the cave, which curved back in a natural fault in the rock, there were several large, cylindrical objects standing in rows. The boy pulled himself up again to the hole, and holding on until his arms and fingers were numb, saw, more clearly this time, that they were large, wide-necked jars, with broken pieces strewn all about them. He waited no longer, but dropped to the ground and was off like a hare, his goat and flock forgotten in a frantic desire to put as much distance between himself and this jinn-ridden cave as possible. For who else but a desert spirit could be living in such a place with an entrance too small for a man?

That night Muhammad discussed his discovery with a friend who, being the elder, was entitled to scoff at the superstitions of his junior. He urged Muhammad to take him to the spot, and the next day the two of them went to the cave, and this time squeezed through the hole and dropped inside. It was just as the younger lad had described. The jars stood in rows on each side of the narrow cave, and, in the middle, broken sherds lay amidst debris fallen from the roof. There were seven or eight of the jars all told, and some had large, bowl-like lids. They lifted one and peered in, but found it empty. And so with another, and another, until in the third they saw a bundle of rags and under it two more. If they had hoped for the glitter of gold and precious stones they were sorely disappointed, for the bundles crumbled at a touch, and, pulling away some of the folds, they could see only some black tarry substance and, below that, folds of smooth brown leather. When, later, the boys had taken this booty back to their camp, they took off all the wrappings from the large bundle, and unrolled the scroll it contained, until, as they later recounted wonderingly, it stretched from one end of the tent to the other. It seems certain that this must have been the larger of the two manuscripts of Isaiah, the news of which was to set the biblical world astir. However, at the time it evoked little

interest among its new owners who could neither read the strange writing inscribed on it, nor think of anything useful to which they could put the leather, fragile as it was. So for a time the Bedouin carried the scrolls about with them as they pastured their flocks and made what trade they could with their neighbors. These Bedouin have no real home. The world is their prey and usually their enemy. This tribe had been in the vicinity since the seventeenth century, and they have managed to eke out a sparse enough living with their few animals, now and again putting their detailed knowledge of the territory to better gain in smuggling. Until the area became effectively policed by the Arab Legion, they practised highway robbery when they could, and always found a ready market for their trading, legal or illegal, in Bethlehem. It was to this town that they made regular visits to sell their milk and cheese, and there, one market day, they took the three scrolls. Their general dealer happened to be an Assyrian Christian, by name Khalil Iskander Shahin, known locally as Kando, who, besides the small general store patronized by the Ta'amireh, owned a cobbler's shop next door. When the Bedouin showed him the scrolls, he evinced little interest, but thought they might serve as raw material for his cobbler's business. Later, after they had been kicking about the floor of the shop for some days, he picked one up and looked more closely at the surface. The writing was as meaningless to him as to the Bedouin, but it occurred to him that his spiritual guardians in Jerusalem might know more about it, and accordingly one day when he was going up to the city, he took the scrolls along with him, to the Syrian Convent of St Mark in the Old City. This much is certain, but it must be confessed that from here on the story begins to disintegrate, as love of truth on the parts of the chief actors in the drama gives way before fear and cupidity. One thing is certain, however; Kando began to realize that the scrolls had some monetary value and found out that the Bedouin had by no means cleared the cave. He and his accomplice George accordingly launched a minor archaeological expedition to the cave indicated by the Bedouin and collected at least a number of

large fragments and probably at this time the remainder of the scrolls, making seven in all. After they had taken all they could find, they seem to have let the Syrian authorities of St Mark's into the secret. In any case the Metropolitan organized his own expedition to the cave, which proceeded to ransack the place, making a large opening near the ground, and pulling out everything they could lay their hands on. Of course, it will be realized that all such excavations were and are completely illegal under the laws of the country, whether of the Mandate or of the succeeding Jordan Government. All such archaeological material remains the property of the country in which it is found, until the Government directs otherwise. So complete secrecy shrouded all these operations, and much harm was done as a result. It is certain that the Syrians found some more fragments, but valuable archaeological data like linen wrappings and sherds from the broken jars they threw on to a rubbish dump outside. Kando had meanwhile deposited the scrolls in his possession with the Metropolitan, on a security, he now says, of £24; and these and some fragments the Church leader began to hawk round the various scholastic institutions of Jerusalem to get an idea of their worth. It seems that one of the scrolls was shown to the late Professor E. L. Sukenik of the Hebrew University, who kept it for some time and then set about finding the rest of the scrolls, which he had realized were very old and of considerable value. He made a perilous journey to Bethlehem, for by now the Jewish-Arab hostilities had become open warfare following on the withdrawal of the Mandate. There he seems to have contacted Kando and brought away three more scrolls. This gentleman now began to get scared since he was afraid that the news of the illegal excavations would leak out, and he would rightly be held responsible by the authorities. He therefore took the precaution of burying some of the largest fragments from the cave in his garden at Bethlehem! Unfortunately, the soil of Kando's back garden is somewhat different from the parched dust of the Qumran caves, and when later he went to retrieve them he found only several lumps of sticky glue.

Meanwhile, in Jerusalem, the Syrian Metropolitan was continuing his rounds trying to discover if the scrolls were really old. Finally, on 18 February 1948 he called up the American School of Oriental Research and spoke to Dr. John C. Trever, who had been left in temporary charge of the establishment during the absence of the Director. He told Trever that during a clear-out of his library at the Convent, he had found some old Hebrew manuscripts on which he would like his advice. An appointment was made for the next day, and the Metropolitan sent round the scrolls packed in an old suitcase, by the hand of a Father Butros Sowmy and his brother. After some hasty comparing of pictures of other ancient Hebrew manuscripts, and complicated research into dictionaries and concordances, Trever discovered that he was looking at a scroll of Isaiah, and that as far as he was able to tell, it was genuinely very old. He asked permission to make photographs of the scroll, and after some negotiations did so. As he worked he became more and more excited, for if it was as old as a favorable comparison with a photograph of a pre-Christian Hebrew papyrus fragment would seem to indicate, then he was handling the oldest manuscript of the Bible ever known. It was only with great difficulty that Trever could restrain his impatience when, half way through the work of photography, he had to fulfil a long-standing engagement with the Curator of the Palestine Museum, then Mr. Harry Iliffe, to go to Jericho and take photographs of a local excavation. But if any mention of the discovery was made at the time to the authorities responsible for the control of antiquities in Palestine, little attention seems to have been paid the story, and nothing was done to organize adequate and immediate steps to safeguard the treasures and seal the cave until a properly equipped expedition could probe its secrets. Trever urged the Metropolitan to take the documents out of the city, since the situation was fast deteriorating, and war was beginning to stalk the streets and hills of that unhappy land. The archaeologists themselves were obliged to leave Jerusalem, and it was not until November of 1948, when the April copies of the *Bulletin of the American*

Schools of Oriental Research reached Jerusalem, that Mr. G. Lankester Harding, newly responsible for the archaeological interests of Arab Palestine as well as Trans-Jordan, learnt that eighteen months before, a fabulous discovery had been made by the Dead Sea. By now photographs of the scrolls had been examined by competent palaeographers like Professor W. F. Albright and pronounced definitely pre-Christian, probably dating to the first or second centuries before our era. Excitement ran high all over the scholarly world, and in Jordan Harding was now faced with an extremely difficult and urgent problem. The source of these scrolls had to be found, and if any related archaeological material remained, it had to be expertly examined at the first opportunity, not only to confirm the palaeographical dating but to determine the community from whose library they had come. Furthermore, it seemed not improbable that there might be more scrolls, and certainly fragments, since apparently some of the documents found were in a fragile condition with pieces missing from the outside and edges. But the original discovery had taken place so long ago that the chances of finding the source relatively free from tampering were very slight. The Metropolitan had succeeded in smuggling the scrolls in his possession out of the country, and had taken them to America. The Jordan Government, of course, demanded their immediate return, but by now the monetary values being accorded them in the popular Press were so astronomical as to persuade the Syrian Church leader that the chances of his returning were well worth sacrificing for the sake of the money he could expect to raise in their sale. The one bright light in the whole miserable affair at this stage was that he had agreed with Trever and the American Schools to allow them to photograph and publish the scrolls immediately, whilst their sale was being negotiated. The Americans had told him that if they were published quickly their value would be much enhanced. In fact, momentarily, it declined, since once they were readily available in printed form the need for the originals became less urgent. The American scholars did, in fact,

publish them, extraordinarily well and quickly, putting the scholarly world greatly in their debt.

Back in Jordan, Harding had gone immediately to the Palestine Archaeological Museum in Jerusalem, and in his capacity as Acting Curator instructed Joseph Saad, the new Secretary, to spare no effort in discovering the whereabouts of the fabulous cave and any other information he could about the find and the personalities involved. Saad's first call was to the American School, and there Dr. O. R. Sellers, that year's Director, immediately offered all the help in his power. Together they went to St Mark's Monastery, despite the extremely dangerous nature of the journey through the Old City, where Jewish shells and sniping were making it near suicide to be out of doors during daylight. Slipping from shelter to shelter they finally arrived at the building which backs on to the dividing wall between Arab and Jewish Jerusalem, and there interviewed a person by the name of George Isaiah. It became clear from the beginning that he was not going to be very helpful, and, although he did not deny that the Monastery had organized an excavation of the cave, refused point-blank to disclose its whereabouts. Saad argued, cajoled, and bullied, but all to no effect, and he was just about to give up hope of gaining any useful information at all when, out of the corner of his eye, he saw one of the Syrian fathers approaching, a venerable saint called Father Yusif. When the old man had drawn quite near, Saad suddenly turned from George and asked Yusif what he knew about the cave. Before George could stop him, the old man began to describe the excavations and their whereabouts. George turned on him fiercely, but could not silence him before he had given at least a general idea of the cave's position. It seemed that it was somewhere south of the junction of the roads to Jericho and the Dead Sea, amongst the cliffs which border the Sea to the west. Now those limestone cliffs are honeycombed with caves and clefts in the rock, and the mountains rise nearly a thousand feet from the marly plateau, so that with a southern limit at Ras Feshkha about six miles to the south, a good deal more detailed pin-pointing was going to be necessary

for the cave to be discovered. As Saad and his companion retraced their steps through the Old City, they discussed the next move. It seemed obvious that they would have to try the great stand-by of the East, bribery. Most things out there have their price, and it only remained to find out how high it was going to be. So on their return, negotiations with George Isaiah were opened, on the general principle that, if he would lead a party to the cave, he would receive a cash payment and the custody of any further scrolls found would be equally shared between them. These negotiations took a considerable time, involving many trips to the Monastery through gun-fire. Finally, when it seemed that arrangements were sufficiently far advanced, Saad arranged for the mayor of Jerusalem and his dignitaries to accompany them to St Mark's to witness the formal agreement. The party arrived on the day appointed and took their seats. Everybody asked after everybody else's health, and were asked in return, and Allah duly thanked. Coffee was passed round, and, after that, the customary small talk ensued, without which no Arab meeting is considered opened. Sellers was beginning to get restless, but Saad, raised in the traditions of the East, played the game in all its formality and was patient. At last, after the seventh round of thanking Allah for their individual good health, the main subject was broached, the terms stated, and nothing but the clasping of hands remained to seal the bargain. And George Isaiah would have nothing to do with it.

Sellers and Joseph parted gloomily at the gates of the American School, and Saad carried on to the Museum. Weeks of negotiation had produced practically nothing and, apart from its general locality, they knew little more about the cave than what had been learnt from the American *Bulletin*. Now it happened that the Museum at this time was in the hands of the Arab Legion, and Saad had to pass a ring of sentries to reach his quarters. He made a perfunctory greeting to the man on duty at the gate and then something prompted him to hesitate and look at the soldier more closely. He was a lean, dark-skinned Arab of the desert, of the type Glubb always chose for his picked

troops, and Saad studied his face for a moment, noticing his long, straight Semitic nose, his short curly beard, and black smoldering eyes. He was a true son of the desert from the sandy wastes of the Hijaz, trained from his boyhood in desert lore and with eyes as keen as an eagle's. It occurred to Saad that if anybody could find that cave, given general directions as to its whereabouts, men like this soldier could. They would be able to perceive from an amazing distance any disturbance of the ground round the illicit excavations, and so detect the cave perhaps even from ground level. The idea crystallized into a plan of campaign, and waiting only to collect Sellers from the American School, Saad went in search of the officer in charge of the troops in the Jerusalem area, a Major-General Lash. He found this officer well prepared, for only a night or two before he had been discussing the problem with a Belgian United Nations observer, Captain Lippens, and had that day telephoned to Harding in Amman, asking if he would like him to send a few of his desert troops down to the area and search for the caves. Harding had agreed, and now with the added information Saad was able to provide, no further time was lost and a detachment of troops under the direction of an English officer, Brigadier Ashton, and a Jordanian Captain (now Major) Akkash el Zebn, was sent down to the road junction by the Dead Sea. Deploying from this point, in such a way that as far as possible no section of the cliffs at all visible from the littoral plain would miss their scrutiny, they set off slowly, working their way south. Within seventy-two hours, Akkash was on the phone reporting that they had found the cave, and asking for further instructions. Whilst waiting for Harding's arrival, Ashton plotted the cave and started collecting the pottery which lay round about, making accurate notes and drawings which were of the greatest help to the excavators later. Then Harding arrived, and together they made the first preliminary excavation. Harding confesses that when he first saw the cave he was dubious of its being the source of the scrolls, but the presence of undoubtedly ancient pottery made it worth investigating further. He asked Ashton to

mount a guard on the cave until such time as a properly equipped archaeological party could be assembled. This was done, but the expedition was dogged by bad luck for days. Every time they gathered at the road junction it rained, which made the tracks completely impassable to their transport, and once it even snowed! Ashton could not leave his men standing about outside a cave by the Dead Sea for long, however, and it became urgent to mount the expedition, which finally started work on 15 February 1949, a fortnight after the rediscovery of the cave. Father De Vaux of the French School of Archaeology, Joseph Saad, and two others joined the excavation, and the early finding of scores of small inscribed fragments of leather, together with pieces of the linen wrappings, and the sherds of dozens of the characteristic large scroll jars, in which it was said that the original scrolls had been found, soon made it plain that this was certainly a scroll cave, if not the original one. The damage caused by illegal excavations was all too plain; no hope could now be entertained of any stratification of the remains, and some of the most valuable of the pottery and wrappings had been tossed outside on to a dump. The number of jars originally placed in the cave was now seen to have been between forty and fifty, and if, as it was then thought, each of those jars had held several scrolls, then it became a matter of extreme urgency to find the rest which might still be in the country and perhaps suffering damage. In any case, there must clearly have been hundreds of fragments and these had also to be found and studied together, if they were to be of any use at all.

Another detective inquiry was instituted, and Saad given *carte blanche* to find and, if necessary, buy those pieces regardless of cost. It was clear now, as more and more reports came in from scholars studying the first scrolls, that every word of these documents was going to be worth its weight in gold, and, indeed, that was just about what they were going to cost before they were all finally in safe hands.

Saad went again to the Monastery of St Mark's, this time accompanied by Harding himself. The object of this inquiry was to find out the name of the dealer in Bethlehem

who had continually cropped up in reports, but had never been named. If there were more scrolls and fragments about, he was the most likely person to know about them, and he would also know the names and tribe of the Bedouin who had found the cave. George Isaiah was a little more informative this time, but could not or would not describe the cave in sufficient detail to make its identification with the Legion's discovery certain, and refused to disclose the name of the dealer. Saad knew better this time than to waste much time over him. After the inevitable coffee, and inquiries after each other's health, with no more useful information forthcoming, they rose to leave, keeping their eyes open all the time for Father Yusif. It was as they were leaving the gate of the Monastery that they saw the frail figure approaching, and immediately engaged him in conversation on the cave. Unfortunately, they now seemed to know more than he, and still they lacked the name of the Bethlehem dealer. Then they had an amazing piece of luck. Harding had noticed that as they had been speaking to Father Yusif, a woman across the road had been showing keen interest in their conversation. Finally, she came across to them and spoke. Were they talking about the excavations of the Dead Sea cave which George Isaiah had organized about a year ago? Her husband had taken part in the "dig," and had even been rewarded for his pains with a leather fragment, which the priests had told him was most valuable, although he had not yet discovered a way of converting it into hard cash. However, if they would like to wait a moment she would see if she could find him; he could not be far away. Saad and Harding looked at each other, and then to heaven. They finally ran the man, Jabra by name, to earth in a nearby coffee shop, and induced him to come along to the Museum. In the basement, the spoils of the official excavation of the cave were arranged on large trestle tables, and, bringing him near, Harding asked Jabra if he could see anything there that he recognized. The man looked long and earnestly over the table, and then a broad smile lit his face. Yes, this. Amidst the broken pottery and linen wrappings, the Roman lamp and the cooking pot, he

had spied his own dear, long-lost but never forgotten cigarette roller. So another link in the chain was forged, the cave was now definitely identified, and it now remained to find out how much more Jabra knew. An Arab who realizes that he has partaken, however, unwittingly, in an illegal act, is a wary creature. Harding and Saad had somehow to win his confidence, if they were to obtain the information they so desperately wanted. Bribery was of course inevitable, and a generous tip went far towards loosening Jabra's tongue. He admitted that they had found some scroll fragments, and the Metropolitan had taken most of them away with him when he left. They tackled him about the name of the Bethlehem dealer; but at once he shut up like a clam, and for a long time would say nothing on the subject. Harding saw the fear of death in his eyes, and the man confessed that he was literally scared for his life. It took a great deal of alternate threatening and reassuring before they finally forced the truth from him, and when they had let him scurry off home, Saad and Harding sat down and faced one another. Events now had taken a sinister turn. If Jabra's fears were justified, it meant that this dealer and his confederates were willing to go to any length to avoid interference in their territory. It was clear that from now on the game would be played to very high stakes, perhaps to higher values than mere money.

The journey to Bethlehem was an adventure in itself. Today it takes only half an hour of smooth driving on a new tarmac road to go from Jerusalem to Bethlehem, and before the troubles a more direct road took only half that time. In 1949, with this in Jewish hands, as it still is, the make-shift route was long and dangerous, a dirt track which snaked far out into the Judean hills by the monastery of Mar Saba. Transport was by donkey, and the journey took half a day. The morning following the interview with Jabra, Saad set out, taking with him two of the Museum guards, and reached Bethlehem shortly after midday. Leaving the guards and the animals on the outskirts of the town, he walked into the center, feeling suddenly lonely and unprotected. From now on he would be working alone; any sign of official support,

and every way would be blocked; the dealer, scrolls, and everything else would go underground and nothing ever recovered. But Bethlehem in those days, cut off from a central government by the fighting, was no place for an unprotected man to face a gang of desperate brigands, and Joseph hesitated a moment outside the shop which had been pointed out to him as Kando's. It opened, like all such eastern shops, straight on to the street, and behind the piles of vegetables and hanging kuffiyas, the bright sunlight did not penetrate. Joseph peered into the shadows but could see nothing from outside. Then he entered.

His eyes took a little time to accustom themselves to the gloom, so he did not at first see the men standing at the back of the room, watching him. One of them was rather portly, heavy-jowled, and dressed in the long Arab night-shirt type of garment, with a red tarbush on his head. His companion was an older man who stared at Joseph suspiciously from beneath heavy eyebrows, and glanced from time to time at his companion and the door standing ajar behind him. Saad realized from their manner that news of his arrival had preceded him and came straight to the point. He had heard that Kando knew something about the scrolls which had been found in a cave, and furthermore, had some of the illegally excavated fragments in his possession. There was a moment's heavy silence, and then the old man flew at him, calling him a government spy, traitor, and worse, pushing Saad against the wall as he hurled abuse at him. Joseph raised his arms to fend off his assailant, but, even as he did so, saw the other man slip out of the open door and shut it behind him. Almost immediately the old man calmed down, glancing behind him to ensure that Kando had got clear, but Saad knew now that there was nothing to be gained by waiting longer and left the shop to return to his friends. Now the fat was really in the fire. Kando knew what he was after and suspected him of being in league with the Government. The chances were that either he would try and silence Saad, or smuggle the incriminating evidence out of the country and make off, until things had quietened down. The safest thing for Saad to do would have been to

make tracks for Jerusalem and his well-guarded Museum. Instead he sent his men away, and took lodgings in Bethlehem, determined to try and win his way into Kando's confidence. It was the act of a brave man.

Day after day Joseph returned to the little shop, engaging Kando in conversation at first on anything but the scrolls. He made the acquaintance of George, who appeared to be Kando's right-hand man, and had certainly co-operated with him in the illicit digging. Slowly he won their confidence, and one day brought up the subject of the scrolls again. He hastened to reassure them that no ill would come to them from working with him; indeed, if they would trust him he would find them a market for their fragments which would pay well and be perfectly safe. After all, if they tried to smuggle them out of the country they might lose everything, including their freedom. They would lose nothing doing things Saad's way. The logic of Joseph's reasoning gradually had its effect, and the first suspicion gave way to a wary, but nevertheless, genuine friendship. When he finally left Bethlehem, it was with a promise from Kando that he would come and visit him at the Museum. On the journey back, Joseph reflected rather ruefully that he had not seen a single fragment during all those days in Bethlehem; yet, on balance, he was not displeased with progress.

Kando kept his word and soon after appeared at Jerusalem, and Saad in due course paid a return visit. This went on for some weeks without further mention being made of the fragments, and Joseph was almost beginning to wonder if Kando had already sold them or, indeed, had ever possessed any. Then one day, in the gardens of the Museum, Kando took Saad over to a shady corner, looked at him hard, and then thrust his hand into the grimy "night-shirt" and brought out a wallet. Inside, as he slowly opened it, there lay a piece of inscribed parchment, about the size of three or four fingers. Saad took the piece in his hand and studied it. There could be no doubt that the writing was very similar to that on the fragments he had already seen and the leather on which it was written was genuinely old. He replaced it carefully in the folds of Kando's wallet,

knowing that one false move now could forfeit in a moment all the confidence he had built up over these trying weeks. Nevertheless, as he watched the wallet go back into its home, he wondered if he would ever see that precious fragment again. However, the game had to be played out the hard way; if Kando had that piece he would probably have a lot more, and Harding had told him to get the lot. Saad showed his interest in buying the piece and any more that Kando might have, and on this they parted, Joseph reporting the new development to Harding. In a few days Kando returned, ready to take negotiations further. Who was Saad acting for? Joseph answered that an English Professor visiting the country was anxious to buy these fragments, but wanted more than this one piece; how much had he to offer? Kando, rather warily replied that he had "quite a lot," and arranged a rendezvous at which Saad would bring the "English Professor" and where Kando would have all the pieces in his possession. The place appointed was to be in Jericho, and, when the date and time had been arranged, Saad went off to find the mythical financier. It so happened that, working with Harding at this time as a non-technical assistant, was an Englishman, Mr. Richmond Brown, who willingly agreed to take the part. At a preliminary meeting Harding handed over a thousand pounds in one dinar notes (1 Jordan dinar = the pound sterling), but told Saad to try and obtain all the fragments in Kando's possession for eight hundred pounds. The absolute maximum was fixed at a pound per square centimeter of fragment, but to try and ascribe any monetary value at all to this priceless material was extremely difficult. If this price seems outrageously high, it must be remembered that, at that time, the Syrian Metropolitan was asking something like a million dollars for the scrolls in his possession, and reports to this effect were being heard all over Jordan on the radio. The Bedouin and Kando were now well aware that these scrolls were considered beyond price by the outside world, and that their recovery was worth almost any amount of money. It should be also recognized that behind all these negotiations there lay the shadow of irresponsible people who were

willing to buy illegally smuggled pieces for their collections or as souvenirs, or in order to make a profit on a further transaction. The danger of such loss was ever present forcing the pace, and thus raising the price. It was bad enough that the complete scrolls should be taken from the country, but at least they could be published as a unity, as the American scholars were doing so admirably. But with fragments, it was different. They could only be made of use to scholarship if they were kept together, and as far as possible reunited with their parent documents. A small piece of Dead Sea Scroll may look very nice framed and hung over the mantelpiece, but it may well ruin the value of other larger pieces, depending for their sense on the inscription on the "souvenir." Furthermore, irresponsibility is not the sole prerogative of tourists and dealers. At a later stage, one world-famous museum was willing to consider buying fragments smuggled from Jordan in order to have them in their cases, even though to have taken them would have delayed the publication of thousands of others, or, at least, reduced their value for want of the additional evidence. Happily the possibility was then foiled by the more responsible attitude of an Eastern University who procured the fragments and returned them immediately to Jordan. Thus at this stage there was little quibbling about price; the main thing was to rescue the fragments and give them to the world in as complete a form and as soon as possible.

Kando's choice in hotels ran pretty low. This was a dirty, fifth-rate hovel, and, as the two drew near, Saad could see that Kando was fearing a trap and taking no chances. Lounging on both sides of the street and round the entrance were some of the grimmest, toughest-looking characters one could wish not to meet anywhere, and they watched Saad and his companion through every move and gesture as they approached. Joseph felt the thick wad of notes bulging in his pocket, and thought they could not have been more conspicuous if he had carried them in his hand. The hairs on their necks bristled as they walked through the porch, trying to look unconcerned. Casually they asked a shifty-looking proprietor if Kando was there, and he motioned

them to a room leading off the main entrance hall. Saad put his hands on the notes in his pocket, squared his shoulders, and the two of them walked in.

Kando was standing with George at the far side of the room. A table covered with a greasy cloth stood in the center, and Saad noticed that, as usual, Kando had prepared for a quick exit with a window standing wide open behind him. It idly crossed Joseph's mind to wonder if they were as well prepared. A brief greeting did nothing to relieve the tension, and Saad asked abruptly if Kando had got the fragments. The man nodded and raised his eyebrows questioningly in return. In answer, with studied carelessness, Joseph brought out the bundle of notes, stripped off the band, and fanned them out on to the table. It was a magnificent gesture and Kando hesitated no longer but laid on to the table beside the notes a pile of decrepit-looking pieces of skin, torn and rotted at the edges, and covered with a fine white dust through which the ancient writing could just be seen. Saad passed them over to the "English professor" who at once began measuring them with a pocket rule. The tension had now decreased considerably, and whilst Richmond Brown was at work, Saad engaged Kando in conversation. Brown's calculations actually brought the figure to 1,250 sq. cm., but following his instructions he said "I can only give eight hundred pounds for this lot." Saad looked at Kando expectantly, but the latter jerked his head and gave the click of the tongue which is the Arabic refusal. Then he began to collect the fragments together, and Saad after a while did the same with the notes. Each delayed the process as long as possible, hoping for the other to give way, but when they both had finished the silence remained unbroken. Saad walked to the door, followed by Brown, both wondering if Kando would let them go through that grim circle of henchmen with a thousand pounds in their pockets. However, they passed unmolested and started to walk towards the Winter Palace Hotel where Harding awaited them. Certainly they were alive, and had handled the precious fragments, but were they to lose them all for the sake of two hundred pounds?

Harding, however, having heard their story supported their action, and was sure that the next day would see Kando at the Museum with his pieces, more than willing to sell them for eight hundred pounds.

The next day sure enough, Kando appeared. But he seemed curiously certain of his ground, and would not go below a thousand pounds. Saad said he would go and ask the "professor" and stepped next door to where Harding sat in the Board Room, awaiting developments. Harding agreed to the price and Saad returned and gave Kando the money. Then part of the cause of his confidence became apparent, for as Kando handed him the fragments, he looked at Joseph and said, "and give my greetings to Mr. Harding." Saad remembered then that, when the three of them had left the Winter Palace in Jericho that day, a bystander had stared curiously into the windows of the car. Of course, Kando now knew the secret of Saad's relationship with the Director of Antiquities, and probably realized that the "English professor" had been a fake. He knew too that the Government meant to deal leniently with him so long as he played their game. Indeed, Harding still had much to learn about the finding of that cave, and wanted badly to know the names of the Bedouin lads who had climbed through the hole. It was by no means certain that with Kando's collection all the fragment material from the cave had been exhausted, and there was always the possibility that new caves in the vicinity might be found any day, now that the Bedouin were on the look-out.

Eventually, Kando told Saad the names of the Bedouin and their tribe, and in due course they were persuaded to leave their desert camps and come to Amman. There Harding learned the full story of the discovery, and the Bedouin found a new friend in the Director of Antiquities. Well dined and liberally tipped, the lads returned to their shepherding to enliven the camp fires of their tribe with marvellous tales of the great city across the Jordan, and of an English official of their Government who spoke their tongue as well as they, and knew their customs and their lore better than any foreigner they had ever met. The wise ad-

ministrator knows when to put the letter of the law into second place, and to the fact that Harding is such a person, the world owes much of the light which further discoveries in the Judæan desert were to throw upon this important Jewish sect by the Dead Sea.

*On the Middle Euphrates lies the small Seleucid-Parthian-Roman fortress city of Dura "called by the Greeks *Europos*," a city of no great shakes in its own day but celebrated in the archaeological annals of ours for the extraordinarily detailed light which its papyri, inscriptions, mural paintings, and domestic artifacts have thrown upon the Greco-Arab society of Hellenistic and Roman Mesopotamia. One of these discoveries, and the steps by which it was required to close one chink in the vast structure of the knowledge of antiquity, is described in the article which follows.*

Jotham Johnson, the author, graduated from Princeton University, studied at the American School of Classical Studies at Athens, and from 1931 to 1934 was Field Director of the University of Pennsylvania Museum Expedition to Minturnae, Italy. He has written numerous papers on archaeological subjects and is former editor of "Classical Weekly," "Archaeology," and "Archaeological Newsletter." He is now head of the Department of Classics, New York University; Chairman of the Department of Classics, Washington Square College; and President of the Archaeological Institute of America. Dr. Johnson is also a member of the board of editors of the New York University Library of Science, of which the present volume is a part.

TELL TIME BY THE STARS

JOTHAM JOHNSON

DURA WAS FOUNDED about 300 B. C., outlived a dozen destinies, and survived until 256 A. D., when it was stormed, sacked, and left deserted by the Sasanian army of Sapor. At some moment between 300 B. C. and 256 A. D., a woman living in a private house near the center of the city gave birth to a child. This was very likely a familiar occurrence at Dura and would probably have remained undistinguished and without special interest for posterity, if it had not been for the family's reliance upon astrology. The child's horoscope, the aspect of the heavens at the moment of his birth, was cast, whether by an amateur astrologer or a professional we are not told, and someone, perhaps to assure against its being misplaced, made a permanent copy by scratching it deeply into the plaster of a courtyard wall.

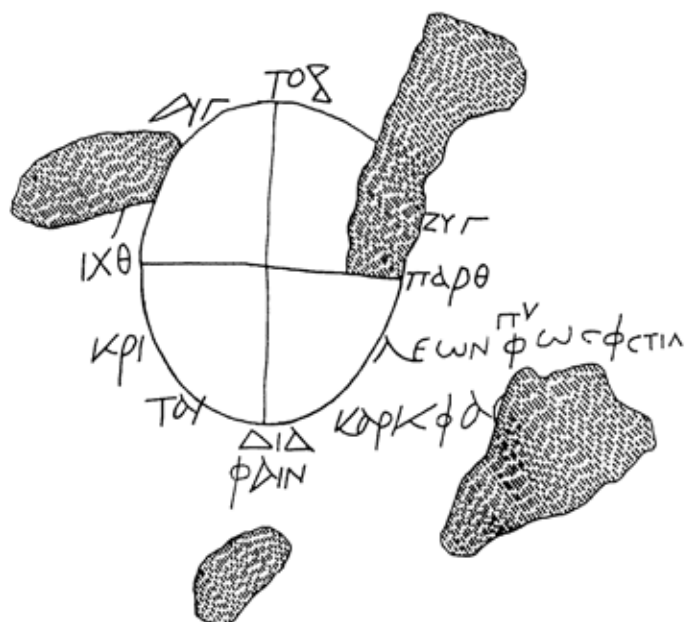
It did not remain exposed even till 256 A. D., however, for at some time later the householders redecorated the house. In order to prepare the wall for replastering, they took a pick and dug gouges out of the whole wall, a few inches apart; these would help the new plaster to take a firm grip over the old. Three of these gouges struck within the area of the horoscope and obliterated a number of the letters. The replastering was then done, hiding the horoscope for centuries.

Dura was discovered and identified by the late James H. Breasted, as a consequence of chance observation by a British army captain during the Iraq War, in 1921. In 1922 and 1923 it was excavated by the famous Belgian scholar, the late Franz Cumont, for the Académie des Inscriptions et Belles-Lettres. Cumont's two volumes, published in 1926, recorded his epochal finds of parchment texts and other objects usually considered highly perishable, as well as

many inscriptions. Nearly all these documents were in Greek, an additional surprise in that obscure eddy of the mainstream of Hellenism.

Professor Michael I. Rostovtzeff of Yale University reasoned that where parchments had been found more might be found, and in 1928 Yale entered into partnership with the Académie to continue the excavations of Dura-Europos, a new series of ten campaigns. These campaigns were extraordinarily fruitful in the very areas of ancient culture where our deficiencies had been most lamentable, and particularly in parchments and papyri; but that is a story not to be compressed into the few pages at our disposal here.

I was a member of the staff during the first full Yale season, from October, 1928, to March, 1929. During most of the working periods I was stationed at the west gate of the city, the Palmyra Gate, keeping an eye on a hundred or so Bedouin workmen and at slack times copying the inscrip-



V-1. Dura horoscope traced from a penciled squeeze.

tions which had come to light on the walls of the passageway.

On my way back and forth between the Palmyra Gate and our camp of tents, I used to vary my path in order to study the traces of ancient buildings showing through the thin soil, and occasionally to pick up a coin or an interesting potsherd. I soon observed that here and there over the site private houses, or single rooms, had been more or less cursorily excavated. In looking through Cumont's report to see what mention he had made, I found no mention of them. When I remarked this to M. Pillet, then field director of our expedition, I learned that these rooms had been dug, for diversion, by a squad of soldiers stationed at Dura to prevent clandestine digging.

These rooms, therefore, were unpublished and unrecorded, and I took a new interest in them, because I had noticed graffiti on several of the walls and although they were in a Greek script with which I was unfamiliar I was sure that I could obtain some readings worth publishing, and perhaps gain for myself a tiny quantum of repute, or at least a bibliographical entry. I had caught the great Cumont in an error! In one place he had read a graffito as ABIAEZHC, and since many Arab names began with *abid-* "servant" (compare modern Abd-ullah "Servant of Allah"), and the shape of the Greek letter *sigma* at Dura was normally C, he reported a new Semitic name, Abidezēs. But my younger eyes saw that what was carved was really ABIAEZHΘ, the first eight letters of the Greek alphabet, and I began to foresee for J. J. a fine future in epigraphy.

So it was that I spent a holiday afternoon trying to read the graffiti of one room, very pleased when I found myself beginning to recognize some of the letters and tickled pink when I identified three or four words. They were names of foods, I remember—*lachana* "vegetables" was one of them.

After a time I turned my attention to the next wall to the right and found myself facing the graffito which appears in Figure V-1. The letters were Greek, all right, but they re-

fused to form words and I could make nothing out of them beyond the general shape of an ellipse, with cross lines dividing it vertically and horizontally and written entries at twelve points corresponding to the hours on a clock face. I copied the letters and gouge marks as well as I could into my notebook, and then it was getting dark so I returned to camp.

I passed my notebook around the dinner table that evening, and a day or two later I carried squeeze paper, a brush, and a pail of water to the spot and gingerly, so as not to do any damage, made several of the paper casts which we call squeezes. One of these, as soon as it was thoroughly dry, I blacked in with a soft pencil (later, when traced with India ink, it became the figure). I also took two photographs, with the 10 x 15 cm. plate camera which has given my friends so much amusement, but since these were not going to be developed and printed for weeks they were of no immediate use to my ambitions.

Armed with squeezes and notebook copies, I retired to my unheated tent, laced myself in, wrapped myself in a blanket, put on woolen mittens, and started to try to puzzle out this curious relic. I noticed again the division into twelve, and in trying to see how many traditional dozens in Greek mythology I could think of I got as far as the twelve gods of the Olympic pantheon, the twelve labors of Herakles, the twelve signs of the zodiac——

But what were the *Greek* names of the twelve signs of the zodiac? I could not remember ever having seen them, and we had no handbook except a Greek dictionary. I found it hard to remember even the Latin or the English names, but with a little reflection they began to come: Sagittarius the Archer, Aquarius the Water-Bearer, Pisces the Fishes, Aries the Ram, Taurus the Bull, Gemini the Twins. . . .

Now for a few moments I made fast progress. I had already spotted *lambda epsilon omega nu* at four o'clock; this could only be *leôn*, Leo the Lion; at three o'clock were the letters *pi alpha rho theta*, the first four letters of *parthenos* "virgin," and this was surely Virgo. At seven o'clock were a *tau* and the letters *alpha* and *upsilon* ligatured—

surely *tau-ros*, Taurus the Bull. At nine o'clock were the letters *iota chi theta*, the first three letters of *ichth-yes* the Fishes. From then on it was only a matter of searching the Greek dictionary, as for the abbreviation *tau omicron xi* at twelve o'clock; of the handful of words beginning with *tox-* one was familiar as a sign of the zodiac, *tox-otes* the Archer. In like manner, two o'clock's *zyg-* turned out to be *zyg-os*, or Libra; *kark-* at five o'clock was *kark-inos*, Cancer; *did-* at six o'clock was *did-ymoi*, Gemini; *kri-* at eight o'clock was *kri-os* the Ram, Aries; and at eleven o'clock *aig-* was *aig-okeros*, Capricornus, the Goat. Two were missing in the gouges, at one o'clock where Scorpio should have been, and at ten o'clock where Aquarius should have been; when I looked for a compound of *hydro-* "water" the dictionary yielded *hydrochoos* "water-pourer," Aquarius, and behold I could see the long tail of the *rho*, just where it should be. The twelve signs of the zodiac were present or accounted for.

But I could not stop there. I knew that the presumable purpose of assembling the signs of the zodiac would have been to arrange among them the names of the planets to form a proper horoscope. I could remember that the planets were as many as the days of the week which were named for them, seven, because to our five visible planets, Mercury, Venus, Mars, Jupiter, and Saturn, the ancients added, logically, two more bodies not fixed immovably in the sky (*planētēs* "wanderer"), the Sun and the Moon.

I had already noticed, at four, five, and six o'clock, groups of letters beside the names of the signs of the zodiac, and these must conceal the names of planets; but when I tried to fit *Hermēs*, *Aphroditē*, *Arēs*, *Zeus*, and *Kronos* to the letters I could read I obtained no results at all. Resorting again to subterfuge, I picked out the one at six o'clock as the clearest, apparently *phi alpha iota nu*, and began running my finger down the *phain-* words in the Greek dictionary, coming almost at once on *Phain-ōn*, Shiner, the early literary name for Saturn.

At five o'clock, after the *kark-* of *karkinos*, were a *phi*, an

alpha, and part of a third letter, which might be an *epsilon*, an *omicron*, a C-shaped *sigma*, or possibly, but probably not, another *phi*. Again the dictionary galloped up to help with *Phaethōn*, the Radiant One, Jupiter. At four o'clock, after *leōn*, were three planets: *phosph-* for *Phosphoros*, Light-bringer, Venus; *stil-* or *stillb-* (I never knew whether I really saw the *beta* or just imagined it) was *Stilhōn*, the Gleamer, Mercury; and above, over the initial *phi* of *phōsph-*, were the letters *py-* for *Pyrocis*, the Fiery One, Mars.

That was all; the Sun and Moon are missing. But we can restore the Sun without hesitation: since the width of a sign of the zodiac is 30°, and since Mercury, by the forces that bind it to its orbit, can never be more than 28.4° from the Sun, Mercury must always be in the same sign as the Sun or in the next sign either way. It can plainly be seen that the Sun was not in Leo with Mercury, and not in Virgo to the east of Leo; therefore it could have been only in the next sign to the west, Cancer, and must have been carried away in the large gouge along with part of the -e- of *Phaethōn*.

As for the Moon, there was no immediate way of checking on its whereabouts. As far as we could then tell, it could have been lost with any of the three gouges, in Aquarius, Scorpio, or Cancer, and any assumptions we made must be based on these alternatives.

When I had gotten this far I realized that I could go no further without access to the reference materials in a large library, and I wrapped up my squeezes, photographs, transcripts, and notes and stored them in a safe place until my return to New Haven. But frequently in the following weeks I stopped at that wall and looked closely at the horoscope to see if I could make out any more letters. And on one such occasion there occurred an incident that might have brought my project to an abrupt halt, for as I bent forward to stare more closely at those silent scratches some object fell upon the brim of my felt hat, slithered off, flashed past my face, and landed writhing across one barefoot-sandaled foot. In the instant that it landed I saw that it was a small snake. With a wild leap I left that spot and took refuge on a mound

of dirt, while the snake in turn found shelter under a pile of potsherds; but before it vanished I saw that it was a horned viper. It had been sunning on the wall above me and, exasperated by my bobbing head, had lunged evilly at it, but had not solved the problem presented by my hat.

Now, the wandering ones move at various apparent speeds in the sky. Since the sky is divided into 360 degrees, each of the twelve signs of the zodiac occupies 30°. To an observer on earth, the sun appears to move about a degree a day, and thus remains in one sign of the zodiac for about a month; but the moon takes only two days and a half to cross one sign and enter another. Mars stays in one sign for two months, or a little less, but Jupiter takes a year. Saturn takes twenty-nine and a half years to make the complete circuit or about two years and a half in each sign.

The application of this principle, I foresaw, would make it possible to calculate the date of the horoscope. For, if we set up a perpetual sky clock, in which each planet's course along the zodiac is shown, it will be seen that particular patterns do not repeat themselves at brief intervals. Having once left their starting points, Jupiter will return to Cancer in the twelfth year, but Saturn will not be in Gemini to meet him; not until 59 years have passed, five of Jupiter's revolutions and two of Saturn's, will they both return, briefly, to the same relative positions; when they do, Mars, Venus, and the Sun will non-cooperate. Actually, a set pattern will recur only after twelve hundred years or so—could have occurred only once, *if at all*, in the five and a half centuries of Dura's life.

Armed with these data and a self-assurance that, I realize now, must have been unbecoming to a youth of twenty-four, I approached Professor Ernest W. Brown of Yale's department of Astronomy, and asked his help in solving the arithmetical problem, posed in this form: Given Saturn in Gemini, Jupiter and the Sun in Cancer, Venus, Mars, and Mercury in Leo, and the Moon in either Aquarius, Scorpio, or Cancer, can the horoscope be dated within the limits of occupation of the city, 300 B. C. and 275 A. D.?

If Professor Brown was overwhelmed he was too polite to show it. He accepted the papers and said mildly that he might be able to get a student to work it out. Six weeks later he sent for me and triumphantly spread the answers before me. Dirk Brouwer, a research assistant, had done the problem as an exercise. The date of the horoscope was July, 176 A. D. Not only that, but it could be fixed within two two-and-a-half day periods: July 3 to 5 if the Moon was in Scorpio, July 10 to 12 if the moon was in Aquarius. (The third possibility, that the Moon was in Cancer, was ruled out; in that circumstance the other relations would not hold.)

This was very handy, an archaeological document dated within ten days, and fixed permanently to the wall of a house, which too acquired a date by the association. I thanked Professor Brown as fervently as I knew how, bowed myself out, and returned to my writing-place in the corner of Professor Rostovtzeff's office. Rosty was pleased too, he said. As for Dr. Brouwer, he rose to be Professor of Astronomy, Chairman of the department of Astronomy; and director of Yale's observatory, titles he holds today.

At this point we must turn back to Figure V-1. Above the horoscope and to the left, at the very edge, were some more letters. We had not paid much attention to them—they did not even appear on the squeezes or in my notebook—and with the horoscope in Mesopotamia and me in Connecticut we were going to have to use the photograph or nothing. With the aid of a lens we succeeded in making out seven letters, ZIIYIIANΘ. We did not know that they belonged with the horoscope—there were reasons for thinking that they did not; but when we found out what they were, *zeta pi upsilon pi alpha nu theta*, it seemed unlikely that they would ever be linked to anything. *Zpypanth*. Strange as some Greek words sound, this would not have meant anything, even to a Greek.

However, it presently occurred to us that it might be a date. The Greeks used letters for numerals. The first three letters might be numerals for the year, the second three the name of a month in abbreviation, the last letter the numeral

for the day, just as I might write 951APR9 for today. In that case the year numerals would be

<i>zeta</i>	7
<i>pi</i>	80
<i>upsilon</i>	400
— 487,	

the 487th year in some one of the eras by which the despots of western Asia counted time. At Dura, under Roman occupation, we would expect dates to be by the Roman emperors; but before the Romans annexed Dura, the era in use had been the Seleucid Era, whose year 1 ran from September, 312 B. C., to September, 311 B. C. If that was the era in use here, the year 487 would have run from September, 175, to September, 176 A. D.

We had a feeling that we were very warm.

This was heightened when we hunted up a list of month names. The other texts at Dura—those few that bothered to mention the months—had shown the Macedonian months in use. Of these, only one began with Pan-; this was Panemos, and it corresponded to July!

But the day did not fit; *theta* stands for 9, and whether or not Panemos was equivalent to July, Panemos 9 would not fit either alternative for the Moon in the horoscope, July 3-5 or July 10-12. Even with the Seleucid Era in use, we would have expected to find the Julian calendar controlling at least the months, and the refusal of Panemos 9 to cooperate was provoking.

But there was one more possibility: that the Romans had not, not yet at Dura at any rate, outlawed the former Macedonian *lunar* calendar. In that case, the months would have begun with the new moon, the first appearance of the slender crescent in the sunset sky. In that case, Panemos 9 would have been the ninth day of the month that had begun with the previous new moon.

Earlier in the century a German scholar named Ginzel had published a three-volume *Handbuch der mathematischen und technischen Chronologie*, and in this he had included a

handy list of the dates of new moons, as seen from Babylon. With trembling fingers I found the new moons for 176 A. D. —April, May, June—June 24, at 9.56 A. M. A momentary frustration: If June 24 was Panemos 1, Panemos 9 would be July 2, another bad fit.

But the month depended on actual observation of the new moon; Ginzel's decimals gave astronomical new moon, and a human observer, unaided, could not have seen the too-thin crescent on the evening of June 24; Panemos would have had to wait until the evening of the following day to start, and consequently Panemos 1 would have run from sunset, June 25, to sunset, June 26. Eight days later, Panemos 9 would have run from sunset, July 3, to sunset, July 4. The correspondence between the two systems of dating, Seleucid and Julian, was complete and perfect.

We did not soak up all the implications of this at once. For a little while it looked much too good to be true; but gradually we took heart. We even found that we could fix the time a little more closely still, because the horizontal diameter is the *hōroskopos* proper, the line that indicates the horizon; the sun, in Cancer, is well below the western horizon, approaching midnight. The baby whose birth was thus memorably noted was born about ten P. M., and that was on July 3, since Panemos 9, as we saw, ran from sunset, July 3, to sunset, July 4, or July 3/4 as we write it. This is about as close as we ever expect to date any ancient document, except another horoscope.

It was of some interest, too, to recall again that at Dura in 176 A. D., under Roman occupation, the Seleucid Era, the Macedonian month names, and some form of lunar calendar were all still in use. This raised the conjecture that we might use this new and isolated correspondence between the Seleucid and Julian calendars,

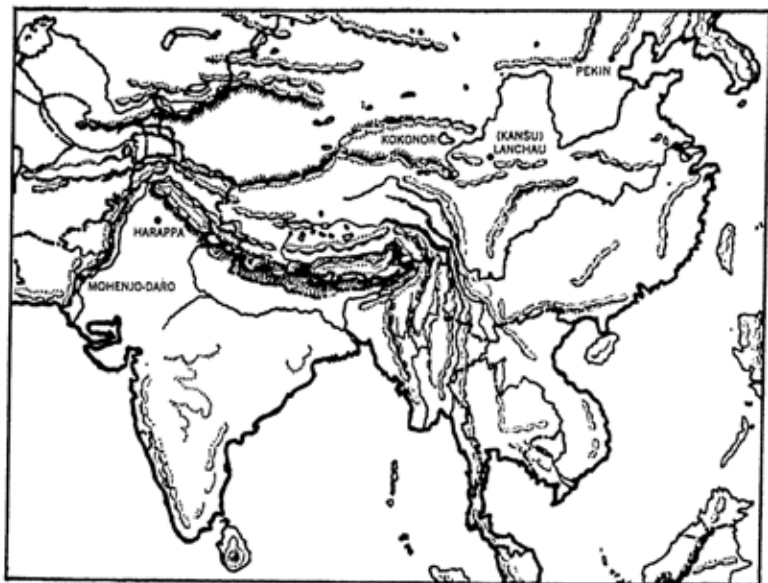
Panemos 9, 487 S. E. = July 3/4, 176 A. D.,

to show one of the Hellenistic lunar calendar cycles still in belated operation, perhaps the famous Babylonian cycle. Later we tried it, and to our amazement succeeded in doing

just that; but that is another episode, a matter of many hundreds of hours more thinking, and figuring, and thinking again, until we ended up with the solution that could not be upset.



IV. Asia and Oceania



ASIA

IV. Asia and Oceania

Until well into the twentieth century, the knowledge of the prehistory of India was in a rudimentary state. A few Paleolithic and Mesolithic artifacts had been discovered, but there was no evidence of any important Indian culture before about 1500 B.C. This situation was abruptly changed by the discovery in the nineteen-twenties, by Indian excavators, of an Indus Valley civilization whose two great centers at Harappa and Mohenjo-daro were dated at about 2500 to 1500 B.C. The Harappa culture was based on a thriving agriculture and a prosperous commercial life. Its cities were large and carefully planned. It had a script, which appears on numerous seals; a system of weights and measures; a group of artisans who worked skillfully in copper and bronze—but little artistic interest or ability. It is this culture and these discoveries to which Wheeler refers in the following article. The finds put new life into the archaeology of northern India and pushed back the frontiers of Indian prehistory by a thousand years. As for southern India, archaeology was a "jelloid mass" until an energetic director general took charge in 1944. "Archaeology in India" gives a brief description in his own words of what he accomplished. It should be noted that by his discovery of Roman artifacts, which he was able to relate to Indian culture, Sir Mortimer supplied the sort of absolute chronology whose importance he stresses in his article on "New Techniques in Archaeology."

ARCHAEOLOGY IN INDIA

SIR MORTIMER WHEELER

THE OLD Archaeological Survey of India, now the Archaeological Department of the Republican Government of India, was and probably still is the largest and most complex archaeological machine in the world. This great machine was essentially the creation of two men, Lord Curzon and Sir John Marshall, and it came into effective existence during Curzon's Viceroyalty in 1902. The combination of the Viceroy's wholehearted backing with the Director-General's wholehearted enthusiasm quickly set the department upon its feet. The task which awaited it was a colossal one. With gathering experience and strength, Marshall tackled it upon a proper scale, and inspecting his work a generation later I found myself constantly marvelling at its scope.

What then went wrong after Marshall's retirement in 1929? Why in the 'thirties did his old department sink so rapidly into disrepute, as indeed it did? First, the retiring Director-General had, it must be remembered, taken office at a very early age and at a period when modern archaeological technique (outside Cranborne Chase) was in a rudimentary stage. His immense task in India inevitably barred close or continuous contact with international development, and in excavation his technical standards remained to the end substantially those of Greece and the Near East in 1900. And there was yet another factor of a personal kind. I once heard a friend and admirer of Marshall describe him as "a beech tree under which nothing grew." That was well put. Marshall was of a temperament which hinders the confident delegation of responsibility, and hinders therefore the adequate training of subordinates to assume responsibility.

Then finally, in 1932, the Indian Government, like others in the universal stringency, applied drastic financial cuts with much haste and little understanding. The survey was left with an utterly unbalanced, ill-trained and un-led staff. It disintegrated. . . .

In March 1938 the Viceroy, through the India Office, summoned Sir Leonard Woolley to the rescue. Sir Leonard recommended that "a European Adviser in Archaeology be appointed for a strictly limited term of years." I subsequently found that he had privately associated my name with that recommendation. At the end of June 1943, Mr. Amery, then Secretary of State for India, received a code telegram from the Viceroy (Lord Wavell) which included the following sentences:

Post of Director-General of Archaeology falls vacant next year and the Member for Education, after discussion with me, is extremely anxious to get a man . . . from home for succession. I fear that condition of department is quite lamentable. It contains no one of any quality and level of its work is low. . . . I do not know if Mortimer Wheeler who I understand is at present serving in the Army would be possible. . . .

The result of this message was the invitation which I received in July at Algiers. My reply was that, whilst I was not prepared to leave the Army until the conclusion of the forthcoming operation (the Salerno landing), I would accept the Director-Generalship if still available in six months' time.

Accordingly, in February 1944 I found myself imprisoned in a tiny cabin of the City of Exeter amidst the sprawling lines of a seven-knot convoy of about a hundred ships. There, brooding upon a scheme for fieldwork and excavation in India, I had jotted down the following notes:

In the immense field offered by India for archaeological exploration, many alternative plans of almost equal value are necessarily feasible.

In the south of India, scraps of information approxi-

mating to an uncertain history begin in the time of Asoka, but it was not until the Graeco-Roman geographers of the 1st and 2nd centuries A.D. included Indian trade within their survey that the historical map assumed something approaching a coherent outline. Not indeed until the time of the Pallavas of the 6th and 7th century A.D. is South Indian history firmly established upon a basis of written record. For earlier periods material is abundant, its inter-relationship unknown. It is a jumble of words with no consecutive meaning. But here again, planned work can gradually bring order and significance into chaos. A potential datum-line is provided by the impact of Roman commerce upon central and southern India, with the consequent deposition of Roman coins and coin-hoards of known date. The careful correlation of these coins with the contemporary Indian cultures is an obvious starting-point for research. It has not yet been attempted.

In my room at the top of the Railway Board building [at Simla], now and then snatching books and papers from the paws of an intrusive monkey, I sat down and drew up a list of the many Roman coins which, since 1775, have been recorded from the soil of South India. I then sent for two of my officers, went through the list with them, and despatched them on a 4000 miles' tour with instructions to select one or more of the named sites where significant association with an Indian culture seemed a fair gamble and where excavation might be feasible. Thereafter I hurried off to the North-West Frontier and the Indus Valley.

Three hundred miles to the south [of the Frontier] lies Harappa, the little country town beside which rise the dusty mounds of one of the two greatest cities of the Indus Valley civilization. Here, in 1921, a member of Marshall's staff had discovered remains of a people who used both stone and copper (but not iron) and were therefore in what archaeologists call a "chacolithic" phase of culture. The date of this manifestly ancient culture was then unknown, but has since, after much exploration, been defined roughly at 2500-1500 B.C. The "Harappa" or "Indus" civilization has now taken its place amongst the great civilizations of the ancient world,

and it was with a proper—though, in the event, inadequate—sense of things to come that, on a May night in 1944, a four miles' tonga-ride along a track deep in sand brought me with my local Muslim officer from the nearest railway station to the little bungalow beside the moonlit mounds. Warned by my anxious colleague that we must start our inspection at 5:30 next morning and finish by 7:30, "after which it would be too hot," we turned in, with the dark figure of the "punka-walla" crouched patiently in the entrance, and the night air rent by the howling of innumerable jackals in the neighboring wildness.

Next morning, punctually at 5:30, our little procession started out towards the heaps. Within ten minutes, I stopped and rubbed my eyes as I gazed upon the tallest mound, scarcely trusting my vision. Six hours later my embarrassed staff and I were still toiling with picks and knives under the blazing sun, the mad sahib setting a relentless pace. To explain what had happened, I must deviate for a moment into Indus archaeology.

The sites of the Indus civilization spread along the rivers from the Himalaya to the Arabian Sea, a distance of 1000 miles, and it was thus by far the largest unitary civilization of pre-classical times. Within that great area two cities were outstanding and presumably in some manner metropolitan: Harappa itself and, 400 miles to the south-west, Mohenjo-daro, beside the main stream of the Indus. Both cities were something like three miles in circumference; both were thought to be devoid of fortifications. Accordingly, prior to 1944 there was a tendency to regard the Indus Civilization as something extraneous to the normal trend of the autocratic or bureaucratic king- and priest-ridden societies further west, in Mesopotamia, Anatolia and Egypt. This apparently heterogeneous character, strangely anachronistic in the chalcolithic age, was stressed by Professor Gordon Childe in his *New Light on the Most Ancient East*, 1934. "No multiplication of weapons of war and battle-scenes [he wrote] attests futile conflicts between city-states as in Babylonia nor yet the force whereby a single king, as in Egypt, achieved by conquest internal peace and warded off jealous

nomads by constant preparedness." This Elysian polity, not altogether devoid perhaps of a Marxist flavor, seemed too good to be true but was not on that account false. There was little in the printed evidence to contradict it. But the printed evidence was in fact singularly incomplete.

As I approached the highest mound at Harappa on that May morning, the truth, or a part of the truth, of the matter stood suddenly revealed to me in the strong sloping light of the early sun. The mound was fringed with great piled masses of yellow mud which could scarcely be other than monsoon-riven brick. Here and there it rose to tower-like peaks; everywhere it contrasted with the interior of the mound, where brickbats and potsherds covered the surface with a red cloak. Nay more; close inspection and a little scraping of the peripheral mud showed up the actual joints in the brickwork, and doubt was out of the question. The mound, standing high above the adjacent heaps, had been barricaded by a great brick wall, long worn and melted by the summer rains. The city, so far from being an unarmed sanctuary of peace, was dominated by the towers and battlements of a lofty man-made acropolis of defiantly feudal aspect. A few minutes' observation had radically changed the social character of the Indus civilization and put it at last into an acceptable secular focus. There remained the task of demonstrating the structural make-up of the newly found acropolis by excavation, and this was in fact to be achieved with rewarding success two years later.

Meanwhile I hurried on to Harappa's opposite number, Mohenjo-daro, away down in Sind. There, as we drove through the heaps of scrub towards the heart of the site, a high mound rose suddenly in front of us, crowned with the tattered *stupa* or shrine which Buddhist monks had added to it in the second century A.D. And there at once the same phenomenon was clear to see: the floodworn remains of an acropolis of similar size, orientation and relative position to that of Harappa, and similarly showing the mud or mud-brick of which its cliff-like edges were composed. In the adjacent bungalow I sat down and wrote to Gordon Childe in London that the bourgeois complacency of the Indus civili-

zation had dissolved into dust and that, instead, a thoroughly militaristic imperialism had raised its ugly head amongst the ruins. To his credit he accepted the retrogression with a good and unhesitating grace, and in due course rewrote his book.

Southwards from Calcutta, in the heat of an impending monsoon, I made Madras, to find most government offices closed. A Japanese bomber, having lost its way over the Bay of Bengal, had recently discharged its remaining small bomb upon one of the open spaces of the city, with a moral effect which might have made the pilot smile. However, with the ready co-operation of the superintendent, a Dr. Aiyappan who became a good friend of mine, I penetrated into the Government Museum and at leisure explored its inmost recesses. The sequel may properly be described as dramatic.

In a workshop cupboard my hand closed upon the neck and long handle of a pottery vessel strangely alien to that tropical environment. In my hand I held the first key to the protohistoric archaeology of South India, of half a million square miles of Asia. Here was India's reply to those words which, three months previously, I had penned a trifle anxiously on the *City of Exeter* and have reproduced above. Roman coins as an index to an associated Indian culture would have been good enough and somewhere on the other side of the peninsula my two officers were even then searching along the coast and amongst the backwaters for a point of impact. But Roman pottery such as the amphora-handle which I was already sketching in my notebook opened up possibilities beyond the reach of coinage, with its incomputable survival value and its facile transmission. A wine-jar from the Mediterranean had not arrived alone; its presence indicated almost infinite possibilities. It had been found, said Aiyappan, on a site some eighty miles south of Madras, near Pondicherry in French India, where he and others had been carrying out some trial excavations on an ancient town-site beside the coast. Two days later I reached Pondicherry in the dawn, after an all-night train journey.

The French Governor was away, but his officials were hos-

pitality itself. Breakfast was prolonged far into the morning, and concluded with an admirable cognac. Thereafter we made our way in loquacious procession through the straightly marshalled streets of the little town to the public library.

An inner room of the library contained three or four museum cases. I strode hopefully forward, and, removing the dust with an excessively sweaty arm, peered into them. For the second time within the month, my eyes started in their sockets. Crowded together were fragments of a dozen more Roman amphorae, part of a Roman lamp, a Roman intaglio, a mass of Indian material—potsherds, beads, terracottas—and several fragments of a red-glazed ware which no one trained in the school of classical archaeology could mistake. After much searching, the keys were discovered and I found myself handling the fragments of cups and dishes of the time of Augustus and Tiberius from the famous potteries of Roman Arezzo. My search was nearly over. . . .

Two miles away, down the coast, a devious journey brought us to journey's end. Here a fishing hamlet, Virampatnam by name, looks upon the Bay of Bengal across a litter of string-tied boats and crude outriggers, and near it a former outlet of the Gingee River is ponded back to form a broad lagoon worthy of the shade of Long John Silver. The flanks of the lagoon are crested by groves of waving coco-nut palms, and from its fishful depths long lines of dark-skinned men from the adjacent villages gather a gullible food supply with primitive fishing-rods. The western shore of the lagoon is flat, little above the average water-level; the eastern shore for some 400 yards rises sheer to a height of twenty feet, and from the eroded cliff project the broken ends of brick walls. It was quickly evident that the whole height of the eastern shore was the product of urban accumulation. Two craters showed where local French and Indian antiquaries during the previous three years had extracted the material now in the public library. And let it be made clear that, devoid of science though their work had been, without it the potentialities of the site would have remained hidden. The unskilled excoriator has on occasion an honorable place in the history of archaeology. In particular, the name of Père

L. Fauchaux of Pondicherry deserves inclusion in the roll of fame, for that he at least stumbled unknowingly upon "Roman" Arikamedu (Pondicherry) when more knowledgeable men had passed it by. Our work there in 1945 and that of J. M. Casal for the French Government in 1948 owed everything to Fauchaux's untutored curiosity. And that curiosity was in turn based upon the accident that in 1937 local Indian children had picked up on the site an intaglio bearing a classical head (allegedly "of Augustus") and had purveyed it for baksheesh to another local French antiquary. My own share in the business—initiated by my accidental observation in the Madras museum—was the recognition of the dated Roman pottery and the subsequent exploration of the site on methodical lines in the interests of Indian chronology.

In New Delhi, I found there Stuart Piggott and Glyn Daniel, the former in the Army, the latter in the Royal Air Force, and both engaged upon air-photograph interpretation. On the principle of "Othere the old sea-captain" and his walrus-tooth, I casually produced an Arretine sherd from Pondicherry, and the effect was gratifying—how childishly rewarding is a comprehending audience! In his spare time, Piggott was already at work upon that series of books and articles which have made him our foremost authority on prehistoric India.¹

On April 1st [of the following year] I sat in a small bungalow amidst the palm-trees, a mile from the scene of my forthcoming excavation at Arikamedu, and wrote to Cyril Fox.

Sheets of rain are descending into the jungle outside my veranda—all wrong for the tropics at this time of year and particularly inopportune for one who is about to dig below sea-level. . . . Here I'm living in solitary state about three miles from the small wall-less *bastide* that is Pondi-

1. Glyn Daniel is also an archaeologist of note. He is the Editor of "Antiquity" and the author of the notable "One Hundred Years in Archaeology." He is Lecturer in Archaeology at Cambridge.—*Eds.*

cherry, with my servant and jemadar and my posse of Ghurka guards, who protect me very amiably from God-knows-what wherever my headquarters be. In addition there is a varying number of naked gentlemen who somehow appoint themselves to my staff and appear unexpectedly on the bill at the end of the month as "sweeper," "water-carrier," "gardener," and what-not. Today my South Indian students, twenty or thirty of them in addition to those I brought with me from the north, are expected. This is the place, by the way, where last year I noticed Arretine pottery amongst the previous finds and where therefore, *for the first time*, we can hope to find an ancient South Indian culture objectively dated by association. Arikamedu can scarcely help becoming a classic site in the annals of Indian archaeology. But I must go and see about those students. I'll light a South Indian cigar and sample the rain.

There may have been forty of them, all told, in the thatched hut, swarthy, volatile, speaking a variety of natal languages—Tamil, Telegu, Malayalam, Hindi, Urdu—but all recurring constantly to the only tongue common to us all. The impending operation was set before them. They were to be the pioneers of protohistoric archaeology in South India. Here at Arikamedu, the ancient Pondicherry or Puduchcheri, the Podoukē of the Greek geographers, they were about to find the wine-jars and table-wares brought thither from the Mediterranean in the first century A.D. Nor was that all. Beside these wine-jars and table-wares they would find Indian things, an Indian culture, even an Indian civilization, which would share the known date of the imports and thus form a firm base for the systematization of South Indian archaeology. . . . *Only*, they must not expect *immediate* success. They would have to work for it. They might have to work for a fortnight before the first hint of success came their way.

I have never ceased to congratulate myself upon the inspiration of that last warning. We started badly, in an area which had been wrecked by brick-robbers from top to bottom. Spirits fell, and only the blessed word "fortnight" staved off the utter despair which comes all too easily to the tropical

mentality. It was in fact on the afternoon of the twelfth day that one of my students emerged from the waterlogged depths, covered with slime but waving exultantly the base of a red dish, bearing upon it the name of its Italian maker. The situation was saved. Thereafter the excavation became a triumph. By return of post the whole history of the potter and his family, the Vibieni of Arezzo, was in our hands, thanks to the prompt and liberal knowledge of Miss M. V. Taylor at Oxford. Other Italic wares and fragments of a hundred wine-jars, with a wide range of associated Indian products, sealed our success.

To find, as we happily and abundantly did, firm equations between dated imports and a native culture was archaeologically useful, and indeed epoch-making, but was not itself enough. To complete the exercise, it remained to demonstrate how such an equation could be extended for the ordering of knowledge over a wide field—over a field in some measure proportionate to peninsular India. With that end in view, and the Arikamedu material freshly in my mind, I left Pondicherry on a rapid summer-tour of the South Indian museums. Of the results of that tour suffice it that, either in these more-or-less derelict museums or on the actual sites from which their material was derived, it was not difficult to identify salient features of the Arikamedu culture and so to transfer its dating for upwards of three hundred miles from the starting-point. In particular, on the arid inland plateau of northern Mysore, where the poorest peasants in the world comb the sand anxiously with their feeble fingers in case a ground-nut or two might have escaped their earlier harvesting, there were the sites of two ancient towns where Arikamedu pottery had come to light. Once more in Simla, I wrote on July 19th to Fox.

I'm living at the United Service Club (Blimps and Blimps) and, in particular, sitting in my room after dinner and smoking a peculiarly pungent cheroot—you can probably smell it. My cigar and I are 7000 feet above the sea, on the slope of an almost vertical hillside. Facing me is the evening sun which streaks wanly through the rain-

sodden sky at 7.5 pm precisely each day. It's the rains, and by rains I mean of course Rains—the sky just falls, and even the monkeys go and hide. . . . Both my excavations have turned out as they should, especially my Roman India at Pondicherry, which was an astonishing piece of luck for my first year. During the past few weeks I've been tracing its ramifications through central India to the far west coast. Given time and reasonable peace of mind (not predictable) we'll build a backbone and a few ribs into the jelloid mass which is South Indian archaeology. . . .

In China as in India, the knowledge of cultures before the time of written history was extremely limited until comparatively recent years. The Chinese have had a superstitious aversion to digging in the soil and in particular to investigating graves. A Swedish geologist, J. Gunnar Andersson, first uncovered evidences of Neolithic cultures in China in 1921. He had gone to China in 1914 as a specialist on coal and oil resources; had become interested in the collection of fossils; and finally, as he explains in the following excerpt, from "People of the Yellow Earth," had been influenced by his own discoveries to change his career. 'Archaeology Takes Charge' is noteworthy as a description not only of important finds but also of the problems and dangers archaeologists are apt to face in remote corners of the earth.

ARCHAEOLOGY TAKES CHARGE

J. GUNNAR ANDERSSON

WHEN, ON September 15th, I returned to my old quarters in Hsi Ning it seemed probable that the whole of my Kansu journey would be a comparative failure. I had organ-

ized this undertaking in the hope of making copious discoveries of fossil vertebrates in the thick clay beds of the Kuei Te series, as also in deposits of the cretaceous formation in Eastern Kansu. These hopes had almost completely failed.

The archaeological discoveries were, it is true, geographically very interesting, but there was only one site, Lo Han T'ang, which could in some degree vie with the wealth of the dwelling-sites in Honan.

I had, however, one more duty to fulfil to satisfy my conscience. On the way up to Kokonor I had seen by the roadside, in a cutting not far from Hsi Ning, some fragments which seemed to hold some archaeological promise, and I sent two of my servants there for a test excavation.

After some days they returned, bringing with them not only a large number of fine fragments of the Yang Shao type, but also several intact urns, bought from the peasants in a village called Chu Chia Chai. These urns were, it is true, both dirty and badly worn, but nevertheless they could be described as a remarkable promise of the possibility of better discoveries.

Instead of returning home we therefore prepared for a new expedition, and thus set out for Chu Chia Chai, which lies about 20 km. upstream, on the northern bank.

Chu Chia Chai is a medium-sized country village situated close to a small watercourse, which runs from the north into the Hsi Ning river. The village consists of a larger northern portion, situated between two temples, and a smaller group of houses 400 meters farther south. North-west of the village, which lies on the plain, there rises a hill 166 meters high above the plain in the southern part of the village.

The best places in the cultural deposits were in the northern part of the village, in many cases close to the houses, so that much care and tact was required on the part of my servants to dig them out without disturbing the occupants.

During the very first days we found some complete urns in the most southerly part of the site, and I then began to seek systematically for the burial-place of the district. On the northern edge of the southern group of houses there was a pit from which the villagers fetched earth for their compost.

By carefully examining the sides of this pit I first found some small beads and then some other indications which led us to one of the richest, and in many respects most remarkable, of all the prehistoric burial-places of which I know.

It soon appeared that the graves were at a considerable depth below the surface, and we therefore had, after concluding a fitting agreement with the owner of the soil, to undertake comprehensive excavations before we reached the level of the ancient graves.

Here we dug out no less than 43 skeletons, together with a unique wealth of burial furniture. Topographically these graves showed a peculiarity which considerably increased the difficulties of our operations. It soon became clear that the objects had been moved some distance from their original position. Parts of one and the same urn were found at some distance from each other. It seemed scarcely probable that later burials had disturbed earlier ones. The disorder in the finds did not point in that direction. Neither was it probable that the peasants of more modern times had dug down to the level of the graves and disturbed them.

There exists in these districts quite a different and alternative explanation of such disturbances as we discovered there. Kansu is one of the earthquake centers of China. In 1920 a devastating earthquake passed over the country and there has since been at least one great earthquake there. I had myself had occasion to observe the catastrophic movements of the strata occasioned by the earthquake of 1920, and it seems to me far from improbable that the slight dislocations in the cemetery at Chu Chia Chai may be regarded as effects of such an earthquake.

As soon as we discovered the burial-place and were assured of its importance and wealth, we introduced a division of labor, so that all my servants were turned on to excavation work and to each one was allotted his special group of skeletons, for which he was responsible. There was a fine rivalry between them to work with a light hand and to observe carefully even the smallest indication of a new find. I myself was fully occupied with surveying first the whole site on a scale of 1:10,000 and then the cemetery, and finally

separate skeletons 1:10. But this was not all: many of the objects which came to light were extremely fragile or constituted groups which should not be disturbed in their setting. It was here that we made the fullest use of the bandaging technique which I had learned from Dr. Walter Granger, the Chief Palaeontologist of Roy Chapman Andrews' great expedition. Skeletons and other coarser objects were bandaged in flour paste and coarse brown Chinese paper, whilst smaller and especially fragile articles were treated with Chinese cotton paper and gum solution. Cotton paper is a splendid bandage material. It is extremely thin and absorbs the gum solution, so that one can paint it with a brush from the outside, which is of the utmost importance when it is a question of loose pieces, such as fragments of jars, beads, etc.

Sometimes, even the most skilful bandaging technique left me in the lurch. I then had to find another way out. The objects were cut away until they were left on the top of a column of earth, which was then impregnated from above with a thin solution of gum, a process which was repeated many times, until the earth would absorb no more solution. In this way it became as hard as brick and could be cut away without risk, together with its precious contents.

Those were happy weeks of work at Chu Chia Chai, filled with the joy and excitement of discovery, without any disturbance from outside.

Yet there was one exception! One day I was to ride the 12 miles into Hsi Ning in order to get some money from the post office and renew our stock provisions. I took Chen and Chuang with me. The district seemed so peaceful that I did not think of taking any weapons with me, but just as we were about to mount our horses Chuang came and begged me to take one of the big automatic pistols with me.

When we arrived at Hsi Ning we found that some of the Mohammedan soldiers had climbed over the roof and broken into the hotel room where I kept my paraphernalia. They had taken my typewriter into the garden, where they had been disturbed and left my machine where it was, much to my delight and with very little loss to themselves, since an

American typewriter is not exactly ready cash in the town of Hsi Ning.

The reporting of this theft to the authorities, and other arrangements, took us some hours. The dusk descended rapidly as we rode out of the town in the evening, and we soon found ourselves in unusually profound darkness. The path was narrow and we relied mainly on the horses. Chen rode first, then I, and Chuang followed with the pistol. A couple of hundred yards behind us came a cart with our baggage, and a policeman whom the sub-prefect of Hsi Ning had given me as an escort.

Just as we were riding forward, step by step, in the inky darkness through a little gorge, I noticed that Chen's horse became restless.

"The pistol, quickly," cried Chen.

What now happened did not take one-twentieth of the time it takes to relate it. By accident I knew that we were only a few hundred yards from a large village inhabited by the Mohammedans, so much feared and hated by the Chinese. Like lightning the thought flashed through my mind: For God's sake no shooting! I jumped off my horse, walked back a couple of steps and said half aloud:

"Give me the pistol."

Just as I took the heavy weapon in my hand I felt on my right elbow the pressure of the loin of a horse which was not one of our hacks. When I looked up I saw dimly in the darkness the trunk of a rider and was conscious of his felt-shod foot at my side. So it was not one of my people, who wore leather boots. In order to forestall him rather than be forestalled I dashed at the dark figure above us, pistol in hand, and felt the next instant a warm fluid pouring down on to my hand. At the second blow the fellow collapsed on the pillion. What followed was in the nature of a tragedy-comedy. Like a couple of angry bears, my two men jumped on the arch-enemy lying on the ground and began to belabor him with their nailed shoes. After a moment I took them by the arm and said:

"Now he seems to have had enough; take him to the side of the road so that he doesn't frighten our horses!"

At this moment Chen pointed to the other side of the stream and cried out:

"Anlaoyeh, there is another!" and we could dimly perceive a second rider.

"Come along, and fetch your friend!" I called to him, but instead of accepting my invitation, he turned his horse and rode away towards the village. We waited a little until the policeman arrived with our cart. He got out, lit a match and looked at the man by the roadside.

"Splendid," said he, "this is one of the worst of the Mohammedan petty robbers. Now he will keep quiet for a bit."

We hastened past the Mohammedan village before its inhabitants could be astir, and afterwards we never heard a breath of this night episode.

"*Hsiao tufei*," petty robber, is a type which goes out in couples in the darkness of the evening to levy toll on simple unarmed travellers on their way home. I imagine that this pair were not at all expecting us, as we were well known to be a little troublesome.

When I travel in the dark it is my habit to remove my glasses and place them in my hat, as I can get on better in the darkness without them. During the few moments when I settled matters with this robber one thought alone possessed me—to forestall him so that he should not break my irreplaceable glasses.

Our discoveries at Chu Chia Chai confirm in every way that the burial-place in the most southerly part of the site and the dwelling place are contemporaneous (Yang Shao age) and belong to the same group of people.

The chief interest of the Chu Chia Chai discovery is connected with the finds of various sorts which we made together with the fragmentary and, in the light of our later discoveries, scanty, burial ceramics. I shall now with all brevity mention some of the most sensational of these finds.

Together with a skeleton we found a bone knife, which is common as early as the Lo Han T'ang dwelling-site, and is also to be found at Kokonor. This knife is made of bone and provided with a groove on one edge. When I made my first

discovery I was fairly certain that this groove was intended for securing flint chips, which constituted the cutting edge of the knife, but it was a great triumph for us when we found in these graves a knife in which the flint chips were still intact in their original position. Together with another skeleton we made an even more remarkable discovery. Close to the arm of a skeleton lay a whole group of carefully formed thin bone plates, on one side long lancet-shaped plates, and on the other, fitting into the bone lancets, short triangular bone plates.

So also beside the other arm a similar group of bone plates probably existed, to judge by the fact that a long lancet-shaped bone splint of exactly the same shape as in the large group was found close to the bone of this arm.

The most natural interpretation of these bone splints is surely that they constituted a sort of bone armor, possibly sewn to the sleeves. Considering that these bone splints are very thin, this armor may have been rather ornamental than defensive. A closer examination of this remarkable discovery has not yet been made.

Perhaps the most important discovery of all at Chu Chia Chai were the groups (up to 7 pieces) of small, thin, rectangular bone plates, lying close together, 12-22 mm. long and 3-8 mm. broad. Some of these plates are perfectly smooth, others have a hook on the edge and others again diagonal cuts across the plate. Here also the considerable quantity of material has not been examined in detail, but it seems quite reasonable, as I suggested in my preliminary report in 1925, to suppose that these plates represent some kind of primitive writing or at any rate a method of recording certain facts or ideas.

Finally, we should mention that at Chu Chia Chai we found for the first time quantities of beads, worn by the dead, and also simply carved pendants of a blue-green turquoise-like stone.

The discovery of the rich, and in many respects unique, site at Chu Chia Chai in the Hsi Ning valley marks a turning point in my life. It determined me to remain in Kansu

for one more summer, and it was the beginning of a series of great archaeological discoveries which caused me to abandon entirely my geological work in order to devote the rest of my life to archaeological research.

As soon as the Chu Chia Chai collections were finally packed, I moved my caravan by the shortest route to the provincial capital of Lanchow. On the outskirts of the town I rented a nice clean house, belonging to a Mohammedan of the name of Ma.

My abundant discoveries at Chu Chia Chai had convinced me that important prehistoric treasures in Kansu only awaited someone to discover them, but at the turn of the year I had no idea whither I should go. A kind fate then came to my assistance.

At that time there lived in the provincial capital of Lanchow a British missionary of the name of George Findlay Andrew. He was a man of about thirty-four, widely travelled, slim, and an enthusiastic explorer, who was most at home on the country roads and not adverse to adventure or danger. As a missionary he did not drink the excellent whisky for which his country is famous, but nevertheless he could stand on the table on festive occasions and sing the excellent Scottish songs as well as he could preach—as few others—in his church or missionary school. Owing to his cheerful, sunny temperament and his incorruptible honesty he was loved by foreigners and natives alike and, curiously enough, enjoyed the confidence both of the Chinese and of their arch-enemies, the Mohammedans. He was probably most interested in the latter and has written a book on the Mohammedans in Kansu.

When, in the latter part of November 1922, we returned to Lanchow, resolved to go into winter quarters in preparation for a new working season, Andrew invited me to give an address on our work to the schoolboys in his missionary school. I accepted the invitation in the hope of obtaining from the boys or their relatives information concerning the unknown sites of prehistoric civilization which more and more began to capture my interest. I consequently first gave an account of our geological and archaeological work and

then asked the boys to make inquiries in various parts of the province as to the occurrence of burial urns and other prehistoric objects of the kind which we had found in the Hsi Ning district.

Some days later I received a short note from Andrew reading as follows:

"I have something which may interest you. Come and look at it when convenient."

There was something in the tone of his note which led me to believe that there was more behind this invitation than the mere words indicated. I therefore immediately ordered my *mafu* to saddle two horses, and some minutes later we raised the dust as we galloped off to the mission station.

When we arrived, my enthusiasm was somewhat damped. Andrew was in his school and could not be seen for another half-hour.

"But," added his wife, "there is something in the hut out there which you may care to look at while you are waiting."

I went out and saw something which almost made my knees give way beneath me; a strange feeling, never experienced before, of astonishment, joy, fear and wild hope overwhelmed me.

On the table in front of me stood a perfectly intact burial urn with wonderfully well-preserved painting. The type was perfectly well known to me from excavations at Hsi Ning, and it was instantly clear that this was a burial urn from the close of the Stone Age, 5,000 years old, though this specimen was larger, and in particular more richly and more finely painted than anything I could imagine in these parts. This was a find which fully equalled, if it did not even surpass, the best that had been found of the same period in the Near East or the Eastern Mediterranean. It was a magnificent discovery, and I stretched out my hands, trembling with eagerness. But it was much more than that—it was a promise, above all things, of untold possibilities of other discoveries.

Andrew told me that the urn belonged to an ex-official who had been taoyin in Chinchow in Southern Kansu and that he was reported to possess some more urns of the same kind, which he, Andrew, would arrange for me to inspect.

"But," said Andrew, "please come on foot, by the back door for preference. The more cautiously we approach, the better will be our prospects of gaining possession of the urns."

Andrew had not in any way exaggerated. The other urns were more than double the size of the first, and one of them is, in respect of character and richness of design, one of our greatest treasures, even taking into consideration that we subsequently obtained several hundreds for our collection.

I left the conclusion of the business in Andrew's hands and he conducted the negotiations with the owner so wisely and so discreetly that within a few days the five superb pieces were our property at a price which must be regarded as very moderate.

The acquisition of five magnificent burial urns spurred me on to further endeavors during the winter to make additional purchases and thereby to prepare for the coming working season. I visited all the dealers in antiques in Lanchow, but found that they knew nothing of the prehistoric burial urns. As a result of repeated inquiries, however, some further fine specimens came into my possession, and there gradually developed a formal trade in these burial urns, many of which had evidently been preserved for a long time in the homes of modern Chinese, to judge by the varnish and the dust with which they are covered.

The supply of these clay vessels—so important to me—was at first small, and prices rose higher every week, especially as Chinese officials and other private persons in the town had heard of my purchases and began to compete with me for the best pieces. A number of rare objects which I should extremely gladly have incorporated in my collection were lost to me, whilst at the same time my own purchases had made very serious inroads on my treasury. For a time things looked very black.

My utmost desire was, naturally, to discover the places from which these fine burial urns came, but all attempts to induce buyers to reveal their secret were unavailing. We soon discovered that all information on this point was, to say the least, unreliable. If a buyer said an urn came from the

north one could be pretty certain that it had been found in the south, and we soon realized that there was no purpose in making such inquiries.

But then, at the beginning of March, much larger quantities of these urns began to arrive, and I could easily see by their appearance that many of them had been quite recently dug out of the earth. The supply of material had now become so abundant that I was able to choose and take only especially fine specimens or rare types. And I foresaw with certainty that one day I should be able to press down prices.

Every day there came to my house three or four different groups selling urns, and there was endless bargaining, whilst frequently in a single day thirty-odd urns or more would pass through my hands. I soon understood, however, that the various sellers had formed a syndicate, of which the members had undertaken not to accept any lowering of prices. I felt as if I stood before an insurmountable wall, and my money melted away with alarming rapidity.

Then one morning I had no less than six groups of sellers, representing at least fifty urns, in my house, and I thought the time had come to venture my coup.

I selected from the various groups a score of urns which I wished to acquire and offered for them prices which were very liberal, though somewhat less than the highly exaggerated prices which I had hitherto been obliged to pay. The Chinese looked questioningly at each other and shook their heads as a sign that my offer was not acceptable.

I made a little speech to them somewhat in the following terms:

"You know that these urns had no value till I came here. Nobody before me asked for them, and if I go away from Lanchow the demand will soon disappear, for the people in the town only buy them because I am interested in them. I am willing to pay you generous, but reasonable prices. If you don't agree I must leave the town and do some other work. Think it over and let me know what you decide."

I waited a little and then added:

"You must accept my offer or leave my house."

I saw a sign from the one who seemed to be the leader,

and then they all nodded in confirmation that the matter was agreed and my price accepted.

During the following days the situation developed with the speed of an avalanche. My house was positively besieged by groups of men wanting to sell me urns. It was said that out on the roads men were seen time after time carrying urns to Lanchow.

I now thought that the time had come to make a resolute attempt to discover where these quantities of large, superb, prehistoric burial urns came from.

I called in my most trusted man Chuang and had a confidential talk with him. I said:

"Chuang, here are fifty dollars; go and make friends with the urn dealers and their assistants. Urns are now so cheap that it will not be difficult to find out where they come from. Entertain the old fellows, if necessary, but don't come back until you can tell me where the place is."

Chuang vanished for two whole days, but then one morning he turned up looking pale and with trembling hands, but beaming with joy and eagerness.

"Anlaoyeh," said he, "now I want one of the horses and 200 dollars and I shall perhaps be away a week."

I knew my man and knew that he would not betray my trust. He got what he asked, and the strongest of our horses was put at his disposal, for I knew that it would be a testing reconnaissance.

Chuang was away a week; then he returned with a whole mule caravan laden with large and splendid burial urns, among which I noticed one of an entirely unknown type, which certainly belonged to a hitherto unknown prehistoric period.

He reported that he had journeyed over 200 Chinese li to the south to the neighborhood of the town of Titao, in a district on the western bank of the T'ao River, populated entirely by Mohammedans. There he had been able to see the cemetery from which most of our fine large urns had come. Owing to the demand which we had created for these prehistoric relics, the Mohammedans had collected them in their hundreds in the old cemeteries. They had dug planlessly

right and left, and when different parties came into conflict they had fought regular battles, in which one day a man with a spade had struck off the hand of his opponent. The consequence had been that the official in charge of the district in question had sent soldiers to see that no further excavations were made.

I now clearly understood that as a result of our purchases a most deplorable spoliation of graves in these prehistoric cemeteries had taken place, and in order to do what I could to prevent further violation I visited the governor and suggested that he should instruct the local authorities to see that the local population should not commit further outrages against these precious scientific monuments of ancient civilizations.

We prepared for several months' absence from Lanchow and broke up for the south on April 23rd, in order to explore this new site which the urn traffic in Lanchow brought to our knowledge. It was only on June 26th that I had an opportunity of myself visiting the sites.

We left our quarters early in the morning, accompanied by Chuang and two Mohammedan porters and guides. All the cemeteries of the prehistoric period in question which we had hitherto examined had been situated close to their respective dwelling-sites, or in other words, the prehistoric habitations and cemeteries had lain side by side. It therefore seemed to us most surprising when our guides led us out of the valley higher and higher up the western slopes. We ascended hundreds of meters. The fertile valley bottom now lay far below us like a deep green ribbon, and the view began to extend over distant valleys which I had not seen before. I asked the men if we should soon arrive at the graves.

"No," they answered, "higher, much higher, up."

Two hundred meters higher up we rode along paths which wound in sharp curves up the steep valley side. We had now reached an entirely different landscape. There was an open view for 50 km. on all sides. I looked out upon a number of hills and ridges, all of about the same height, and thus con-

stituting an old, but now broken, plateau, which in the east continued unbroken as far as the horizon, but on the south and west at a distance of about 30 miles was bounded by a high dark wall of mountains which marks the boundary of the Tibetan highlands. We were now 2,200 meters above the sea and the mountain wall to the south-west was between three and four thousand meters high.

We had reached a height from which we had a completely open view in all directions. Here I saw the traces of extensive excavations, and in the earth thrown up were visible everywhere fragments of painted vessels of the same kind as the magnificent, intact vessels which we had bought at Lanchow. It was evident that many vessels had been crushed in the graves by the pressure of the earth and that others had been broken in the competition of the villagers to despoil the old graves of their treasures.

The extent of the cemetery was clearly indicated by the recent excavations, which had fairly completely plundered the whole of the site. The cunning Mohammedans had made yard-long iron probes, with which they had dragged the ground and with striking accuracy localized every burial urn which was not more than one meter below the surface.

After we had hastily examined this first site, my guides conducted me to a second cemetery of the same kind, and it soon became clear to me how many hundreds of graves containing burial ware of unique size and beauty had been looted by a desecration which had for all time rendered impossible a scientific investigation of the connection between the various objects in the graves. It was poor comfort that we had been able to acquire by purchase almost all the more interesting burial urns. It is more important that, but for the large scale urn business in Lanchow, we should not have known at all of the existence of these remarkable sites.

When I had thought out, with very mixed feelings, the course of events, I sat down and tried to reconstruct the conditions under which these in many respects unique accumulations of graves had come into existence. Each of the five grave sites is situated on one of the highest hills in the district, surrounded by steep and deep ravines, 400 meters

above the floor of the neighboring T'ao valley. Continued investigation fully confirmed my first surmise that these cemeteries, situated on the highest hill-tops, must have belonged to the habitations of the same period down on the valley terraces. It then became clear that the settlers in the T'ao valley of that age carried their dead 10 km. or more from the villages up steep paths to hill-tops situated fully 400 meters above the dwellings of the living to resting places from which they could behold in a wide circle the place where they had grown up, worked, grown grey and at last found a grave swept by the winds and bathed in sunshine.

It must indeed have been a strong, virile and nature-loving people which was at pains to give to its departed such a dominating resting place, and as I sat there on a grave mound that sunlight day in June I tried in imagination to reconstruct the funeral procession which assuredly slowly wound its way with great pomp and now for ever forgotten ceremonies up the mountain sides.

It was now a question of saving what remained of undisturbed evidence of the old graves, and in order to facilitate my work, I removed the whole of my staff to the nearest farm where suitable quarters could be obtained.

This farm happened to belong to a rich young Mohammedan of the name of Ma, who was so exceedingly kind as to place his best house at my disposal and another at that of my servants and soldiers. He himself had previously lived in the large house with his two young wives and a whole bunch of little children, but he now removed the whole family to another much smaller house, and I greatly appreciated his kindness in giving up the best premises to me.

Ma's two wives were quite young and, as far as I could judge, of about the same age. They were pretty little creatures, but extremely shy. I only saw them properly on two occasions, once when I came home unexpectedly and found them in my house examining my things, and the second time when we left the place and they came out to nod farewell to us. But their seemingly modesty was combined with considerable curiosity. The little ladies' window was diagonally opposite mine, and whenever I looked out in their direction

I always saw a pair of interested eyes seeking a glimpse of the curious foreign devil. We used to call them Huang-Yang, gazelles, because they were so shy.

But there was another woman in Ma's house who was not at all timid, and that was his old grandmother. Ma's parents were dead, but his grandmother lived, and although she was old and wrinkled and hobbled about on a stick, she ruled the whole household. Not only did the two wives and the small children obey her least sign, but my men and my soldiers stood to attention when granny was hobbling around. She ruled and ordered even in my house, with the consequence that I had to pack up all my collections so that the old lady might not mix up my labels, for which she had very little respect.

For a long time we sought for graves which had escaped the ravages of the villagers. For several days it looked as if the whole district had been completely plundered, but finally Chuang made a magnificent discovery at Pien Chia Kou. It was, in fact, the most splendid grave which we found during the whole of the Kansu expedition.

One exquisitely painted jar after another was laid bare during our careful excavations, and in the end we beheld twelve burial urns placed round the skeleton of a full-grown man, who lay on his left side with his knees drawn up. Two polished stone axes and two whetstones close to his head completed the ample equipment of the grave.

It was not possible to complete the major excavation the same day as we made the discovery, so I had one of our small tents pitched on the spot and left the two soldiers to guard the site. Early the following morning I was up on the mountain, but found the situation changed in an alarming way. The whole slope was swarming with Mohammedans. One of the soldiers met me a short distance down the slope, evidently much perturbed.

"Anlaoyeh," he said, "many Mohammedans have come, more than 200. I am afraid they will make war on us. Cannot Anlaoyeh make haste with the old man's bones so that we can go back to Titao? I think that would be best."

We had now reached the cemetery and I saw to my in-

describable joy that nothing had been touched in the grave. But round about sat a couple of hundred men from the villages, looking very serious.

In the middle of the crowd, on one of our tarpaulins, which one of the soldiers had laid out, sat an old Mohammeden with large horn spectacles on his nose. He looked very venerable and pleasant. He rose up and advanced to meet me. We saluted each other according to all the rules of Chinese etiquette. Then we sat down together on the tarpaulin and began to talk.

He explained that our excavations had aroused general hostility in the neighborhood and that he expected serious difficulties if I did not kindly abandon the work and leave the district.

I saw that there was little prospect of defying such a widely held opinion. I therefore decided to concentrate entirely on the unique grave which was for the most part laid bare before our eyes.

I told him that I was quite willing to agree with him and to undertake not to look for any more graves, but I made clear to him at the same time that under all circumstances and without regard to what the villagers proposed to do, I was resolved to complete the excavation which we had begun the previous day.

He explained that he fully understood my point of view and promised to order the men present to give me every assistance during the day on condition that this would be the last excavation. Thus we became good friends and in the end I took a photograph of the original old gentleman.

Towards midday we had the grave so cleaned up that I could take my photographs and make the necessary detailed measurements. Whilst I was doing this I saw a dark bank of clouds mounting up in the west and I knew only too well what that meant. We hurried on our work as much as possible, and just as we had collected the last bones of the skeleton the first raindrops fell. We then hastily retreated to the little tent, where we sat for several hours, packed like sardines in a box, among urns and packages of bones, with a torrent of rain streaming down around us. At dusk the rain

abated somewhat and we wandered back to Ma's house over steep mountain paths, which were now so slippery from the rain that the men had to dig down to dry earth with their spades in the most difficult streams.

Just as the T'ao valley with its confusing maze of prehistoric sites will certainly one day in the future be regarded as one of the foremost fields of prehistoric research in the world, ranking with the rich sites of the Eastern Mediterranean, the Nile valley and the river areas of the Tigris and the Euphrates, so also we may say without the least exaggeration that the P'an Shan district, with its five cemeteries high up on the hill-tops, is one of the most magnificent burial-places left to us by prehistoric peoples. It is true that the graves were here invisible beneath their grass covering when the great spoliation began in the spring of 1924. No giant megalithic structures bore witness here to the industrious and virile people slumbering in the windswept graves. But in the majestic free situation of the cemetery, as in the perfect modelling of the burial urns and the finished beauty of their decoration, following inexorable laws of design, these burial-places are perhaps without parallel in the history of the human race.

The history of the peoples of the Pacific Islands has been a matter of speculation and controversy. Their beginnings on some sunken continent, their descent from the lost Ten Tribes, and other legendary accounts have been suggested. Thor Heyerdahl's theory of their origin on the South American continent, which led to the voyage recorded in the best-selling Kon-Tiki, is received with suspicion by archaeologists. In his book entitled Easter Island, Métraux criticizes Heyerdahl's thesis on linguistic grounds and because of "the existence of numerous cultivated plants of Asian origin on the most distant islands of Polynesia." The generally accepted theory is that the

islands were populated by successive waves of seafarers from the continent of Asia.

Among the fascinating and puzzling monuments of the Pacific reported by early explorers were the giant statues of Easter Island. An examination of these statues in 1914 by the British anthropologist Mrs. Scoresby Routledge served to dissipate many false ideas about them. Later, as Métraux points out, scripts which seemed to bear some relationship to recently discovered Indus Valley writing (see Sir Mortimer Wheeler's article beginning on p. 264) intensified interest in the island's history. As a result, a French expedition, whose ethnographic and linguistic enquiries were headed by Métraux, was organized in 1934. Métraux concludes that "certain riddles of Easter Island remain only half-solved and will perhaps never be fully elucidated." His article illustrates the close connection between anthropology and archaeology.

Alfred Métraux is a native of Switzerland who received his doctorate at the University of Paris. He has done research and has held posts in such diverse localities as Argentina and Hawaii, and in Haiti where his investigations resulted in a book on voodoo. He has been a Visiting Professor at Yale and has served on the staffs of the Smithsonian Institution and UNESCO.

EASTER ISLAND

ALFRED MÉTRAUX

A TREELESS volcanic rock, scarcely 13 miles long and 7 miles wide, slowly being eaten away by the waves and lost in the great emptiness of the Pacific Ocean—2,000 miles off the coast of Chile and 1,500 miles from the nearest Polynesian archipelago—this is Easter Island, the most isolated spot ever inhabited by man. Today it supports a mere handful of natives, mostly half-castes, and many of them lepers.

These 450 people, now under Chilean rule, are the only descendants of the men who created there one of the most original civilizations that have left a trace behind. Yet they have all but forgotten their past.

For two centuries, the name of the island has been almost synonymous with mystery. In the world of ethnologists it occupies a place much like that of the isles of fancy in children's imaginations.

The sense of mystery which still surrounds this lonely rock was first aroused on Easter Sunday, 1722, when the Dutch Admiral Roggeveen, in command of three frigates cruising about the Pacific in search of the fabulous Davis Land, saw the dome-shaped peaks of its volcanoes jutting above the horizon. From the decks of their ships his sailors, as they drew nearer, could discern all along the cliffs of this unknown shore an army of gigantic statues, which completely overshadowed a small band of naked and noisy savages on the beach below. The visit of the Dutch discoverers did not last long, but they carried back to Europe the strange tale of a solitary, desolate island guarded by colossal stone images, far too heavy and impressive to have been carved and erected by the few primitive people they found living there.

Later in the eighteenth century, and afterward, Easter Island was visited in succession by several other great navigators: Cook, La Pérouse, Kotzebue, Beechey. They, too, saw with amazement the stone monsters, measured them, and even sketched them. To their minds also, the contrast between the monuments, indicative of a flourishing and skillful population, and the desolation they found about them was a peculiar enigma. They spoke of cataclysms, of volcanic eruptions, that might have changed the course of the island's history, but these were pure guesses based on superficial observation.

In the first half of the nineteenth century, a different group of visitors appeared. These were the whalers, most of them enterprising New Englanders in pursuit of business and adventure in the South Seas. A few echoes of their experiences come to us in indirect ways. Thus we know that the captain of one of these ships kidnapped several men

who afterward escaped and tried to swim back to their island although they were 3 days out. It is not surprising that relations between the whalers and the natives were far from cordial. Too often the ships' officers resorted to impressing the islanders into their service. Such incidents explain the hostility shown to some European navigators between 1820 and 1830 when they attempted to land. But these brief visits of Yankee sailors were not without benefit to the study of Easter Island. Thanks to their collecting instinct, numerous precious specimens of its early art have been well preserved in the Peabody Museum at Cambridge and the Peabody Museum at Salem. In Cambridge, besides various wood and stone carvings, there are two images brought from the island, made of bark stuffed with bulrushes, which represent a branch of its artistic tradition otherwise entirely unknown. They are covered with painted designs that reproduce, with fine and precise workmanship, the elaborate patterns used in tattooing up to a hundred years ago. In this respect the old Easter Islanders rivaled the achievements of the Marquesans.

In 1859 a frightful disaster befell the islanders when Peruvian blackbirders attacked the island and kidnapped the king, a large number of the nobles and priests, and many hundred commoners, all of whom were carried off to the guano islands of Peru to work as slaves. Most of the people died within a short time. When at last the few survivors were repatriated by a French ship, they spread among the remaining islanders the smallpox and tuberculosis contracted in Peru. Thus within a few years most of the native population and with them the vital links with the past were wantonly destroyed.

The mystery of Easter Island became still deeper when, in 1864, the first Christian missionaries (members of the French Order of the Sacred Heart) arrived and tried to obtain from the natives details about the origin of the statues, and the methods that had been used to transport them—since many of them had obviously been moved from the place where the stone was quarried. Their answers to questions of this kind were unilluminating and showed that they

had only a vague tradition of what had happened before their time. Their ignorance, combined with the state of primitive poverty into which they had fallen, again emphasized their enigmatic relation to the lost civilization, of which the statues and great stone mausoleums as well as other finely wrought remains of the past were mute evidence.

Then scientists began to study Easter Island. At what time and by what manner of men, they asked, were these images made, with their colossal bulk, their empty eyes and scornful expressions? Was the island the remnant of a sunken continent? Had it been inhabited by a powerful earlier race which had died out, or been destroyed and displaced by more warlike conquerors? Had eruptions of the volcanoes exterminated the skilled craftsmen, the sculptors, and the architects, leaving only a small group of people too discouraged and weak to continue the work of their forefathers? These are among the questions that still puzzle students.

The statues symbolize the mystery of the island and have made it famous. Yet their paradoxical presence on this speck of land in the midst of the Pacific is perhaps less difficult to understand than are the wooden tablets covered with small incised designs that were collected from the natives in the second half of the last century. The tablets raised the fascinating question whether their makers used on them a kind of hieroglyphic script which might some day be deciphered and would unveil the secret of its past. But all attempts to decipher them, with the help of intelligent natives, failed.

A few years ago the study of the tablets took an unexpected turn. A Hungarian linguist, Guillaume de Hevesy, published a long list of Easter Island hieroglyphs which, it was claimed, presented very striking analogies with the symbols of a newly discovered script found in the ruins of a civilization, 5,000 years old, in the Indus Valley at Mohenjo-daro and Harappa. There, coetaneous with the Sumerian civilization, flourished large and opulent cities inhabited by people whose name and affiliations are totally unknown to us. They were wiped out probably at the time of the Aryan, and their existence remained unsuspected until the great excavations of Sir John Marshall. The Mohenjo-daro people

have left a great many inscriptions on seals which have so far resisted any attempt at decipherment. If it could be shown that the two scripts were related, new light might be thrown on the obscure past of the whole Pacific area.

The problem thus posed was of such significance for an understanding of the early history of man that the French Government in association with the Belgian Government decided to organize an expedition to Easter Island to try to read its riddle. The leader of the expedition was a French archaeologist, Charles Watelin, who, unfortunately, died in Tierra del Fuego. I was then asked to carry on the research, in association with the Belgian archaeologist, Dr. Henry Lavachery.

We saw Easter Island for the first time on a rainy day in winter. It was also my first sight of a Polynesian island. I did not expect, of course, to find the classic coconut palms and hibiscus, for I knew that the island was without trees or shrubs, but I certainly had not imagined that this outpost of the sunny islands in the South Seas would remind me, as it did at once, of the coasts of Sweden and Norway. When the cruiser on which we had made the voyage anchored off Hangaroa, the only modern village on the island, memories of Scandinavia came even more vividly into my mind as I examined through my field glasses the frame houses of the natives, which are of a type common in northern Europe. The capital of the legendary Easter Island looked, for all the world, like a humble fishermen's hamlet seen in a fog on the Baltic.

I shall never forget that first day when we were anchored just off the little harbor. Gusts of wind drove long rollers against the shore with such force that they broke amid spouts of spray with a deep pounding. In front of the sandy cove, the waves piled up over a bar that, it seemed, nobody could cross. The natives gathered on the beach did not appear very eager to meet us, but the *karanga*, the cries which announce any important event, had sounded in the village, and from everywhere, on all the paths leading to the sea, we could see men on horseback coming at full speed. Near the boathouses a palaver was held, and on the outcome of that

everything depended. The commander of the cruiser had decided that on no condition would he put us and our 90 boxes of equipment ashore. Our only hope for an immediate and safe landing lay with the natives.

Suddenly we saw them rush to the boathouses, drag three canoes toward the sea, jump into them and disappear in the surf. We held our breath, expecting the canoes to capsize in their attempt to cross the bar. But after a short time, one, two, then all three surged up from the wall of water and headed toward our ship. The men were received with cheers, a well-deserved tribute to their courage and skill.

When the canoes reached our ship we saw that they were full of natives wearing the most surprising disguises. The majority were dressed in old uniforms of the Chilean navy. In one canoe there were, it appeared, lieutenants, admirals, surgeons, and engineers. A few had also put on feather head-dresses, similar to those in which their ancestors had received Captain Cook, but they wore them merely as an advertisement of the native wares of all kinds which they wished to trade for shirts and sailors' caps.

Each time I find myself using the word "natives" for the modern inhabitants of Easter Island, I have a hesitant feeling, just as hesitant as on that day when I first saw their faces over the railing. I could not decide whether these men were a heterogeneous crowd of European beachcombers or real Polynesians, the sons of the sea rovers who had colonized the island. That European blood flowed in their veins, there was no doubt. Some of the men who came aboard and tried to sell their curios looked decidedly French; others might almost have had brothers or cousins in Hamburg or in London. Yet there was something exotic in all of them and traces of old Polynesian descent could be seen in their black, wavy hair, in the strange, vivacious dark eyes, in the high foreheads. These first Easter Islanders whom I met impressed me as of mixed race. Later, genealogical investigations showed that only a third of the present inhabitants could claim descent from a pure Polynesian ancestry—and the claims were not always well attested.

There is one misconception about these people which

should be dispelled. It has been stated over and over again that the modern Easter Islanders are a degenerate population and that they can have nothing in common with the people who carved the statues and inscribed the tablets. This is not true. They appeared to me in many ways to be highly gifted.

During the 6 months I spent on the island, I found myself compelled to admire their ingenuity and their remarkable talent for assimilation. No European village has given me the impression of more intelligent adaptation to a changing world. This capacity is doubtless responsible, in part, for the passing of the old culture. Though the most isolated people in the world, the Easter Islanders are constantly on the lookout for new ideas, new fashions—and also new vices. Their extraordinary faculty for exploiting any weakness or interest in their visitors has had some amusing results. For example, a few years after the missionaries came to the island, the natives started to speculate on the antiquities and on the mysterious past of their little country. Finding that foreigners were interested in the small wooden images of emaciated figures which had been one of their forefathers' greatest artistic achievements, they proceeded to produce crude imitations by the hundreds. The modern craftsmen are without illusion as to the perfection of their work, but they excuse themselves by saying: "Why should we bother about beauty and finish when our patrons don't discriminate between good and bad images and we get in exchange the soap and clothes we want?" Thanks to this commercial instinct, several of their old industries have been kept alive.

One of their greatest and most profitable activities is palming off on amateur archaeologists rough stones alleged to be ancient artifacts or well-made imitations of them. The very day of my landing a native cynically proposed to cooperate with me in faking old implements and works of art. His idea was that since I had books and photographs showing the designs and he had the manual skill we might form an ideal, not to say a profitable, partnership. I must confess that on several occasions the islanders' skillful imitations completely deceived me, and I thus acquired a beautiful collection of

ancient stone hooks that I only gradually realized were modern copies.

This continued practice of the traditional arts has a certain historical bearing. It suggests that there has never been a complete breach in Easter Island civilization and that the present natives, however mixed in blood they may be, are, nevertheless, the successors in direct line of the unknown men who carved the old wooden images that are nowadays prized specimens in our museums.

Unfortunately, this is not the only old custom which has survived. From the time when the Dutch discovered the island to the present, its people have had the reputation of being the cleverest thieves in the South Seas, and quite rightly. This complaint is repeated in all the accounts of the early navigators, and many of the dramatic incidents on the beach of Hangaroa have arisen from the natives' brazen contempt for the sanctity of private property. Only the sensitive and elegant French explorer La Pérouse adopted the policy of laughing at such pilfering, and paid no further attention to it. He and his men were amused by the attitude of the native women who helped their mates pick pockets by distracting the attention of innocent victims through entreaties and "ludicrous gestures."

The natives of our day are just as thievish as their forefathers, and this wayward disposition is the cause of endless troubles for the English company which has leased the island from the Chilean Government for sheep raising. To prevent constant stealing of the sheep the company put barbed wire across the island in an attempt to force the people to remain within the bounds of their village. But such drastic measures were of little avail, and in the year I spent there 3,000 sheep disappeared. Though the culprits are known to the whole community, family loyalty protects them and makes investigation useless.

Otherwise the natives are law-abiding and peaceful; there are very few records of murder or bloody violence among them. The only criminal we heard of was one of our guides, who, ironically enough, proved to be about the only honest man on the island.

The people live as they did in the past, on the produce of their fields. Taros, sweet potatoes, yams, bananas, and sugarcane grow abundantly on the fertile volcanic soil. The only wants they cannot supply themselves are for manufactured goods such as soap. And they like especially to get foreign clothing. In this matter, the men do well for themselves by barter with the white sailors who visit the island, but the women cannot be so provided. They complain bitterly of the difficulty they have in satisfying their coquettish taste.

For an anthropologist, the material on Easter Island is rather scant. The old culture has nearly gone. No Westerner ever saw it while it was still functioning. The data on the past, which can be gathered, are limited to statements or tales which a few people have heard from fathers or grandfathers. Nevertheless, I was surprised to find a relatively rich folklore, which helped me to understand many aspects of the ancient civilization. Both legends and anecdotes stress cannibalism, which seems to have haunted the imagination of the Easter Islanders before the arrival of Christianity.

Those who expect to find in these traditions any evidence for the existence of a civilization previous to that of the Polynesians will be sadly disappointed. There is not a single feature of the Easter Island lore that does not point toward Polynesian origin. The language itself is pure Polynesian, and no words now in use hint of a legacy from any other linguistic stock.

These are the main facts to bear in mind as we turn to the problem posed by the mysterious gigantic statues and the inscribed tablets. But before we go into it, we must first consider what is to be said of the theory that the island is a peak of a sunken continent, since upon this assumption the classic interpretation of its mysteries has for a long time rested. There is no scientific evidence that Easter Island is the wreckage of such a sunken continent—Lemuria or Atlantis. It is plainly a typical volcanic island of recent origin, formed by a series of eruptions originating on the floor of the ocean. Soundings have revealed a depth of 1,770 fathoms 20 miles from its coast. Moreover, when the island was settled by Polynesian migrants it does not seem to have

been much more extensive than it is now. Its coasts are subjected to continual erosion from the waves, and it is true that during the last decades a few of the monuments which once stood on the top of a high cliff have been precipitated into the sea. But since the ancient sanctuaries were erected along the shore, if the erosion had been very great, all of them would have been washed away by now. There has also been a question about a great road which, it is said, ran to the shore of the island and continued under water, suggesting that the shore was once much farther out. The famous French writer, Pierre Loti, was, if I am not mistaken, the first to mention this "triumphal avenue," which he thought would lead to the heart of the mystery. On a simple statement of this traveling poet visions of submerged glory have been based, and many good minds have allowed their imaginations to follow the submarine road down to enchanted palaces. The truth is that no such road exists. What Loti took for a paved highway is seen on close examination to be only a bed of lava that in its flow reached the sea.

Other writers, abandoning the hypothesis of the sunken continent, have advanced the view that Easter Island is the center of an archipelago which vanished beneath the waves in a great cataclysm not so many centuries ago. They suggest further that the inhabitants of this supposed string of islands had used Easter Island as a burial place for their dead. According to this surmise, the dream Land of Davis would have been among the many islands that were submerged. But no geological facts can be found to support this theory either. We know, too, that the sanctuaries of Easter Island continued to be used as burial places by the islanders as recently as 70 years ago. Ruins of old villages near the monuments are added evidence that this speck of land was inhabited by the living in former times as it is today, and that it could not have been merely a mausoleum.

However, there remains the baffling fact that such a diminutive island is covered with great statues, some of them 30 or 40 feet high and weighing many tons. Despite my skepticism about the elaborate theories offered in explanation of this miraculous flowering of sculpture, I must con-

fess that I, too, like all previous travelers to the island, was overwhelmed by a feeling of astonishment and awe when I first saw them.

There are few spectacles in the world more impressive than the sight of the statue quarry on the slopes of Ranorakū. The place is indeed sinister. Imagine a half-crumbled volcano, a black shore line, and huge cliffs which rise up from the sea with smooth green pastures above them. Guarding the quarry, near the volcano, is an army of giant stone figures scattered in the most picturesque disorder. Most of them still stand out boldly. Successive landslides have partially covered others, so that only their heads emerge from the ground, like those of a cursed race buried alive in quicksand. Behind the rows of the erect statues, along the slopes of the volcano, there are 150 figures still in the process of being born. Wherever one looks in the quarry, one sees half-finished sculpture. Ledges of the mountain have been given human shape. Caves have been opened in which statues rest like those on medieval sepulchers in the crypt of some great cathedral. Hardly a single surface has been left uncarved by the artists in their frenzy to exploit the soft tufa of the mountain.

There is something weird in the sight of this deserted workshop with the dead giants all about. At every step, one stumbles over discarded stone hammers. It is as if the quarry had been abandoned on the eve of some holiday, and the workers were expecting on the day after to return and resume their tasks; indeed, in several cases, only a few more blows would have been needed to cut the statues finally free from the rock of the slope.

In my opinion, the seemingly sudden interruption of work in the quarry is the most puzzling problem presented by Easter Island. Such an abrupt stoppage in the sculptors' activity suggests some unforeseen catastrophe, some extraordinary event which upset the entire life of the place. The natives have always had the idea that magic was at the bottom of the trouble whatever it was. There is a legend among them that an old sorceress, forgotten perhaps at a

feast, may in her rage have put a curse on the quarry which frightened the workers forever away.

If we reject this fabulous story, we have no explanation of the phenomenon for which there is any basis, however slight. Was there possibly some surprise attack by a hostile group on the island in which all the skilled stone carvers were killed? Was there an attack from chance invaders? Were the natives suddenly overwhelmed by a violent epidemic, or did something about their first contact with white men cause them to lay down their tools once for all? We do not know the answer, and I doubt if we shall ever have any light on it.

Whatever the truth about the end of their work, it appears that the last of the stone carvers were under the spell of a megalomaniac dream. Some of the unfinished statues are of enormous size, one of them 60 feet tall. Others are to be found in places out of which it seems impossible that they could have been taken. Perhaps their sculptors never intended to move these isolated giants.

There are two types of Easter Island statues—those which still stand in the crater or at the foot of the volcano Ranoraraku, and those which once surmounted the *ahu* or burial places. Though they are of the same stone and of the same general style, there are differences which are worth stressing.

A word must be said about the burial places, which were situated at frequent intervals all along the shore in a line that encircled the island. Most of them were huge stone structures of a peculiar plan developed from the primitive cairn. In these large mausoleums, the crude heap of stones has evolved into a real monument through the use of a retaining wall. This wall, which formed a façade always facing seaward, was built of slabs or regular blocks of stone carefully fitted together into beautiful, smooth surfaces. Behind this is a level platform, and then a gradual slope backward, filled in with coarse rubble. The central portion of the façade juts out, like the apron of a stage, and on the top of this projecting part of the platform stood a row of statues with their faces turned inland. In the long slope leading up to this sacred place the dead were buried.

The figures of the mausoleums or sanctuaries were in the

nature of huge busts, the head being disproportionately large in relation to what appears of the body. The back of the head goes straight up from the shoulders and, with the vertical lines of the ears, gives the head a flattened appearance. The eyebrows are well marked and overlap the elliptical cavities which represent the sockets of the eyes. The nose is long, the tip slightly upturned and the nostrils expanded. The thin lips are pursed with what seems a scornful expression. The arms, slightly flexed, cling to the bust with the hands joined over the abdomen, below which the figure is cut off.

The other sculptures on the island—the lonely images on the plain and those that guard the slope of the volcano Ranoraraku—have the same features except that there are no sockets for the eyes. This part of the face, as in some modernistic sculpture, is defined only by the ridge of the eyebrows and by the flat plane of the cheeks below. The lower part of these statues tapers to an enormous peg, which was sunk into the soil.

The function of the *ahu* images can be surmised from analogies with the rest of Polynesia. The old Marquesans, close relatives and perhaps forebears of the Easter Islanders, adorned their stone platforms with statues which represented their ancestors. Among all the natives of central and marginal Polynesia, there is the same tendency to give human form to ancestral gods presiding over the sacred places. In the sanctuaries of central Polynesia stood huge slabs that were erected in the same position as the Easter Island statues. These slabs were receptacles for the souls of the ancestral gods, who entered them when they were called by the priests. The Easter Island statues are merely a more realistic development of this idea, favored by the existence of easily carved tufa deposits. Their sculptors elaborated rather than originated a tradition.

Everywhere on the island statues are to be found: on top of volcanic hills, along cliffs, and in places which seem almost inaccessible. Their mass must have made their transportation difficult. As a matter of fact, no one has yet explained how some of them were hauled from the quarry and

then erected on the platforms on the opposite side of the island.

Of course, there are many other instances of people with rudimentary equipment moving objects of great size—for instance, the dolmens and menhirs of Europe. As the statues that the Easter Islanders erected on their sanctuaries were of the native tufa, they were not exceedingly heavy for their bulk. Their weight ranges from 5 to 8 tons; only one weighs as much as 20 tons. But because the rock from which they were carved is soft, it must have been necessary to take innumerable precautions not to mar or break them in transit. This would have been easy if abundant supplies of wood had been accessible, but, except for a few bushes, the island seems always to have lacked wood. Good material for making ropes was apparently also lacking. The only thing they could have been made from is paper mulberry, which the natives grew in special stone-enclosed plots. Perhaps the wood necessary for making sledges on which the statues might have been hauled was lumber that floated ashore. This is frequently mentioned in ancient tales. If native timber or driftwood was available in the old days, the difficulties of transportation would not have been overwhelming. We know that other Polynesians transported objects quite as heavy as the Easter Island images. For instance in the Marquesas, slabs weighing as much as 10 tons were hauled along the slopes of the mountains. The famous doorway, or trilithon, of Tonga, which is one of the marvels of the world, has a lintel weighing 30 tons. But when the Easter Islanders of today are asked about the means by which the statues were transported, they only say: "King Tuu-ko-i-hu, the great magician, used to move them with the words of his mouth."

Other questions have arisen about the Easter Island carvings. How, for instance, did the people get the manpower for such large enterprises, which would have been impossible, it seems, if the population were as small as it is today? The answer is that before the Europeans arrived, the island had ten times as many inhabitants as it now has—4 or 5 thousand would be a conservative estimate. We know

this from data given by its first European visitors and the early missionaries.

Again, are these statues as old as has been said? Certain writers have dated them as far back as 1000 B. C. There are even some who think that they might have been in existence 10,000 years ago.¹ But the weight of general evidence is against these views. Although their material is a relatively soft stone, they still retain sharp outlines, and the hammer marks are still noticeable on them. As the winds blow with relentless force over the island, and rains are both frequent and violent, if the carving had been done thousands of years ago, it could not be in such good condition as it is today. Tradition seems to indicate that the Polynesian ancestors of the present inhabitants came to the island and settled it in the twelfth and thirteenth centuries A. D. All things considered, I do not think the statues can be more than five or six centuries old. But no definite date can be set for them.

The figures of stone that stood so high above the shores of Easter Island, and in such striking formation that it is no wonder they amazed the old navigators, have attracted more attention than the other mysterious objects to which I have already referred—the wooden tablets with rows of strange signs incised on them. But these curious pieces of wood have also given rise to much speculation. They were bought from the natives by the missionaries in the early days of their work, and ever since they have been thought to contain a real script which, if it could be read, would prove a key to the island's mysteries.

The first white man to discover the tablets was Monseigneur Jaussen, French Bishop of Tahiti, in 1866. As he was looking at a piece of wood, wrapped around with strands of hair, which a missionary had brought from Easter Island as a gift from the natives to the head of their new church, he was puzzled by the rows of small designs he noticed on it. These he took to be hieroglyphs, and his view

1. Recent results of Carbon 14 dating indicate that, in the words of Heyerdahl, the "earliest discoverers of the Island had arrived more than a thousand years before the ancestors of the present Polynesian population.

has been shared by all the later students of the problem. The so-called "hieroglyphs," cut in the wood with a shark's tooth, are realistic or conventionalized drawings of various subjects, including apparently geometrical figures. Many of them represent men, animals, plants, and other familiar forms reduced to their essential features with no unnecessary detail to blur the image. They run up and down the tablets in rows so arranged that when the reader arrives at the bottom of one row, he has to turn the tablet upside down to see the designs of the next one in a normal position. These images, or characters, are among the masterpieces of primitive graphic art that have come down to us. They are outlined with an exquisite grace. The symbols are uniform in style suggesting an established and highly developed aesthetic tradition.

Unfortunately, the discovery of this remarkable work was not followed up by scientific inquiries at a time when they might have borne fruit. When, finally, in 1914 Mrs. Katherine Routledge, the distinguished English anthropologist, tried to obtain a key to its meaning from the last native who had been trained in the old chanters' school, it was already too late. He died of leprosy a few days after his first interview with her. The modern natives know nothing of the matter. They tell merely vague tales of the tablets, saying that they are magical objects which have the power to cause death.

The supposed substance of the rows of designs on some of the tablets was dictated in the Easter Island dialect to Jaussen by a native named Metoro. But when Metoro's words were translated it appeared that they were only a simple description of the designs, not their actual contents, as had been hoped.

Other attempts at interpretation have been undertaken but with even less success. The most serious was that of an American naval officer, W. J. Thomson. In 1886 he tried to obtain the text of what was inscribed on the tablets from an elderly native. This man undoubtedly had some knowledge of the characters, but he had become a good Christian and was afraid of jeopardizing his chances in another world

by touching the tablets or even looking at their pagan symbols. In order to resist the temptation, he ran away and hid in a cave, where Thomson finally captured him. There he was "stimulated" by flattery and a few drinks to what was thought to be a revelation of these secrets of the past. At any rate, he began to chant old Polynesian hymns, which he said were the texts of the tablets. Thomson and his colleagues noticed, however, that their informant was paying no attention to the rows of designs as he chanted and did not repeat his words when the same tablet was put into his hands a second time. He was, therefore, thought to be a fraud and was dismissed.

As I have already said, a definite clue to the enigma of this so-called "script" seemed at last to have been discovered 7 years ago,² when Mr. de Hevesy pointed out a series of analogies between some of these Easter Island designs and those of an old Asiatic script found on stone and clay seals in the ruins of two forgotten cities, Mohenjo-daro and Harappa, in the valley of the Indus. Now, archeologists agree in thinking that the civilization of the Indus region dates from about 3000 B. C. Its people were an unknown race that knew how to build planned cities with a complicated sewerage system. The script they used is still undeciphered, but hypotheses about it have been advanced which, if substantiated, would make it one of the earliest known forms of man's writing. Some Orientalists see striking analogies between this Mohenjo-daro script and the early Chinese hieroglyphs.

Although the relationship between Easter Island "script" and that of the Indus has been accepted widely as a demonstrated fact, I cannot help being skeptical for several reasons. The Indus civilization, contemporaneous with that of Sumeria and Egypt, was extinct by 2000 B. C. Easter Island culture died out only 80 years ago. Roughly 15,000 miles of land and sea separate the Indus Valley from the island. Between them lie India, Indonesia, and enormous wastes of water. In other respects Mohenjo-daro and Easter Island have nothing in common: the arts of the Indus, like weaving,

2. In 1937.—*Eds.*

pottery, and metal working, were unknown to the remote islanders. The proud city dwellers of Mohenjo-daro would have looked down upon the half-naked people who lived in thatched huts, and indulged in cannibalism. How could two such different and widely separated peoples have shared the same form of writing?

In order to answer this question, Mr. de Hevesy advanced the theory that the Easter Island tablets are many centuries, if not millenniums, old and were brought to Easter Island by the first immigrants. Here the evidence that remains is against him. The wood of the best and largest Easter Island tablet is that of a European oar. Besides, if Hevesy's theory were to be accepted we should have to make the difficult assumption that the Easter Islanders kept their script unchanged for more than 5,000 years. A careful analysis of the tablets and the Indus script has not borne out this theory. True, some of the signs in the Indus script have striking analogies with those of Easter Island. I am, nevertheless, still more impressed by the divergencies, and by the doubtfulness of parallels based only on a few cases which take no account of many variants of the same design.

Moreover, there is little question, I believe, that the designs on the tablets were created by natives of Easter Island. It would be difficult to explain on any other assumption the presence among them of so many figures of animals belonging to the local fauna and of objects that are found, as far as is known, in its culture only. Mr. de Hevesy interpreted certain of the Easter Island symbols as representations of monkeys and elephants, but for these suggestions of India's jungle life he drew on his imagination.

In the hope of throwing some light on the mystery, I applied to several tablets an analytical method. I counted their symbols and studied their combinations to find out whether they might constitute an actual script. If the symbols represented sounds, the same signs would have been combined in the same order whenever a word was repeated. But this seldom happens. The same combinations of the same symbols recur in only a very few cases. The individual designs

are repeated over and over again but apparently in haphazard order. No clue to a script came from this study.

If we might assume that the tablets contain an actual script, the question would arise whether it were pictographic or ideographic. To answer this there are not enough different symbols. Most of them are variants of about a hundred fundamental designs. On certain tablets the same signs form a high percentage of the total.

Assuming that the Easter Island tablets contained a script, I thought it likely for a long time that this was based on the same principle as the designs inscribed on birchbark by the Ojibway Indians, who record charms by means of figures which sometimes remind us of the Easter Island symbols. From the images drawn on bark, the Indian shaman reads a text which, to his mind, they represent. The Cuma Indians of Panama still use the same primitive form of writing.

But one thing made me suspicious of such an interpretation. The Easter Island tablets are pieces of wood of various odd shapes which are always covered with designs from one end to the other and on both sides. If their contents corresponded to a script text, this would mean that the artist always knew in advance just the size and shape of the piece of wood his chant would fill. As this seemed highly improbable, I was obliged to abandon this entire hypothesis and seek for some better clue to the mystery.

I found it in a link that has been kept between the tablets and the oral traditions, songs, and prayers of the Easter Islanders. The very word that the natives use for the tablets puts us on the right track.

They are called *kohau rongorongo*, which means literally "orator staff"—that is, the stick, sometimes decorated with carved symbols, sometimes not—which a speaker holds in his hands while making a public address or reciting a piece of traditional lore, as if to give added significance to his words. The *rongorongo* were professional chanters who formed a society, which existed not only on Easter Island but also on other Polynesian islands. In childhood they were taught in special schools to memorize and to recite the lore of their tribe.

Everywhere in Polynesia the chanters use such an "orator staff." Sometimes, as in New Zealand, the staffs are provided with notches, which are supposed to help in reciting genealogical tables. In the Marquesas, the chanters held, while chanting, a bundle made of string wound about with knotted ends hanging down, which was thought of as containing the substance of the chant though the connection between the words and the contents of the bundle was loose. The bundles symbolized the chants and were in consequence of paramount importance. They were solemnly given to the young people after they had been initiated into the lore of their ancestors.

These facts, I concluded, give us the best clue in the problem of the Easter Island tablets. To its chanters as to the chanters of other islands, the "orator staffs" were the accessories and the symbols of their function. Originally, the designs on the staffs or tablets might have been mnemonic, but later on they lost their exact significance in the minds of the natives and were looked upon merely as simple ornaments or magic symbols. It may be added that even now we can observe on Easter Island a slight relation that has been preserved between design and chant. The natives are in the habit of chanting when they make string figures or cat's cradles. This interpretation of the tablets may not contain the whole truth about them. I offer it rather as the hypothesis which best fits the facts available today, and which harmonizes also with what we know of an underlying tendency in Polynesian civilization.

But these are not all the questions that have been raised by Easter Island. Some observers have found in the well-carved and well-fitted stones of its sanctuaries likenesses and relations to the ancient remains in Peru, and to account for them have said that there must have been intercourse between these two parts of the world at some period of history. But close study has revealed that between the Peruvian and the island ruins the resemblances do not go beyond the general fact of an exact fitting of the stones. The plan and the structure of the Peruvian buildings are entirely different. In Peru the walls are all of carved stone blocks, whereas in Easter

Island they consist of slabs set on edge outside with rubble behind. The only conspicuous architectural achievement of the Easter Islanders was to select the slabs and to dress their corners so that no gap would appear on the surface and impair the general appearance. This they could naturally have learned to do without crossing the Pacific in frail canoes and making the long journey inland to the site of the wonderful ruins in Peru. Moreover, these are certainly far older than the Easter Island sanctuaries. Thus it seems clear that we must give up hope that the remains on Easter Island will help to solve the problems of early American civilizations.

The result of 3 years' work on the island culture pursued at the Bishop Museum in Honolulu, with which I have been associated, shows that this Ultima Thule was discovered and settled by Polynesians, who arrived in a fleet of double canoes sometime, roughly, between the middle of the twelfth century A. D. and the end of the thirteenth. The time of the discovery and settlement can be established approximately from the lists of chiefs that have come to us. These the early missionaries took down from the dictation of the natives. I was permitted to copy another one from a list which my native informant had compiled himself. Many errors have, of course, slipped into these records, but a comparative study of them shows that Easter Island has been ruled by about 25 or 30 chiefs since the founder of the dynasty, Hotu-matua, and his people first came to its shores. Allowing 25 years for each ruler's reign—the usual method of measuring time in Polynesian annals—we find that this must have happened very close to the twelfth or thirteenth century. From other sources, we know also that this was a period of great sea expeditions, and that the settling of New Zealand and of many other islands in the Pacific occurred in what seems to have been a heroic age of ancient Polynesia.

Curiously enough, the oral tradition of the migration to Easter Island has been preserved remarkably well even down to the present. While I was there, I was told in great detail many more or less legendary incidents of the voyage eastward of Hotu-matua and his associate, the noble Tuu-ko-ihu.

These stories with their core of history were the glorious sagas of the first emigrants to this little lost world.

At about the same time, the Tahitians, Maori, and Marquesans had a culture which was still undefined but was very similar in the different groups. In the course of the succeeding centuries, over each of these island areas a civilization developed along original lines, though still retaining the common background. The Easter Island culture belongs to this purely Polynesian type. The ancestors of the present population merely improved upon the legacy they received.

Where then did the Easter Islanders come from? Since they are Polynesians in race, language, and culture, the problem of their origin coincides with that of the Polynesians as a whole and is as yet unsolved. That the Polynesians came from Asia is beyond doubt. India, Assam, and Indo-China have been variously given as the cradle of these seafaring tribes, but sufficient evidence to validate these theories is still lacking. Within the Polynesian world the Easter Islanders offer many analogies with the Maori of New Zealand, the people of Mangareva and those of the Marquesas. Actually the resemblances between Easter Island culture and that of the Marquesas are very striking. It is possible that the Easter Islanders were among the early Polynesian emigrants who spread from central Polynesia toward the east, occupying the Tuamotus, Mangareva, and the Marquesas. Very likely after a sojourn in the Marquesas some again sailed eastward and discovered Easter Island. At the time they left the Marquesas their culture, of course, had not yet developed the specific pattern which characterized it when the Europeans landed there in the eighteenth century.

The genealogies of Mangareva, the nearest Polynesian island to Easter Island, date back to the twelfth century, but traditional history mentions early immigrants who settled on these islands and then left for other countries, leading a restless life. Similar traditions exist among the Marquesans. Hotu-matua, the discoverer of Easter Island, and his followers may well have represented a defeated tribe or a junior branch of the Marquesas or Mangareva.

What remains today of their work is evidence of the beauty and greatness of their isolated civilization, revealing the vigor and audacity of these Polynesians who spread over what seem once to have been the happiest islands on earth.

V. The New World



THE NEW WORLD

v. The New World

Since the inhabitants of the New World were first misnamed Indians by Columbus, there has been constant speculation about their culture and origins. Were they indigenous to the Americas? If not, were they first carried by primitive vessels from the Pacific Islands or the Asian mainland? Or was there some land route by which they had come? How long ago did such migrations take place? What sort of environment did these primitive peoples face and what sort of existence did they lead? During the twentieth century, archaeologists and anthropologists have begun to learn the answers to these questions and some of the evidence is described by Frank C. Hibben in 'The Earliest Americans.' Hibben studied archaeology and anthropology at Princeton, the University of New Mexico, and Harvard. He wrote *Treasure in the Dust*, an account of archaeology in the New World from which the present selection is taken. He is now Professor of Anthropology and Curator of the Museum of Anthropology at the University of New Mexico, one of America's most active centers of research on the prehistoric Indians.

THE EARLIEST AMERICANS

FRANK C. HIBBEN

MEN OF THE SADDLE ordinarily have no interest in archaeology, and McJunkin, a Negro cowboy, was no exception. He was interested in cow tracks, which were more to his liking and certainly a part of his calling. In the spring of 1926 he was following a set of cow tracks when he stum-

bled on one of the most remarkable archaeological discoveries of the era.

McJunkin was jogging his horse along one bank of an unimportant-looking arroyo in north-eastern New Mexico. Chancing to glance up from his scrutiny of the cow tracks in the bare dirt ahead of him, he noticed a line of jagged bones protruding from the far side of the arroyo bank. He pulled up his horse and sat there a moment squinting into the shadow of the cut bank at the whiteness of the bones. The line of broken fragments protruded from the dirt some twelve feet below the surface. Certainly they could not be cow bones at such a depth, although the sockets and joints that McJunkin could see were of considerable size and obviously belonged to animals as heavy-bodied as a steer.

The cowboy slid stiffly out of the saddle and descended the arroyo bank to look more closely at the peculiar line of bones. Had he ridden on we might never have known the true story of the earliest Americans. As it was, McJunkin opened a large clasp knife and pried among the bone fragments at some pieces of flint that he saw there. Soon he held in his hand a pair of strange-looking stone points. These flints were like no ordinary arrowheads that cowboys had noticed on old Apache and Ute camping-grounds. These points from among the bones were straight-sided and without the usual notch of the Indian arrowhead. These tips also had a hollow groove running up either side and were in general shape and outline like a short bayonet.

George McJunkin reported his find to several acquaintances in the city of Raton, New Mexico. He showed them, too, the flint points with their peculiarity of outline and design. These men agreed with George that these flint tools had certainly been made by human hands and also that they were most peculiar. The thing should be looked into.

The word came in this way to Dr. J. D. Figgins, of the University of Colorado. Dr. Figgins, too, was excited by the possibilities of the situation and came to see the arroyo bank where the strange bones showed white in the sun. He dug in the same tentative manner as the cowboy had before him,

although with more knowledge of what he saw. He soon discovered that the bones were those of a type of bison that had been extinct in the American South-west since the last of the Ice Age. This huge animal was called by the scientific name, *Bison taylori*, after Dr. Taylor who was then head of the Colorado Museum. Dr. Figgins ascertained also that the flint points were, indeed, the spear tips manufactured by ancient men apparently as old as the bones of the animals among which they lay. Because of the nearness of this particular arroyo to the small town of Folsom, New Mexico, these points came to be called "Folsom points" and the men who made them the "Folsom men."

But there were other scientists more sceptical, perhaps, than those who actually saw the bison bones of the Folsom arroyo. Invitations were sent out to all of those antiquarians who might be interested in seeing with their own eyes the indubitable evidence of the earliest Americans. Investigators with great names came from the American Museum, from the National Museum, from Chicago, New York, Philadelphia, and San Diego. With their own trowels they pried among the bison ribs in the dirt of the Folsom arroyo. With their own whisk brooms they cleared away the accumulated debris.

At Folsom, New Mexico, all of the scientists agreed that some person as yet unknown killed a type of bison that had lived perhaps as long as ten thousand years before. The report was like that of an antiquarian coroner's jury passing judgment only after weighing the evidence. The results have been on trial ever since. The American people immediately wanted to know who were these Folsom men? Where had they come from? What did they look like?

In the next few years, extending into the 1930s and 1940s, the traces and tracks of Folsom men turned up in a number of places but never the skeleton of one of the hunters himself. At Clovis, New Mexico, a large area was found where these ancient Americans had killed other animals of that time and had thrown the bones around them in careless, discarded heaps. But in all of this debris there was no

fragment of human bone. At Lindenmeier in eastern Colorado, not far from the Wyoming line, another great encampment of Folsom men was discovered. Other living places and the bones of other slaughtered animals were found scattered from the Rio Grande on the south, north through the Texas Panhandle, Nebraska, Kansas, the Dakotas, and into the plains of Canada. Along the eastern foot of the Rockies, these ancient hunters had scoured the country with their Folsom-tipped spears. Before these puny but lethal weapons fell bison, Ice Age horses, camels, mastodon, and mammoth. Occasionally, Folsom men, and women too, must have been the hunted rather than the hunters. There were giant cats and other predators that lived at the same time as the mammoth and Taylor's bison. None of these animals has lived in these places for the last several thousands of years. Occasionally, as is usual in such instances, some conservative scientist contended that Folsom men killed animals and gnawed the meat from their bones only six thousand years ago. Other experts, swept away by the strength of the evidence they saw, claimed that it must have been fifteen thousand years or more. But what is a millennium or two when we are discussing happenings that occurred so long ago? The main facts of the Folsom story were abundantly clear. There had been men and women living in America at this particular time and hunting animals now extinct.

Certain additional discoveries which occurred at about this time elaborated the picture. In a cave near Albuquerque, New Mexico, excavators found evidences of an even earlier type of American. In this cave, called the Sandia Cave, because of its location in the Sandia Mountains, the archaeologists found accumulated debris in several levels. There were in the topmost layer of dust and bat guano, broken pottery and the corn-grinding equipment of Pueblo Indians who had visited the cave in the last few centuries. Below this Pueblo accumulation was a layer of cave rock and stalagmitic material indicating that the cave had been a wet and dripping place at this early stage. But when the

excavators dug in the Sandia Cave, it was excruciatingly dry. Below the hard-rock layer was a cave floor piled with the refuse of human occupation. There were bones, broken and splintered to extract the marrow. There was the charcoal of ancient fires, flint scrapers and knives for the dressing of animal skins and stone points shaped like a bayonet with a groove up either side. It was obvious from these flint points that Folsom men and women had lived in the Sandia Cave and had sallied forth from time to time to kill the animals of this region. The bones of these successful hunts they had dragged back to the cavern and gnawed them there, and thrown the refuse behind them into the darkness. As the archaeologists dug yet deeper into the Sandia Cave they found another accumulated floor below that of the Folsom level and seemingly several thousand years earlier. This place, also, was littered with bones and piles of charcoal from fires that had been dead these many thousands of years. There were flint points, too, and other primitive tools with which these hunters plied their trade. These stone projectiles were also the tips of spears, but they differed in shape and manufacture from the typical Folsom points. The spear points of the lowest level of Sandia were leaf-shaped and roughly chipped with a side shoulder at the base to help in hafting to the wooden shaft. Because they were obviously different from other kinds, these spear tips were called "Sandia points" and the humans who used them became known as "Sandia men."

Essentially there was no difference between Sandia and Folsom people. Both of them had lived in the American South-west a long time ago. Both of these groups were hunters and made their living in the pursuit of animal herds of types and species now extinct. It was significant that the Sandia humans were apparently the first to wander these plains and mountains that we call America. It seemed from this evidence that the first immigrants to these shores were hunters and wanderers, as is not surprising.

But other discoveries in the South-west seemed at variance with the picture of a hunting American. In southern

Arizona a whole series of finds came to light which seemed to be evidences of people as early as the Folsom and Sandia nomads. Insomuch as a number of these discoveries were made near the town of Cochise, named from the famous Apache chief, this material became known by that name. The Cochise cultures indicated that primitive humans were living there at a time when Ice Age mammals roamed lush and swampy valleys in southern Arizona. Evidences of wet and dripping conditions were interspersed with the bones of extinct mammals in places where now only desert plants and dry arroyos exist. But instead of spear points and tips for penetrating the tough hides of pachyderms, the Cochise people had no offensive weapons whatsoever. Their repertoire of utensils included grinding-stones and mullers, roughly flaked choppers, and handy-sized boulders for mashing and pounding. This equipment seems to indicate a dependence upon seeds and nuts. We can visualize the ancient Cochise people digging roots and picking berries. They perhaps also snared and trapped small mammals and birds which they could pound into an edible pulp on their flat stones. It was a gathering type of life, relying on human ingenuity to wring from an inhospitable nature the rudiments of existence. Possibly the Cochise people were too timid to hunt, or it might have been that the Ice Age animals were scarce and wary in that region.

Not to be outdone by New Mexico and Arizona, additional discoveries of the litter resulting from the living of early Americans turned up in Texas, Nevada, California, and Oregon. It would seem that once they had entered that fair land these ancient immigrants had penetrated through the mountain passes into all places where they could eke out an existence. They hunted ancient animals on the plains of Texas. They lived around lakes in southern California on beaches that now bake in the relentless sun above arid alkaline flats. These ancient hunters and gatherers penetrated into Old Mexico and presumably even farther to the south into Panama and, ultimately, South America.

In the southern portion of the New World the traces of

early Americans are more scattered. There is sure evidence, however, that early types of humans some thousands of years before the birth of Christ reached the extreme tip of southern South America. Here in southern Chile and Tierra del Fuego archaeologists have uncovered flint points in caves where ancient hunters lived.

Perhaps the most distressing consideration in connection with our story of the earliest Americans is that we have so little knowledge of these people themselves. On the original Folsom sites at Clovis, Lindenmeier, or many of the other camping-places of these ancient hunters, we have found no single fragment of human bone. This seems most unnatural. Other primitive people in other living-places in the world buried their dead or threw them out with the garbage with little discrimination. Even though these Folsom and Sandia people might have had only rudimentary ideas of life in the hereafter, it would seem that we should actually find their remains. Even supposing a primitive aversion to death and the dead, we should discover the skeleton of some Folsom fellow accidentally included in the same bone pile with his animal victims. Someone usually suggests at this juncture that they burned their dead in a ceremonial fashion. Even if this were true, and there seems no evidence for it, we should find the fragments and bits of cremated bones.

It is true that there are a number of discoveries of human skeletons which seem to date from the same time as the animals that the earliest Americans knew. Such a one was Tepexpan Man, found recently near Mexico City at the small village of Tepexpan. This human skeleton had been incarcerated in a layer of earth which apparently included the skeletons of mammoths. If the stratification is correct, it would seem to be of very early time. However, unfortunately for our complete peace of mind in the matter, no Folsom point or Sandia spear was found with or near the skeleton. There were no Cochise choppers or other weapons or implements by which we might surely date him. We have still to find the indubitable skeleton of the earliest of Americans.

We can state unequivocally, however, that when we find him he will be essentially modern in type. It is clear that when these earliest immigrants crossed from Asia to Alaska it was already at a time when modern men, by physical standards, had peopled Asia. These people, although living a primitive life and following a hunting or gathering type of existence, were as well formed in body as ourselves and of the same modern type of features and intelligence.

The time of the exotic mammals that were the meat supply of Folsom and Sandia men was a period which the geologists call the *Pleistocene*. This particular period, most authorities agree, lasted approximately one million years. During the Pleistocene epoch, the entire anatomical history of mankind took place. In the early Pleistocene, the *Pithecanthropus erectus* and other fossilized forms of men developed in the Old World land masses of Asia, Africa, and Europe. It was during the Pleistocene period that the first bestial forms of men learned to use stone tools and gradually improved on those tools. It became obvious, as the American scientists delved into the bone piles of the earliest immigrants from Asia, that these colonists had lived on the plains of Colorado and New Mexico only at the very end of the Pleistocene period. The era of the early exploration of the Americas had taken place just as the Pleistocene was drawing to a close.

The Pleistocene period is important, too, for a reason other than that it was the geologic period of man. This time period is often called "The Age of Ice."

At first blush it might appear that these icy times would have been a poor background indeed for the development of mankind. Nothing is farther from the truth. Instead of the ice masses being a hindrance to the development of human life, they actually furthered this end. The great glaciers of North America, Asia, and Europe did not cover all of the land by any means. In those marginal areas surrounding the glacial centers, the rainfall, and undoubtedly the snowfall, was considerable. These times were wet and uncomfortable by modern standards. But the heavy rains

and abundant moisture created a situation in which vegetation, grasses, bushes, and trees increased to a tremendous extent. On this verdant lushness animal herds of myriad varieties increased in like measure. This was the time of the mammoth and the mastodon, of the Pleistocene horse, and the fleet-footed camel. There were moose and antelope, caribou and bison, all in teeming herds dotting the landscape in every direction. This was a situation upon which meat-eating humans could exist with ease even with comparatively ineffective weapons such as throwing javelins tipped with flint points.

The Age of Ice was then the time of man. It was also the era of those interesting animals which are called collectively the "Pleistocene fauna." These elephants, bison, and other ponderous forms became extinct as the Pleistocene era passed away. With the last melting of the ice the conditions which had made possible this teeming mammalian life apparently disappeared also. From geological considerations the end of the last glaciation and the dying off of the tremendous herds of Pleistocene animals occurred about ten thousand years ago, with the glacial effects and some Ice Age mammals lingering in certain areas until much later times.

The as yet incomplete list of dates from the camp-sites of ancient Americans determined by the C14 method is surprising in some particulars and expected in others. Bones and bison teeth from a fire pit at the Clovis Folsom site near Clovis, New Mexico, have been dated at about ten thousand years ago. This shows that the bison were killed, cooked, and the flesh eaten by Folsom men at that early date. The Cochise gatherers in southern Arizona were plying their trade there almost eight thousand years ago as revealed by the C14 in the charcoal of their cooking fires. Early Americans inhabited a cave (Gypsum Cave) near Las Vegas, Nevada, over ten thousand years ago. Indeed, some of the most impressive C14 dates thus far have come from Nevada and Oregon. A most interesting C14 date was derived from a cave in southern Chile excavated by Dr. Junius

Bird. This showed conclusively that humans had reached the southern tip of South America almost nine thousand years ago. We shall have occasion to mention C14 dates and their significance in a number of places in ancient America. It is most reassuring that our early story is now bolstered by several sure pin-points of time.

But there were other questions in addition to the one which asks "How old?" By what route had the Sandia or first Folsom people found their way southward? And most pressing query of all was: "Where had they left their dead?"

Some clues as to the route of the first migrants came from provinces in western Canada in the form of letters sent by interested collectors. The collectors told of types of flint points known to be associated with the early meat-eaters of the South-west. Gradually, these traces led the scientific search ever northward into the western plains of Canada. At this point other sporadic evidences were found in the Yukon Valley of Alaska. In this area there were already diggers who were not at all interested in archaeology.

The Yukon Valley of the Northland was opened up by human greed for gold. The gold lies beneath a layer of muck. This muck material is a fine sandy silt eternally frozen in these northern latitudes and thawing only in summer on the uppermost surface. In many places the muck is a hundred feet thick. Unfortunate for the miners, but a bonanza for the archaeologists, is the fact that the gold-bearing gravels of Alaska lie beneath this muck layer. With steam jets and other ingenious devices, the "muckers" of the Yukon drilled their way down through this frozen stuff to get to the gold underneath. Not infrequently as they penetrated the blanket of muck, the miners encountered bones of elephants, bison, and other bulky animals which were obviously foreign to the Alaska of 1898. In places the mammoth bones and tusks were so numerous, frozen solid in the gritty muck, that they impeded mining operations.

On a basis of the mammalian life and the contours of the Bering Strait area, it was logical that the first humans as hunters had passed from Asia to Alaska by that route, as we have seen. It was no particular surprise then when the par-

ties looking for such evidences found here in Alaska the sure traces of the earliest humans in the New World. Backtracking as they were, the archaeologists found indications of the first immigrants leading inevitably to the area of the lower Yukon Valley and that part of Alaska which comes closest to Siberia. Deep in the gold pits in the vicinity of Fairbanks, Alaska, a few lenses of charcoal were embedded in the frozen muck. A scattering of man-made implements also indicated that man had camped there and human eyes had seen the teeming herds of Ice Age mammals when they grazed in the Yukon Valley. A geologist found a Folsom-like point near the Bering Strait. In places the indications were dim. There were areas of hundreds of miles where no proofs were found at all. But it was a trail abundantly plain in its major direction and import. Across the Bering Strait at some time around the end of the Pleistocene the hunters had come.

Such a great amount of moisture was locked up on the continental land masses in the form of glacial ice during the Pleistocene that the levels of the oceans were actually lowered by many feet. This reduction in the sea-level was more than enough to make the Bering Strait dry land. Both the Ice Age mammals and the early humans who hunted them moved freely back and forth across the land bridge. There are muck deposits in Siberia which are even more impressive than those on the Alaskan side.

For years a lively trade in ancient ivory has been going on in this region. Eskimos and Indians regularly collect the mammoth tusks washed out of the Siberian deposits by the spring freshets. These are sold in commercial channels to make billiard balls, piano keys, and cribbage boards. As these traders collect the ivory, they occasionally find evidences of ancient hunters in the Siberian mucks, the same people who later became Americans.

It is clear that the earliest Americans, as hunters of meat, followed their meat supply across the Bering Isthmus from Siberia to Alaska in very ancient times. Still as wandering hunters, they found their way down into the North American continent, pausing here and there to establish camp-sites

and hunt for a few years or a few centuries, as the case might be. These were the Sandia and Folsom men whose flint points and bone piles have been found scattered in a dozen hunting-camps of long ago. There seems evidence also that some of these early wanderers lived on roots and berries or such other vegetable and natural food as they could scour from the landscape. These were the gatherers of Cochise, who either did not care to hunt or could not find enough animals to satiate their hunger. The human being has a very adaptable appetite and for this reason he probably survived where other kinds of mammals did not.

The backdrops of this stirring human drama were the last ice cliffs of the Pleistocene period. Folsom men and the other types of early Americans established their camps along the edges of lakes where only dusty basins now exist. In southern Arizona and New Mexico, where these ancient hunters lingered the longest, there are abundant evidences of pluvial conditions. There were lakes and running streams, lush meadows and verdant grasslands where now the investigators can find only dusty arroyos and semi-desert wastes.

The most pressing query in this connection is the oft-asked question: "When did the earliest Americans arrive?" It is difficult to answer this exactly in years, although a passable guess is not impossible. Carbon 14 dating of wood found under eighty to one hundred feet of frozen muck near Fairbanks, Alaska, shows that the tree died over twenty thousand years ago. Comparing this dating with other finds at similar levels, it seems apparent that the earliest adventurers into the New World walked up the Yukon Valley about thirty thousand years ago. Some scientists would cut this figure down to a bare twenty thousand. Others, attaching more importance to considerations which seem to extend the antiquity, would estimate it at forty thousand years or more. However, it makes little difference whether we attempt to fix the exact time of the transmigration according to the Christian calendar. We can definitely say that the earliest immigrants became Americans at the last of the period called the Pleistocene.

With the advent of the first humans into the New World

the whole story is not told by any means. Are the Folsom and Sandia men the direct ancestors of the American Indian? What relation did these early meat-eaters have to the later sedentary people such as the Mexicans and the Mayans?

For the past decade American archaeologists have been working at the problem of our earliest beginnings from two opposite directions. One group of scientists have been eagerly back-tracking the earliest Americans along their route of entry from the Bering Strait of Alaska. These, with painstaking effort, have painted a clear picture of hunters and gatherers who moved in scattered groups southward at the very last of the Ice Age.

Other archaeologists have delved into the ruins of the ancient pueblos of the American South-west. They have excavated the earthen monuments of the Moundbuilders in the East and have traced the rise and fall of the Mexicans, the Mayans, and the ancient people of Peru. The archaeologists have followed these great civilizations down to their very roots, for the most part by the process of digging ever deeper in the accumulations of time. Most of the great cultures of the New World flowered around the year A.D. 1000. Even the earliest of them in the highlands of the Andes and possibly also in the Mayan area did not begin much before 2000 B.C. Even with a recent series of C14 dates, especially in the Andean area, the investigators of these later levels could not push the antiquity of the high civilizations of the New World back as early as the Pleistocene. There was a seeming gap of several thousands of years between early Ice Age times and the beginning of the high civilizations in the Pueblo area or many of the other New World centers of development.

So great did this historical gap appear that certain authorities stated that the early hunting Americans died out with the large mammals at the end of the Ice Age. They contended that the New World was repopled by other migrations across the Bering Strait at later times. Other scientists, however, with perhaps more confidence in the ability of man, doggedly asserted that the early nomad Americans must have lingered on somehow, somewhere. Even if only

a remnant survived by eating leaves, roots, and berries in the thin times after the ice had disappeared, it was enough. These remnants would be sufficient to provide the seeds for later populations possibly added to by other people coming later across the strait from Asia.

Recent discoveries by scientists from the University of Arizona in a large cave in the southern part of that state have done much to fill the gap between Folsom times and the more recent periods of culture. This cave, the Ventana Cave, contains a considerable sequence of human achievement and indicates by a succession of crude stone implements that humans probably occupied that area continuously from the end of the Pleistocene to the present day.

Not a small part of the story is the pressing mystery of what happened to the large animal herds which were the first food supply of the earliest Americans. It has been supposed by some that the early human hunters themselves with their ineffective implements may have encompassed the destruction of the last of the game herds. Certain imaginative writers have visualized human meat-eaters as the greatest predators of all. They recognized no game laws and never gave a thought to conservation.

Even with the known destructiveness of man, however, it is difficult to visualize how these early hunters, armed with puny flint-tipped spears, could have destroyed enough animals to cause complete extinction. But whatever the actual cause or causes may have been, there is no doubt that the end of the ice masses also saw the end of the exotic animals of the same period. Only a mammal with the survival power of man could have changed his habitat, his mode of life, and his menu to meet these changing conditions.

The essential story of the earliest American then is laid at the end of that period that the geologists designate the Pleistocene. This was the first act of the great human play which we may call "The Drama of America." The scenery has shifted. The ice cliffs in the background have shrivelled and gone. The trumpeting herds of mammoth and the pounding hooves of the other animals are no more. But the major actors, the men and women who play the main parts,

are still strutting their fretful time on the front of the stage. From century to century they have changed their costumes. Appurtenances in the form of stone pyramids and carved temples appear and disappear in the background. Act has followed act in an orderly fashion. There have been side shows, too, auxiliaries of the main attraction. But the humans who are the heroes and the villains of all of these scenes continue. The play is not yet over.

Among the Mongoloid peoples who probably crossed into America from Asia there were groups which continued south into Mexico, Central, and South America, and down to the southernmost tip of the continent. Very slowly their cultures developed into civilizations far superior to anything in the territories to the north. The most advanced of these civilizations—indeed one of the most brilliant of ancient times—was that of the Mayas, who flourished in Central America, Yucatan, and southern Mexico. Their beginnings are dated about 500 B.C., but they did not reach cultural maturity until almost a millennium later. For reasons not fully understood, they began to abandon their established southern cities about 800 A.D. and trekked first west and then back toward the eastern coast of Yucatan. In this period Chichen-Itzá, which had been an unimportant outpost of the Empire, became their principal city. Later their culture became intermixed with that of invading Toltecs.

The Mayas were skilled in architecture, agriculture, and the arts. They had a form of hieroglyphic writing. They built magnificent buildings and reached a high level in mathematics. Without scientific instruments they made careful astronomical observations, producing a calendar of astonishing accuracy.

Chichen-Itzá during its great period was the Mecca of the surrounding country. It was filled with temples and temple pyramids, an astronomical observatory, theaters, and a ball court, and was decorated with intricately carved sculptures. It contained also a sacred well, a "Well of Sacrifice," which was

first excavated by Edward H. Thompson and which he here describes. From this high point the civilization gradually deteriorated and eventually ceased to exist. The people were enslaved by the Conquistadors who, in their Christian zeal, destroyed the greater part of the "heathen" documents; and the people reverted to the intellectual level of peons from which they have never recovered. The destruction of these documents was a serious blow to the study of Maya culture, but descriptions written by the Spaniards themselves, the most noteworthy of which is Bishop Diego de Landa's "*Relación de Las Cosas de Yucatan*," about 1560, helped compensate for the loss.

This great civilization was completely forgotten until it was discovered, in 1839, by John Lloyd Stephens, accompanied by the artist Frederick Catherwood. Later explorations were made by Alfred Maudslay and by Edward H. Thompson, the American archaeologist from whose book *People of the Serpent* this selection is taken. Thompson, who had no scientific training, was an ardent and adventurous amateur archaeologist. He had been fascinated as a boy by Stephens' *Incidents of Travel in Yucatan*. He went to Yucatan as United States Consul with the understanding that he would spend as much time as possible investigating the Mayan ruins and thus began a career which lasted for forty years. Many detailed studies have since been made of this extraordinary people who, with all their accomplishments, never knew the wheel and technically were people of the Stone Age.

THE WELL OF SACRIFICE

EDWARD H. THOMPSON

I HAVE REFERRED before to an article, "Atlantis Not a Myth," written during my college days, and of the important bearing it had on determining my future course. It was while hunting up material for this article that I first came upon an old volume written by Diego de Landa, one of the earliest Spanish missionaries to Yucatan and later bishop of that diocese. Among other things recounted in quaint old Spanish in this book was a description of Chichen Itzá, the capital and sacred city of the Mayas. The wise priest laid special emphasis upon the traditions concerning the Sacred Well that lay within the confines of the city.

According to these traditions, as told to de Landa by his native converts, in times of drought, pestilence, or disaster, solemn processions of priests, devotees with rich offerings, and victims for the sacrifice wound down the steep stairway of the Temple of Kukil Can, the Sacred Serpent, and along the Sacred Way to the Well of Sacrifice. There, amid the droning boom of the *tunkul*, the shrill pipings of the whistle and the plaintive notes of the flute, beautiful maidens and captive warriors of renown, as well as rich treasures, were thrown into the dark waters of the Sacred Well to propitiate the angry god who, it was believed, lived in the deeps of the pool.

From the moment I read the musty old volume, the thought of that grim old water pit and the wonderful objects that lay concealed within its depths became an obsession with me. Then, long years after, by what seemed to me almost an interposition of Providence, I became the sole owner of the great Chichen plantation, within whose confines the City of the Sacred Well and the Sacred Well itself lay.

For days and weeks after I purchased the plantation, I was a frequent worshiper at the little shrine on the brink of the Sacred Well. I pondered, mused, and calculated. I made measurements and numberless soundings, until, not satisfied but patiently expectant, I put my notebook aside and awaited the accepted time. It came when I was called to the United States for a scientific conference. After the session was over, at an informal gathering I told of the tradition concerning this Sacred Well of Chichen Itzá, of my belief in its authenticity, and the methods by which I proposed to prove it.

My statements brought forth a storm of protests from my friends.

"No person," they said, "can go down into the unknown depths of that great water pit and expect to come out alive. If you want to commit suicide, why not seek a less shocking way of doing it?"

But I had already weighed the chances and made up my mind. My next step was to go to Boston and take lessons in deep-sea diving. My tutor was Captain Ephraim Nickerson of Long Wharf, who passed to his reward a score of years ago. Under his expert and patient teaching, I became in time a fairly good diver, but by no means a perfect one, as I was to learn some time later. My next move was to adapt to my purpose an "orange-peel bucket" dredge with the winch, tackles, steel cables, and ropes of a stiff-legged derrick and a thirty-foot swinging boom. All this material was crated and ready for immediate shipment when ordered by either letter or wire.

Then, and not until then, did I appear before the Honorable Stephen Salisbury of Worcester, Massachusetts, and Charles P. Bowditch of Boston, both officers of the American Antiquarian Society and of Harvard University of which the Peabody Museum is a part. To them I explained the project and asked the moral and financial aid of the two organizations they represented. Although I had headed several important and successful expeditions under the auspices of these institutions, I found both of these gentlemen very reluctant to put the seal of their approval upon what they

clearly believed to be a most audacious undertaking. They were willing to finance the scheme, but hesitated to take upon themselves the responsibility for my life.

I finally argued them out of their fears, and all other obstacles having been overcome, the dredge and its equipment were duly installed on the platform to the right of the shrine, and close to the edge of the great water pit, the Sacred Well.

During my preliminary investigations I had established what I called the "fertile zone" by throwing in wooden logs shaped like human beings and having the weight of the average native. By measuring the rope after these manikins were hauled ashore, I learned of the extreme distance to which sacrificial victims could have been thrown. In this way I fixed the spot where the human remains would probably be found. Regulating my operations by these calculations, I found them to respond with gratifying accuracy.

I doubt if anybody can realize the thrill I felt when, with four men at the winch handles and one at the brake, the dredge, with its steel jaw agape, swung from the platform, hung poised for a brief moment in mid-air over the dark pit and then, with a long swift glide downward, entered the still, dark waters and sank smoothly on its quest. A few moments of waiting to allow the sharp-pointed teeth to bite into the deposit, and then the forms of the workmen bent over the winch handles and muscles under the dark brown skin began to play like quicksilver as the steel cables tautened under the strain of the upcoming burden.

The water, until then still as an obsidian mirror, began to surge and boil around the cable and continued to do so long after the bucket, its tightly closed jaws dripping clear water, had risen, slowly but steadily, up to the rim of the pit. Swinging around by the boom, the dredge deposited on the planked receiving platform, a cartload of dark brown material, wood punk, dead leaves, broken branches, and other debris; then it swung back and hung poised, ready to seek another load.

For days the dredge went up and down, up and down, interminably, bringing up muck and rocks, muck, more

muck. Once it brought up, gripped lightly in its jaws, the trunk of a tree apparently as sound as if toppled into the pit by a storm of yesterday. This was on a Saturday. By Monday the tree had vanished and on the pile of rocks where the dredge had deposited it only a few lines of wood fibre remained, surrounded by a dark stain of a pyroligneous character. Another time the dredge brought up the bones of a jaguar and those of a deer, mute evidence of a forest tragedy. And so the work went on for days.

I began to get nervous by day and sleepless at night.

"Is it possible," I asked myself, "that I have let my friends into all this expense and exposed myself to a world of ridicule only to prove, what many have contended, that these traditions are simply old tales, tales without any foundation in fact?"

At times, as if to tantalize me, the dredge recovered portions of earthen vessels undeniably ancient. I resolutely threw aside the thought that these might be the proofs I sought. Potsherds, I argued, were likely to be found anywhere on the site of this old city, washed from the surface deposits by rains. Boys are boys, whether in Yucatan or Massachusetts, and have been for some thousands of years. The instinct of a boy is to "skitter" any smooth hard object, stone or potsherd, across smooth waters like those of the deep water pit and then it rests amid the mud and rocks at the bottom until brought up by the dredge. I could not accept these chance potsherds as the proofs that I required.

One day—I remember it as if it were but yesterday—I rose in the morning from a sleepless night. The day was gray as my thoughts and the thick mist dropped from the leaves of the trees as quiet tears drop from half-closed eyes. I plodded through the dampness down to where the staccato clicks of the dredge brake called me and, crouching under the palm leaf lean-to, watched the monotonous motions of the brown-skinned natives as they worked at the winches. The bucket slowly emerged from the heaving water that boiled around it and, as I looked listlessly down into it, I saw two yellow-white, globular masses lying on the surface of the chocolate-colored muck that filled the basin. As the

mass swung over the brink and up to the platform, I took from it the two objects and closely examined them.

They were hard, formed evidently by human hands from some substance unknown to me. They resembled somewhat the balls of "bog butter" from the lacustrine deposits of Switzerland and Austria. There, ancient dwellings were built on piles in the midst of the lake to protect them against raiding enemies. The crocks of butter were suspended by cords let down between the piles and immersed in the ice-cold water for preservation. Despite all their precaution, raids did occur and the dwellings were destroyed by casual fires as well as by raids; so the crocks of butter fell unobserved from the charred piles down through the icy waters to rest unheeded in the increasing deposit until ages of time changed them into the almost fossilized material known to archaeologists as "bog butter."

But these two nodules could not be bog butter, for unless the known data are strangely wrong, the ancient Mayas kept no domestic animals of any kind, much less cows or goats. They seemed to be made of some resinous substance. I tasted one. It was resin. I put a piece into a mass of lighted embers and immediately a wonderful fragrance permeated the atmosphere. Like a ray of bright sunlight breaking through a dense fog came to me the words of the old *H' Men*, the Wise Man of Ebtun: "In ancient times our fathers burned the sacred resin—*pom*—and by the fragrant smoke their prayers were wafted to their God whose home was in the Sun."

These yellow balls of resin were masses of the sacred incense *pom*, and had been thrown in as part of the rich offerings mentioned in the traditions. That night for the first time in weeks I slept soundly and long.

For a long time the belief had been growing in my mind that the scientific exploration of this Sacred Well of Chichen Itzá was to be the crowning event of my life-work, and that to do it as it should be done, I must give it all my time and attention. With the finding of these two nodules of incense and realization of what they indicated, this belief be-

came a certainty. After much reflection I resigned my position as consul and devoted myself entirely to the work.

From that time on for months there was seldom a day when the dredge failed to yield objects of great scientific interest, earthen vessels, temple vases and incense burners, arrow-heads, lance-points finely shaped and chipped with wonderful skill, axes and hammer stones of flint and calcite. There were copper chisels, too, and disks of beaten copper covered with symbolical emblems and the conventionalized figures of the Maya deities, bells, disks, and pendent figures of low-grade gold, beads, pendants, and fragments of jade. Among the finds were the skeletons of young women, of thick-skulled, low-browed men. In every detail the old traditions were corroborated.

And now we come to the weirdest part of the weird undertaking, but, in order to put each thing in its proper place and make all matters clear, I must speak once more of the details of the sacrifices at this Sacred Well as reported in the ancient accounts.

The legend regarding the Sacred Well and the sacrificial rites performed therein was so clearly and yet so quaintly stated by the *Alcalde* of Valladolid, Don Diego Sarmiento de Figueroa, in 1579, that I am going to give his account here. Valladolid is the shire town of the *partido*, or county, in which Chichen is situated, and the *Alcalde* corresponds as nearly as possible to the officer we call mayor. This account is the official and authentic report rendered by the *Alcalde* to his sovereign, Carlos V of Spain. He writes of the Sacred Well, called by him the *Cenote*, as follows:

The lords and principal personages of the land had the custom, after sixty days of abstinence and fasting, of arriving by daybreak at the mouth of the *Cenote* and throwing into it Indian women belonging to each of these lords and personages, at the same time telling these women to ask for their masters a year favorable to his particular needs and desires.

The women, being thrown in unbound, fell into the water with great force and noise. At high noon those that could cried out loudly and ropes were let down to them.

After the women came up, half dead, fires were built around them and copal incense was burned before them. When they recovered their senses, they said that below there were many people of their nation, men and women, and that they received them. When they tried to raise their heads to look at them, heavy blows were given them on the head, and when their heads were inclined downward beneath the water they seemed to see many deeps and hollows, and they, the people, responded to their queries concerning the good or the bad year that was in store for their masters.

I had some time before caused to be built a large, flat scow to serve me in the diving operations which I planned to carry on later and had lowered it by means of the derrick down to the surface of the well. There, moored to a rock shelf, it floated on the still water, awaiting the time for its use. One day I sat in it writing my notes and waiting for repairs that were being made on the dredge. The scow was moored ten feet under the overhang of the cliff-like wall and directly under the site of the derricks, sixty feet or more above. Looking casually over the gunwale, I saw that which gave me a thrill. It was the key to the story of the woman messengers in the old tradition.

The waters of the two great *cenotes* around which the ancient city was built are totally unlike. The water of one, called by the natives *Toloc*, and used by me as a bathing-pool, is dark blue by reason of depth, but is actually as clear and transparent, if not as cool, as the waters of a mountain lake. The water of the other, *Chen Ku*, or Well of the Sacrifices, is, on the contrary, dark colored and turbid, changing in hue at times from brown to jade green and even to a blood-red, as I shall later describe, but it is always so turbid that it reflects the light like a mirror rather than deflecting it like a crystal.

Looking over the gunwale of the pontoon and downward to the water surface, I could see, as if looking down through great depths, "many deeps and hollows." They were in reality the reflections of the cavities and hollow places in the side of the cliff directly above me.

When they recovered their senses, the women had said: "Below, there were many people of their nation and they . . . responded to our queries." As I continued to gaze into those depths and hollows, I saw below many people of their nation and they, too, responded. They were the heads and parts of the bodies of my workmen, leaning over the brink of the well to catch a glimpse of the pontoon. Meanwhile they conversed in low tones and the sound of their voices, directed downward, struck the water surface and was deflected upwards to my ears in words softly sounding in native accent, yet intelligible. The whole episode gave me an explanation of the old tradition that developed as clearly as the details of a photographic negative.

The natives of the region have long asserted that at times the waters of the Sacred Well turn to blood. We found out that the green color the water sometimes shows was caused by the growth of a microscopic algæ; its occasional brown hue was caused by decaying leaves; and certain flowers and seed capsules, blood-red in color, at times gave the surface of the water an appearance like that of clotted blood.

I mention these discoveries to show why I have come to believe that all authentic traditions have a basis of fact and can always be explained by a sufficiently close observation of the conditions.

The time finally came when the dredge no longer brought up valuable material from the bottom of the well. For weeks and months it had ceaselessly chewed its way through the thick deposit on the bottom within the area of the "fertile zone." For some time past the material that collected in the basin of the dredge was mostly a thin, watery mud, with only an occasional object of scientific value embedded in it. For a while the dredge doubled its trips and lessened the time of making them by dumping its load into the waiting scow, where the contents were carefully examined and the tailings dumped on the shore of the Little Beach.

On the western side of the Sacred Well and nearly on a level with its waters, a rock shelf stands out from the cliff-like walls far enough to form a narrow beach and strong

enough to support a thick clump of balsa-wood trees called by the natives *mash*. The interlacing roots of these strange trees, half-buried in the black mold about them and half-showing, darkly smooth and shining, seem like the writhing bodies of antediluvian reptiles. In the moist and darkly shadowed places beneath them can be seen the glistening eyes of giant toads, turtles, and lizards. This little beach is like a scene from the time when the world was young.

As each afternoon the tailings were thrown from the scow to the beach, the big lizards, their serrated backs bristling, would slink silently deeper into their holes, and the giant toads, their eyes blazing like diamond points in the darkness of their sheltered crannies, would cry out in deep-toned chorus: "Don't! Don't!"

At least so it seemed to me as, wet to the skin and plastered with sticky, black mud, I kept on throwing out the tailings.

When the dredge at the Sacred Well came up holding in its basin only the mud and sticks that had fallen into it from the loose material above; when the sharp-pointed steel teeth came up gritting with slivers of the rock bottom between them, we decided that our work with the dredge was finished. From now on human fingers must search in the crevices and the crannies of the bottom for the objects that the dredge could not reach to grasp. Nicolas, a Greek diver with whom I had previously made arrangements, arrived from the Bahamas where he had been gathering sponges. He brought an assistant, also a Greek, and we prepared at once for under-water exploration.

We first rigged the air pump in the boat, no longer a scow but once more a dignified pontoon, and then the two Greeks, turned instructors, taught a chosen gang of natives how to manage the pumps and send through the tube in a steady current the air upon which our lives depended and how to read and answer signals sent up from below. When they considered that the men were letter perfect, we were ready to dive.

We rode down to the pontoon in the basin of the dredge

and, while the assistant took his place by the men at the pump to direct them, we put on our suits, outfits of waterproof canvas with big copper helmets weighing more than thirty pounds and equipped with plate-glass goggle eyes and air valves near the ears, lead necklaces nearly half as heavy as the helmets and canvas shoes with thick wrought-iron soles. With the speaking-tube, air hose, and life-line carefully adjusted, I toddled, aided by the assistant, to where a short, wide ladder fastened to the gunwale led down into the water.

As I stepped on the first rung of the ladder, each of the pumping gang, my faithful native boys, left his place in turn and with a very solemn face shook hands with me and then went back again to wait for the signal. It was not hard to read their thoughts. They were bidding me a last farewell, never expecting to see me again. Then, releasing my hold on the ladder, I sank like a bag of lead, leaving behind me a silvery chain of bubbles.

During the first ten feet of descent, the light rays changed from yellow to green and then to a purplish black. After that I was in utter darkness. Sharp pains shot through my ears, because of the increasing air pressure. When I gulped and opened the air valves in my helmet a sound like "pht! pht!" came from each ear and then the pain ceased. Several times this process had to be repeated before I stood on the bottom. I noted another curious sensation on my way down. I felt as if I were rapidly losing weight until, as I stood on the flat end of a big stone column that had fallen from the old ruined shrine above, I seemed to have almost no weight at all. I fancied that I was more like a bubble than a man clogged by heavy weights.

But I felt as well a strange thrill when I realized that I was the only living being who had ever reached this place alive and expected to leave it again still living. Then the Greek diver came down beside me and we shook hands.

I had brought with me a submarine flashlight and a submarine telephone, both of which I discarded after the first descent. The submarine flashlight was serviceable in clear water or water merely turbid. The medium in which we had

to work was neither water nor mud, but a combination of both, stirred up by the working of the dredge. It was a thick mixture like gruel and no ray so feeble as that of a flashlight could even penetrate it. So we had to work in utter darkness; yet, after a short time, we hardly felt the fact to be a serious inconvenience; for the palpic whorls of our finger-ends seemed not only to distinguish objects by the sense of touch, but actually to aid in distinguishing color.

The submarine telephone was of very little use and was soon laid aside. Communication by the speaking-tube and the life-line was easier and even quicker than by telephone. There was another strange thing that I have never heard mentioned by other divers. Nicolas and I found that at the depth we were working, from sixty to eighty feet, we could sit down and put our noses together—the noses of our helmets, be it understood—and could then talk to each other quite intelligibly. Our voices sounded flat and lifeless as if coming from a great distance, but I could give him my instructions and I could hear his replies quite clearly.

The curious loss of weight under water led me into several ludicrous mishaps before I became accustomed to it. In order to go from place to place on the bottom, I had only to stand up and push with my foot on the rock bottom. At once I would rise like a rocket, sail majestically through the mud gruel and often land several feet beyond where I wanted to go.

The well itself is, roughly speaking, an oval with one hundred and eighty-seven feet as its longer diameter. From the jungle surface about it to the water surface varied from sixty-seven to eighty feet. Where the water surface commenced could be ascertained easily, but where it left off and the mud of the bottom began was not so easy to determine, for the lines of demarcation did not exist. However, I can roughly estimate that of the total depth of mud and water, about sixty-five feet, thirty feet was a mud deposit sufficiently consistent to sustain tree-branches and even tree-roots of considerable size. About eighteen feet of this deposit was so compact that it held large rocks, fallen columns, and wall stones. Into this mud and silt deposit the dredge had

bitten until it had left what I called the "fertile zone" with a vertical wall of mud almost as hard as rock at the bottom and fully eighteen feet high. In this were embedded rocks of varied shapes and sizes, as raisins are embedded in plum puddings.

Imagine us, then, searching in the darkness, with these mud walls all about us, exploring the cracks and the crevices of the rough limestone bottom for the objects that the dredge had failed to bring up to the light of day. Imagine also that every little while one of the stone blocks, loosened from its place in the wall by the infiltration of the water, would come plunging down upon us in the worse than Stygian darkness that was all about us. After all, it was not so bad as it sounds. It is true that the big rocks fell when and where they would and we were powerless to direct or even to see them, but so long as we kept our speaking-tubes, air hose, and life-line and ourselves well away from the wall surface we were in no special danger. As the rock masses fell, the push of the water before and around them reached us before the rock did and even if we did not get away of our own accord, it struck us like a huge soft cushion and sent us caroming, often head down and feet upward, balancing and tremulous like the white of an egg in a glassful of water, until the commotion subsided and we could get on our feet again. Had we incautiously been standing with our backs to the wall, we should have been sheared in two as cleanly as if by a pair of gigantic shears and two more victims would have been sacrificed to the Rain God.

Before the dredge had even been installed and months before it brought up the first load, I had been told by a *H'Men*, pointing to a certain spot: "There is where the Palace of the Rain God lies, as our fathers told us."

That spot was out of the "fertile zone," and considerably to the right of it, but I determined to examine it. I found a deep natural depression in the floor of the pool that, so far as my observation could show, existed in no other place; and around the edge of that depression I found the outstretched skeletons of three poor women. Around the neck of one of them there were several jade beads as pendants.

Portions of the garments worn by these victims preserved from decay in some strange way were secured for examination and study.

By what mode of reasoning did the *H'Men* or his predecessors select that special spot as the place where the Rain God dwelt? Its depth, if nothing else, made it physically impossible for a native diver to reach the place, 'spy it out, and return to the surface alive to tell of it. Who knows?

The natives for ages have believed that somewhere in those unknown depths the powerful God of the Waters had his home and that his anger caused the droughts, the pestilences, and the plagues of insects that from time to time descended upon the land. It was this belief that caused them to send messengers with supplications and rich gifts to propitiate the God. It can safely be inferred that the messengers were neither old women nor ill-favored.

The present natives of the region believe that big snakes and strange monsters live in the dark depths of the Sacred Well. Whether this belief is due to some faint remembrance of the old serpent worship, or is based upon something seen by some of the natives, can only be guessed at. I have seen big snakes and lizards swimming in these waters, but they were only snakes and lizards that in chasing their prey through the trees above had fallen into the pool and were trying to get out. We saw no traces of any reptiles or monsters of unusual size anywhere in the pool.

No strange reptile ever got me in its clutches, but I had one experience that is worth repeating. Both of us, the Greek diver and I, were busily digging with our fingers in a narrow crevice of the floor and it was yielding such rich returns that we neglected some of our usual precautions. Suddenly I felt something over me, an enormous something that with a stealthy, gliding movement was pressing down on me. Something smooth and slimy was pushing me irresistibly into the mud. For a moment my blood ran cold. Then I felt the Greek beside me pushing at the object and I aided him until we had worked ourselves free. It was the decaying trunk of a tree that had drifted off the bank of mud and in sinking had encountered my stooping body.

One day I was seated on a rock gloating over a remarkable find, a moulded bell of metal, and I quite forgot to open the air valves as I should have done. I put the find in my pouch and rose to change my position, when suddenly I began to float upward like an inflated bladder. It was ludicrous, but also dangerous, for at this depth the blood is charged with bubbles like champagne and unless one rises slowly and gives the blood time to become normal, a terrible disease called the "bends" results, from which one can die in terrible agony. Luckily I had enough presence of mind to open the valves before going up very far and so escaped the extreme penalty, but I suffer the effects of my carelessness today in a pair of injured ear drums and greatly impaired hearing.

Even after I had opened the valves and was rising more and more slowly, I struck the bottom of the pontoon topsy-turvy, half-dazed by the concussion. Then, realizing what had happened and laughing at the thought of the fright my boys must have had when they heard me thump on the bottom of the boat, I scrambled from under it and threw my arm over the gunwale. As my helmet appeared over the side I felt a pair of arms thrown around my neck and startled eyes looked into the plate-glass goggles of my helmet. As they took off my diving-suit and I rested on a seat, getting back into normal condition and enjoying a cup of hot black coffee and the sunlight, the young Greek told me the story.

"The men," he said, "turned a pale yellow with terror when they heard the knock on the bottom that announced your unexpected arrival. When I told them what it was, they shook their heads mournfully and one of them, faithful old Juan Mis, said, 'It's no use, *El Amo* the master is dead. He was swallowed by the Serpent God and spewed up again. We shall never hear him speak to us again'; and his eyes filled with tears. When your helmet came over the gunwale and he looked into its window, he raised both arms high above his head and said with great thankfulness, 'Thank God, he is still alive, and laughing.'"

As for the results of our dredging and diving into the great water pit, the first and most important is that we

proved that in all essential details the traditions about the Sacred Well are true. Then we found a great store of symbolical figures carved on jade stone and beaten on gold and copper disks, copal masses and nodules of resin incense, many skeletal remains, a number of *hul chés*, or dart-throwers, and many darts with finely worked points of flint, calcite, and obsidian; and some bits of ancient fabric. All these had real archæological value. Objects of nearly pure gold were encountered, both cast, beaten, and engraved in *repoussé*, but they were few in number and relatively unimportant. Most of the so-called gold objects were of low-grade alloy, with more copper than gold in them. That which gave them their chief value were the symbolical and other figures cast or carved upon them.

Most of the objects brought up were in fragments. Probably they were votive offerings broken before being thrown into the well, as a ritualistic act performed by the priests. The breaking was always in such a way that the head and features of the personages represented on jade plaque or gold disk were left intact. We have reason to believe that these jade pendants, gold disks, and other ornaments of metal or stone when broken were considered to have been killed. It is known that these ancient civilized races of America believed, as did their still more ancient forbears of northern Asia and as the Mongols to this day believe, that jade and other sacred objects have life. Accordingly these ornaments were broken or "killed" that their spirits might serve as ornaments to the messenger, whose spirit would be appropriately adorned when it finally appeared before the *Hunal Ku*, the One Supreme God in the Heavens.

That this belief has come down through the ages to the present day is shown by this curious fact: A Maya noted for his knowledge of herbs and native medicines, not quite a *H'Men*, but respected among his people, lost his wife in childbirth and, as a particularly esteemed friend of the family, I was invited to the death feast, a ceremony much resembling the Celtic "wake." I was the only white man present.

The body of the beloved was dressed in new garments

of white cotton cloth finely embroidered in the native fashion and handsome new shoes. I noticed first that the soles of the shoes had been cut in several places until the white stockings were to be seen between the slashes and then I saw that the new white garments had been similarly treated. I asked the husband the reason for this, and he answered:

"It is so that her soul shall appear before God dressed as the soul of my wife should be. If we had not done this, the spirits of the garments she wore would have remained in the coffin until the things rotted. Meantime the soul of my wife would remain without clothing, and that ought not to be."

The value in money of the objects recovered from the Sacred Well with so much labor and at such expense is, to be sure, insignificant. But the value of all things is relative. The historian delves into the past as the engineer digs into the ground, and for the same reason, to make the future secure. It is conceivable that some of these objects have graven upon their surfaces, embodied in symbols, ideas and beliefs that reach back through the ages to the primal home of these peoples in that land beyond the seas. To help prove that is well worth the labor of a lifetime.

Sometime during the early centuries of the Christian era (authorities are not in agreement as to the exact dates) the Toltecs, a tribe known to legend as "the master builders," displaced a sedentary agricultural people then living in the valley of Mexico, built a temple city known as Teotihuacan, and laid the foundations of central Mexican civilization. The Indian historian Ixtlilxochitl relates that they were architects, farmers, and mechanics; that they engaged in warfare, not always successfully; and incidentally that they invented the fermented drink called pulque. Around the close of the twelfth century, they fell on evil times—perhaps due to crop failure, religious differences, or revolt—abandoned their capital, and wandered

south. Their customs and achievements were wrapped in mystery until recent archaeological excavations began to throw light on their culture.

The several centuries following the migration were a period of confusion in the valley of Mexico. A number of powerful tribes vied with each other for control, but eventually banded together, and from this confederation the Aztec civilization, named after the most aggressive of the tribes, was born. The Aztecs had a capital at Tenochtitlan, situated on marshy ground which later became the site of Mexico City. They probably originated in Puebla—their own tradition had it that they first lived in a cave on an island somewhere to the north. They had been wandering warriors who had imposed themselves on less powerful tribes. With their overlordship of the valley of Mexico, they began to build an Empire which became the most powerful in Mexico. It had achieved great riches and was still expanding when in 1520, in one of the most dramatic conquests in history, they came under the heel of Cortez and the Conquistadors.

An astonishingly lifelike picture of "what the Spaniards saw when they entered this great Aztec capital" is contained in 'Glimpses of Tenochtitlan,' by the eminent American archaeologist George C. Vaillant. He was born in Boston, educated at Harvard, and taught at Harvard, Yale, Columbia, and New York University. He made numerous field expeditions to Mexico and Yucatan, was for several years curator of Mexican archaeology at the Museum of Natural History, and later became Director of the University of Pennsylvania Museum. He was considered a foremost authority on the early civilizations of Mexico and Central America. He was the author of the well-known book *The Aztecs of Mexico*, from which the following selection is taken.

GLIMPSES OF TENOCHTITLAN

GEORGE C. VAILLANT

THE HISTORY of the Aztecs and their forebears is the most complete record we have of the growth of any Indian civilization. Their conquest was the greatest feat in the European occupation of the American continent. The Aztecs were at their zenith in 1519, when Cortés and his 400 men first landed, and a description of Tenochtitlan, taken from the contemporary records of the conquerors themselves, will show us something of the external character of Indian civilization in America.

Bernal Diaz del Castillo, who left the most personal record of the Spanish Conquest, tells how his comrade-in-arms on first beholding Tenochtitlan, the ancient Mexico City, exclaimed, "It is like the enchantments they tell of in the legend of Amadis! Are not the things we see a dream?"

This is lyric language from hard-bitten men-at-arms, whose chief avocations, while engaged in converting the heathen, lay in acquiring booty and enjoying the charms of dusky Dulcineas. Yet, in contrast to the drab towns and tawny hills of Spain, Tenochtitlan must have appeared a paradise, for its green gardens and white buildings were set in the midst of blue lakes, ringed by lofty mountains. "Gazing on such wonderful sights," wrote Bernal Diaz, "we did not know what to say or whether what appeared before us was real, for on one side in the land there were great cities and in the lake ever so many more, and the lake itself was crowded with canoes, and in the causeway were many bridges at intervals, and in front of us stood the great City of Mexico, and we . . . we did not even number four hundred soldiers."

Although socially and governmentally Tenochtitlan was distinctly an American Indian tribal town, outwardly it ap-

peared the capital city of an empire. A bird's-eye view would have revealed an oval island connected with the mainland by three causeways which converged at the center of the city. These roads were cut by waterways over which removable bridges extended. The edges of the island were fringed by the green of the "floating gardens," while at the center the shiny white of the houses predominated, and the verdure was reduced to tiny green squares in the patio gardens. Thrust above the quadrate masses of the roof-tops loomed the various clan temples, each set on its platform in the form of a truncated pyramid. The city had few streets or open spaces, but was gridded with canals crossed by portable bridges. The two principal plazas were those of the Temple of Tlalotelco and of the religious center of Tenochtitlan proper, open spaces which gave a welcome relief from the pyramids and official palaces clustered about them. There must have been a curiously living quality about this grouping, the temples seeming to ride like horsemen among the serrated ranks of the houses.

Were a visitor to have traversed Tenochtitlan from south to north, he would have been struck by the rich variety of sights. Approaching along the causeway, the traveller of that time passed first between expanses of open water. Then gradually tiny islands of green appeared, made of masses of mud dredged up from the bottom of the shallow lake and held in place by wicker-work. White-clad farmers dexterously poled their tiny dugouts through the maze as they went about the cultivation of their gardens. These irregular islets merged gradually into a more orderly grouping where the accumulation of soil had become stabilized as the roots, striking downward, had established anchorage in the lake bottom and created solid ground. This artificially made land reduced the open water of the lake to mere canals.

Save for the broad causeways, roads there were none; and along the canals the traveller saw, in increasing numbers, boatloads of produce headed towards the city. Here and there among the green of the crops and trees he caught glimpses of thatched roofs and wattled walls, the huts of the farmers. Then adobe walls of more substantial dwellings be-

gan to encroach on the gardens, and the waters of the lake shrank to a canal following the roadway. The adobe walls gave way to the fronts of more pretentious houses plastered white or washed with powdered pumice, a dull, rich red. Now the visitor could realize how the city expanded through the successive creation of artificial islands which bore first a crop, then a modest hut and finally became integral with the masonry of the city proper.

The causeway had now changed from a simple means of communication into a principal street with all its social complexity. Since canals took the place of roads, space for a saunter was so rare that the causeways were as much recreation grounds as arteries of traffic. Thus people out to see the sights, people on errands, people on their way to the myriad functions of religious import, swallowed up the long lines of trotting carriers who, bowed under their burdens, went to the city with produce and tribute or left with goods for barter. Not a wheel turned or a pack-animal neighed; transport was on the backs of men or in the bottoms of boats.

Outside the city limits the monotony of ant-like columns of laden folk had been but rarely relieved by the passage of a civil functionary, all pomp and feathers, or by a stern merchant with a handful of fighting men, followed by a chain of apprentices, showing the whites of their eyes as they peered from under the press of their tumplines. Now could be seen clan leaders wearing rich mantles and sniffing flowers as they watched the milling crowd, and black-robed priests whose ears were shredded and whose hair was matted with the blood of self-inflicted penance. There was little sound, little hurry, save for the carriers trotting to reach relief from their burdens. There was an intense vitality, none the less, that of a multitude of units participating in complex action, knowing each its allotted part, but never the substance of the whole.

A glance into the doorway of a house gave welcome relief from the cold-blooded, almost insect-like quality of life outside. A shaded patio was flanked by buildings whose interiors were cool and spacious. Mats and straw cushions on the polished red of the cement floor welcomed the visitor to

repose, while the rhythmic clap of hands and the scrape of stone on stone told that tortillas were being made and corn-meal ground in a kitchen at the back. Seated in a corner, an elderly man was talking to two small boys, whose serious faces showed that, already conscious of their participation in the tribal life, they heeded their uncle's precepts as to conduct befitting boys and men. A fat little girl squatting in the doorway vainly tried to imitate with her stubby fingers and toy implements the graceful movements of her mother as she produced fine threads by the cunning manipulation of her spindle. Lolling on a cushion, a young man idly smoked a cigarette in a cane holder as he picked thoughtfully at the scarcely healed lobe of his ear, tattered by penitential blood-letting with cactus spine and obsidian blade.

A fiesta was going on in another house, and one heard the rich vibration of wooden drums and the high squeal of reed flutes. The patio was full of people, gay in the bright colors of their holiday clothes, and the air was heavy with the cloying scent of lilies. The sharp smells of rich sauces cunningly mixed from many peppers embroidered this odor, and occasionally a light breeze wafted the cool, mystic scent of incense. Somebody was celebrating his birthday, since in the background one saw a painted figure adorned with amate paper, representing the god who presided over that event. A little apart from the feasters, who partook of their entertainment with dignified pleasure, was a group of old men whose clownish gestures and burlesque solemnity could be easily associated with the cups of pulque that a slave was industriously filling for them. Not for nothing had these elders passed through the rigid self-denial of young manhood; they were permitted alcoholic indulgence in their old age whenever a feast came to pass. A last backward glance revealed the musicians, garlanded with flowers, blowing their flutes and conch shells, while one man beat the head of a cylindrical drum and another the wooden tongues in the side of the two-toned *teponaztli*.

Farther up the street the priests seemed to increase in number. More individuals wore the trappings of high office, such as nodding panaches of quetzal plumes and cloaks,

the designs of which were worked in feathers like the personal insignia on their circular shields. Evidently the visitor was near the center of the town, and presently the causeway ended in a great open square, where the temples rose above the majestic planes of their pyramidal foundations. In the hard, bright light of early afternoon, heat-waves joined the smoke of incense in rendering indistinct and unearthly the outlines of the temples.

The short, black shadows suggested unspeakable things. Was it imagination or reality, that sickening smell of a filthy butcher shop, that hung in the air in revolting contrast to the immaculate pavement of the temple courtyard? Imagination is too personal and egocentric a sensation for an Indian community, and the great block of the skull-rack gave an answer founded only too firmly on fact. Thousands of skulls, threaded on poles, were piled up in orderly symmetry, and the black cavities of their orbits and nasal apertures suggested the marks on infernal dice. Undisturbed by this monument to human sacrifice, a few young men were practising in a ball court near by. They thrust at a solid rubber ball with agile hips and elbows, in an effort to drive it through two rings set transversely to the walls in the length of the court.

A circular stone placed a short distance away was the scene of a most cruel game. Here, on certain ceremonial days, a tethered captive was forced to defend himself with a wooden club against the onslaught of an adversary whose weapon was set with razor-sharp obsidian blades. Usually he was killed in the most honorable of deaths, that of sacrificial victim to the Sun God, Tonatiuh, but sometimes he would resist so successfully that he gained a pardon. Other disc-shaped stones were placed about the plaza. One, 13 feet in diameter, was set vertically on a special platform. Carved with a consummate mastery of design, it represented the symbolic history of the world. Another disc, set flat, was hollowed in the center so that hearts wrung from war captives might be burned to nourish the great gods. This was carved on its surface and edge to commemorate the many con-

quests of War Chief Tizoc, who was shown dressed as a god with his captives before him.

In another part of the plaza a sacrifice was to be made. Before a small temple dedicated to one of the myriad Aztec gods a group was gathered, some in the gay panoply of merchants and others wearing the sinister black of the priesthood. A tightly pinioned slave stood in their midst and looked unseemingly before him, resignation, not fear, on his face. The priests rushed him up the steep steps of the temple, followed by the merchants at a more leisurely pace. Two priests seized the slave by either arm, forcing him backward, while two others pulled his legs from under him until his body curved, belly upward, over the altar. A fifth priest ploughed his flint knife in a long sweep from the breastbone to the base of the stomach and, reaching into the aperture, with a dexterous twist tore out the heart. This he burned, while it was still throbbing, in a carved stone vase, while the merchants, swinging long ladles of smoking incense, chanted their thanks for a safe and profitable excursion into the hot country.

Paying only the most cursory attention to this pious little scene, knots of chiefs were converging on a large building at a corner of the plaza. The war chief, Montezuma, was planning an attack on a neighboring town, remiss in its tribute payment, so there must be a gathering of clan leaders to prepare for war. Adorned with helmets like the heads of jaguars, eagles and wolves, girt with armor of wadded cotton brocaded in many colors or embroidered with feathers, their faces set with nose and lip ornaments of jade and gold, these fierce-visaged chiefs passed proudly through the door, but in an anteroom to the council chamber they stripped off their ornaments. Then, bareheaded and barefooted, with downcast eyes, they made their way to the throne, where sat the slim figure of Montezuma, simply dressed but for the gold crown and jade earrings of his exalted office.

The austerity of the council chamber was not borne out by Montezuma's other apartments, which contained all the appurtenances of a sybaritic potentate. The war chief's two

wives and his many concubines occupied magnificent quarters. Kitchens and storehouses were spread over another great space, for not only were there some 300 guests served at each meal but also a thousand guards and attendants. In contrast to the profusion within, outside the kitchen door squatted patiently a threadbare group of countrymen from whose carrying-bags swayed the mottled heads of the trussed turkeys which they had brought as offerings for the royal larder.

Other rooms in Montezuma's palace contained the tribal treasure, composed of the tribute wrung from many towns. Gold, jade, rich feather mantles, baskets of produce, were heaped in abundance. Clerks were listing the goods in picture-writing to see that each subject town had fulfilled its quota or else were calculating the share that should be turned over to the various clan stewards. Another patio presented a more animated scene. Here acrobats were practising their feats and poor, warped dwarfs were composing grosser contortions to win a chiefly smile. In another set of buildings was housed the zoo, where serpents undulated sluggishly and where, from behind wooden bars, peered the greedy, yellow eyes of jaguars and ocelots. In a side room a human arm projecting from a basket of raw meat showed how the bodies of some sacrificial victims were utilized.

The highway to Tlatelolco extended north from this great plaza, which even to-day is the center of the city. This wide road, with a canal beside it, was filled with the same indecisive multitude that thronged the southern artery. The setting sun had brought people out on their roof-tops. Some leaned over parapets to watch the crowd below, while idlers, squatting in a shaded bit of the street, took equal interest in the slow movements of the householders above them.

A path and a canal, debouching into the main avenue, led to a small square, in the center of which loomed a pyramid. From the patio of an adjacent building shrill cries arose and the dull clash of wooden instruments. Within, a number of boys were receiving instruction in the manual of arms. Each equipped with a small buckler and a flat wooden club, they learned the art of cut and parry under the scornful eye of a

warrior. They dealt and received hard blows, but the clubs were not toothed with wedges of obsidian, the volcanic glass that made hand-to-hand combat so vicious in war. Another group was practising with the *atl-atl*, or throwing-stick. The marksman laid his spear along a narrow wooden trough with a hook at the farther end, the nearer end being grasped in the hand. By lengthening the arm in this way it was possible to give a greater propulsive force to the spear.

On the other side of the plaza the boys in the religious-training school presented a less animated scene. Their little legs and faces lacerated by maguey spines, their bodies thin from fasts and penance and their eyes dulled by the monotony of self-denial, these children were chanting strophes from a ritualistic chant. Their preceptor, who led the singing, showed by his own scarred and emaciated body that the propitiation of the gods was a relentless and never-ending task. Priest, chief, warrior or husband, every Aztec, from boyhood on, spent much of his life either in a kind of beseeching penance, to ensure his future, or in a state of grateful atonement for not having had a worse past. The Aztecs lived on intimate if uncomfortable terms with the supernatural powers.

Another aspect of this lack of individualism was to be seen in the *tecpan* or clan building. Here elders of the clan were arranging the affairs of the tribal unit, twenty of which made up the city-state of Tenochtitlan. One old man peered over picture-maps as he adjusted a question of land tenure between two contesting families and made his final judgment on the basis of how much land each family could cultivate by its own efforts. Another elder distributed pottery vessels, given up as tribute by a town across the mountains, to some of the poorer members of the community. None of these people, litigants or applicants, bestowed more than occasional glances into the back courtyard, where an adulterer was being stoned to death by members of the affronted family. Urban existence contained too many interests and life was too cheap for them to view as an excitement the inevitable result of wrongdoing.

Each of the twenty tribal divisions regulated its own af-

fairs. The great plaza where Montezuma had his palace and where all the gods were worshipped in many temples was for the use of all the clans together; and was the civic center for the 60,000 households of Tenochtitlan. Yet in spite of the importance of this center of religion and government, the great plaza of Tlaltelolco near the northern edge of the islands was almost as striking. Once a Mexican tribe acknowledged the sway of another power it was supposed to furnish fighting men and tribute, but its government and economics were seldom modified.

Thus the recently conquered Tlaltelolco had a communal center as majestic as that of Tenochtitlan. It seemed more dramatic to Spanish eyes because its great temple to the War God, Huitzilopochtli, was thrust into prominence by the wide spread of the market-place, while in Tenochtitlan the great buildings were so close together that it was hard to gain an impression of their size.

The market-place of Tlaltelolco consisted of a large area of polished pavement, bordered by arcades which sheltered many of the merchants. At one edge a basin opened out from the canal beside the northern causeway, where boats bringing goods and produce could find an anchorage. Each kind of product was concentrated in a special place. Thus one section was completely devoted to vegetables, and compactly squatting women sat watching their goods, arranged before them in symmetrical heaps on woven mats. In another section cotton mantles were being sold, some spread to show the full design and others neatly folded. Elsewhere was a row of vendors of implements and tools, such as obsidian blades, carved and burnished pottery, spindle whorls, deer-horn awls, bone bodkins and a few copper axes and needles. A brilliant mass of color characterized the booths of the feather salesmen. Some sold merely bunches of plumes, the lovely green of the quetzal, or trogon, and the multi-colored plumage of parrots. At the other stands feather cloaks, mats and shields gave evidence of charming fancy in their design and patient toil in their execution.

Jewellers displayed jade ornaments and gold worked into precious rings of filigree or massive beaten gorgets. It was

the jade, however, that caught the envious eye and was produced with furtive circumspection as a material of great price. Other merchants sold ornaments of shell, and the pinks, whites and subtle mottled browns of sea-shells contrasted with the rich dark sheen of tortoise carapaces. At one booth a rich warrior earnestly bargained with the proprietor for an exquisite pair of earplugs, cunningly inlaid with a mosaic of turquoise and mother-of-pearl.

The smiling whispers and admiring glances of the crowd at the jeweller's abruptly changed in the slave quarters to appraising stares. Some of the chattels wore wooden collars, and their brutish faces had a hopeless expression. These had sunk to servitude long ago as a result of crime or of capture in war. Others were thin and emaciated but did not wear the collar of bondage. They had met with misfortune and were selling themselves for the first time to ensure food and shelter.

A low hum rose from the market-place; there was none of the strident shouting of the European fair. The bargaining for goods was carried on slowly, quietly, but, none the less, keenly. The Aztecs had no money, so that barter was the usual means of purchase. The cacao bean, however, had a standard value, and this, in equalizing exchanges, performed the nearest approach to the function of currency. Passing through the crowd were warriors who acted as police and, should a disagreement arise, haled disputants into a court, where a tribal elder settled the question in his capacity as judge.

Beyond the market was a double line of walls which divided the market from the temple precinct of Tlalotelco. Rectangular buildings, with patios in their centers, housed the priests and the various schools and councils of the central organization of the community. Farther on were grouped the principal shrines. In their midst the great temple to the War God shouldered its bulk into the sky. There was a skull-rack here, like the one in Tenochtitlan, and another heap was made of the bones of the victims. Near the great pyramid stood a circular temple, the door of which was built to resemble the mouth of a serpent, the place of worship of the god Quetzalcoatl. The sacrificial block in front was black

with the smoke of incense and the blood of victims. A pile of stone knives and axes gave a sinister indication of what rites were practised there.

Pools fed by the pipes of an aqueduct leading from the mainland gave an impression of quiet peace. The reflections of the temples, distorted occasionally by the breeze, intensified the brooding mysticism of the sacred enclosure. In contrast to the austerity of the priests, young girls, their eyes virtuously downcast, slipped back and forth, carrying out the various errands of their training-school within the enclosure. The great pyramid and the temple of the War God completely dominated the place. At regular intervals terraces broke the lines of the sloping sides and increased the impression of its size. A wide staircase of 114 narrow steps led up the western side, and so steep was this stair that not until one's head rose clear of the platform did the temple itself come into view.

The temple, in reality, comprised two shrines, built side by side, each having stone walls and soaring roofs of wood coated with plaster. Through the right-hand door one could clearly see the squat figure of Huitzilopochtli carved from the stone and covered with a paste in which were set jade, turquoise, gold and seed pearls. A girdle of gold snakes, picked out in precious stones, adorned his waist, and around his neck hung a string of gold masks covered with turquoise mosaic. By his side stood the statue of an attendant deity, equipped with a short lance and a gold shield, richly decorated with the customary mosaic.

In the adjoining shrine stood an image of Tezcatlipoca, one of the most prominent Aztec gods. His eye-sockets were inlaid with mirrors of obsidian, the black depths of which reflected the red gleams of the afternoon light. This statue, too, was adorned with gold and precious stones. High in the wooden roof of this temple perched a small figure of Xipe, the God of Seed-time. Braziers of incense discharged greasy coils of smoke which deepened the gloom of the temples, whose walls were already black with the blood of many victims. In dim corners stood heaps of ritualistic paraphernalia, conch-shell trumpets, knives, banners and baskets of shape-

less lumps of meat, surplus human hearts which, for some reason, had not yet been placed upon the braziers. The priests who glided through this murk seemed fitting satellites to the diabolic images to which they ministered. In front of the temples stood the great drum which was soon to throb across the lake as a nation suffered its death-agony.

It was from this point that Montezuma showed Cortés his empire, and Bernal Diaz, who witnessed the scene, left us this unforgettable description:

"Then Montezuma took Cortés by the hand and told him to look at his great city and all the other cities that were standing in the water and the many other towns and the land around the lake. . . . So we stood looking about us, for that huge and cursed temple stood so high that from it one could see over everything very well, and we saw the three causeways which led into Mexico . . . and we saw the [aqueduct of] fresh water that comes from Chapultepec, which supplies the city, and we saw the bridges on the three causeways which were built at certain distances apart . . . and we beheld on the lake a great multitude of canoes, some coming with supplies of food, others returning loaded with cargoes of merchandise, and we saw that from every house of that great city and of all the other cities that were built in the water it was impossible to pass from house to house except by drawbridges, which were made of wood, or in canoes; and we saw in those cities Cues [temples] and oratories like towers and fortresses and all gleaming white, and it was a wonderful thing to behold."

Scattered throughout the Mississippi and its tributary river valleys are mounds of earth constructed by prehistoric Indians. At first they were thought to be the product of a separate race, the Mound Builders, who antedated the Indians known to the early settlers. They are now recognized as the work of a variety of peoples over a period from about 1000 B.C. to just before the coming of the white man. Some of the mounds

were building platforms or religious sites but the majority, like the example described below, were for burial.

'Excavation of a Virginia Burial Mound in 1784,' written by the man who was to become the third President of the United States, is noteworthy because it is probably the first account on record of the observation of archaeological stratification. The number and nature of the various strata, the position of the human bones in each and the deductions made provided an example of scientific excavation which in general was to be ignored for a hundred years.

EXCAVATION OF A VIRGINIA BURIAL MOUND IN 1784

THOMAS JEFFERSON

I KNOW OF no such thing existing as an Indian monument: for I would not honor with that name arrow points, stone hatchets, stone pipes, and half-shapen images. Of labor on the large scale, I think there is no remain as respectable as would be a common ditch for the draining of lands: unless indeed it be the Barrows, of which many are to be found all over this country. These are of different sizes, some of them constructed of earth, and some of loose stones. That they were repositories of the dead, has been obvious to all: but on what particular occasion constructed, was matter of doubt. Some have thought they covered the bones of those who have fallen in battles fought on the spot of interment. Some ascribed them to the custom, said to prevail among the Indians, of collecting, at certain periods, the bones of all their dead, wheresoever deposited at the time of death. Others again supposed them the general sepulchres for towns, conjectured to have been on or near these grounds; and this opinion was supported by the quality of the lands in which they are found (those constructed of earth being generally

in the softest and most fertile meadow grounds on river sides), and by a tradition, said to be handed down from the Aboriginal Indians, that, when they settled in a town, the first person who died was placed erect, and earth put about him, so as to cover and support him; that, when another died, a narrow passage was dug to the first, the second reclined against him, and the cover of earth replaced, and so on. There being one of these in my neighborhood, I wished to satisfy myself whether any, and which of these opinions were just. For this purpose I determined to open and examine it thoroughly. It was situated on the low grounds of the Rivanna, about two miles above its principal fork, and opposite to some hills, on which had been an Indian town. It was of a spheroidal form, of about 40 feet diameter at the base, and had been of about twelve feet altitude, though now reduced by the plough to seven and a half, having been under cultivation about a dozen years. Before this it was covered with trees of twelve inches diameter, and round the base was an excavation of five feet depth and width, from whence the earth had been taken of which the hillock was formed. I first dug superficially in several parts of it, and came to collections of human bones, at different depths, from six inches to three feet below the surface. These were lying in the utmost confusion, some vertical, some oblique, some horizontal, and directed to every point of the compass, entangled, and held together in clusters by the earth. Bones of the most distant parts were found together, as, for instance, the small bones of the foot in the hollow of a skull, many skulls would sometimes be in contact, lying on the face, on the side, on the back, top or bottom, so as, on the whole, to give the idea of bones emptied promiscuously from a bag or basket, and covered over with earth, without any attention to their order. The bones of which the greatest numbers remained, were skulls, jaw-bones, teeth, the bones of the arms, thighs, legs, feet, and hands. A few ribs remained, some vertebrae of the neck and spine, without their processes, and one instance only of the bone which serves as a base to the vertebral column. The skulls were so tender, that they generally fell to pieces on being touched. The other bones were stronger.

There were some teeth which were judged to be smaller than those of an adult; a skull, which, on a slight view, appeared to be that of an infant, but it fell to pieces on being taken out, so as to prevent satisfactory examination; a rib, and a fragment of the under-jaw of a person about half grown; another rib of an infant; and part of the jaw of a child, which had not yet cut its teeth. This last furnishing the most decisive proof of the burial of children here, I was particular in my attention to it. It was part of the right-half of the under-jaw. The processes, by which it was articulated to the temporal bones, were entire; and the bone itself firm to where it had been broken off, which, as nearly as I could judge, was about the place of the eyetooth. Its upper edge, wherein would have been the sockets of the teeth, was perfectly smooth. Measuring it with that of an adult, by placing their hinder processes together, its broken end extended to the penultimate grinder of the adult. This bone was white, all the others of a sand color. The bones of infants being soft, they probably decay sooner, which might be the cause so few were found here. I proceeded then to make a perpendicular cut through the body of the barrow, that I might examine its internal structure. This passed about three feet from its center, was opened to the former surface of the earth, and was wide enough for a man to walk through and examine its sides. At the bottom, that is, on the level of the circumjacent plain, I found bones; above these a few stones, brought from a cliff a quarter of a mile off, and from the river one-eighth of a mile off; then a large interval of earth, then a stratum of bones, and so on. At one end of the section were four strata of bones plainly distinguishable; at the other, three; the strata in one part not ranging with those in another. The bones nearest the surface were least decayed. No holes were discovered in any of them as if made with bullets, arrows, or other weapons. I conjectured that in this barrow might have been a thousand skeletons. Every one will readily seize the circumstances above related, which militate against the opinion, that it covered the bones only of persons fallen in battle; and against the tradition also, which would make it the common sepulchre of a town, in which the bodies were placed

upright, and touching each other. Appearances certainly indicate that it has derived both origin and growth from the accustomary collection of bones, and deposition of them together; that the first collection had been deposited on the common surface of the earth, a few stones put over it, and then a covering of earth, that the second had been laid on this, had covered more or less of it in proportion to the number of bones, and then also covered with earth; and so on. The following are the particular circumstances which give it this aspect. 1] The number of bones. 2] Their confused position. 3] Their being in different strata. 4] The strata in one part have no correspondence with those in another. 5] The difference in the time of inhumation. 6] The existence of infant bones among them.

EPILOGUE

Many who have read the previous accounts of the discoveries of lost and forgotten civilizations have no doubt wondered what heritage our own civilization will unveil to diggers of the future. This is the theme of 'The Science of the City Dump' by E. E. Slosson, the late editor of Science Service who was well known for such popular books as Creative Chemistry. The article was written before the menace of nuclear explosions existed. A direct hit by such an explosive would of course destroy all evidence. But the peripheral results might be such as to cause archaeologists of the future to echo Sir Leonard Woolley's comment on volcanic eruptions—that such events are "lamentably rare."

THE SCIENCE OF THE CITY DUMP

E. E. SLOSSON

MY EYES ARE TIRED from long reading on the cars. To rest them I lay aside my book, Sir William Flinders Petrie's *Revolutions of Civilization*, and look out of the window. A dismal prospect. But thought inspiring. For my car has halted for some mysterious reason in front of a hideous heap of city refuse, to which ash carts on the banks are dumping their daily quota. They are filling up a draw, full thirty feet deep, eventually to be built over by skyscrapers.

How long will they stand? A hundred or five hundred years? Some day doubtless the steel skeleton will succumb to the secret corrosion of the concrete, or the oxygen that leaks through the cracks. Perhaps by that time the place will be deserted. But probably not. For cities stick to their sites with strange persistence. We may surmise that when these skyscrapers decay or are demolished they will be replaced by new structures, possibly of some synthetic substance that may stand for a thousand years or more.

By that time probably the site will be deserted. Petrie gives 1400 years as the average length of a cycle of civilization before it loses its grip and is overwhelmed by barbarians from abroad or of its own breeding. The land then may lie fallow for four or five thousand years. The city may be forgotten or legendary like Cnossus or Chichen Itzá, Troy or Ur of the Chaldees. It may be lost like the Hittite empire.

But some time will come the archæologist. He is a sort of inverted sexton, who disinters instead of burying, and he sifts the ashes of a city dump with more assiduity than the scavenger.

What will he find when he digs down thirty feet below the level of the ancient city? No iron or paper, for these are perishable; and what idea can he get of our life if iron and

paper are left out of the picture? A few coins and jewelry of gold and silver. Some bits of crockery and glassware, the latter made beautifully iridescent by soil corrosion, giving some Wendell Phillips of the future a chance to lecture on "The Lost Arts."

I lean out of the window to scrutinize the dump-heap more closely to see what is imperishable—what remains the Schliemann of the future will have on which to appraise our civilization. "Select Pasteurized Milk"—the name is blown in the bottle. So Pasteur is sure of post-mortem immortality by reason of his name becoming a verb. "Vanity Face Cream"—the vanities are everlasting. It is by their cosmetic caskets that we know ancient Egypt and Assyria. "Bloomfeld's Brick"—these are the most numerous relics of all. They will probably give the name to our times: "The Bloomfeld Period," "The Bloomfeldian culture"; but whether Bloomfeld was a monarch or a divinity will be matter of hot dispute among the experts.

Well, let us hope that the savants of the seventieth century A.D. will remember how little they have to work upon and be charitable in their estimates of our achievements. And let us make the same allowances for the ancients and remember that we too are taking an ashman's view of earlier civilizations.



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