From the Flood to the Exodus: Egypt's Earliest Settlers

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ABSTRACT

One of the major obstacles to accepting a diluvialist interpretation of the geological record is the length of time generally attributed to the prehistoric human record, that is, the Stone Age. Since the earliest civilizations sprang out of the Stone Age cultures, this record must belong to the period after the Flood, and indeed after the events at Babel.

Can the gap between the Flood and datable history be bridged? According to the Darwinian view, the transitional period between the purely animal existence of man's ancestors and the emergence of civilization proper must have lasted millions of years, and one may expect a vast quantity of prehistoric remains to substantiate those millions of years. According to the diluvialist view, the Flood was a comparatively recent event and one may expect the evidence to agree with a transitional period between the destruction of civilisation and its rebirth which lasted no more than hundreds of years. The prehistoric record therefore constitutes an important test of the diluvialist view. Apart from the 'scientific' dates attached to the evidence, which interpretation does the prehistoric record favour? Is the evidence an embarrassment to anyone believing in the Genesis tradition, or does the Genesis tradition stand up? These questions are considered with particular reference to the archaeology of Egypt.

THE BIBLICAL CONTEXT

According to a simple reading of the book of Genesis the cataclysm which engulfed the earth in the days of Noah occurred nine generations before Abraham. From the fourth year of Solomon, fixed at 968/7 BC,[1,2] one may count back to the Flood as follows:

479 years to the Exodus — 1446 BC (I Kings 6:1)
430 years to Jacob's entry into Egypt — 1876 BC (Exodus 12:40)
130 years to the birth of Jacob — 2006 BC (Genesis 47:28)
60 years to the birth of Isaac — 2066 BC (Genesis 25:26)
100 years to the birth of Abraham — 2166 BC (Genesis 21:5)
292 years to the Flood — 2458 BC (Genesis 11:10–26)

However, there is an immediate problem with this date, since in modern textbooks 2458 BC comes six or seven centuries after the unification of Egypt under Menes, which was preceded by at least 1,000 years of Predynastic civilization and 1,000,000 years of Neolithic and Palaeolithic culture. Prior to that stretches a further expanse of geological time which is devoid of human remains — how much further depending on where in the geological record the Flood ended.

This study will consider what constraints are imposed on the chronology of the post-Flood period by the historical and archaeological record of Egypt; one of its conclusions being that, although Egypt's history has been over-extended — drastically in the case of the Stone Age — there is no scope for lowering the dates sufficiently to accommodate the Flood at 2458 BC. The focus will be on Egypt for several reasons. That country was one of the first to be settled after the Flood. Its Stone Age remains have been carefully researched and are fairly typical of the remains which one finds elsewhere. Its earliest monuments are less fragmentary than those of its contemporaries. And the potentially datable period encompassed by its written records goes back further than that of other countries.

In chronological research it is usually necessary to work backwards in time, from the known to the unknown. Dates can be considered absolute only insofar as they measure a definite period from the present, and the further back one goes the scantier become the records from which absolute dates can be inferred. On the other hand, the flow of events and historical change to which chronology imparts structure proceeds in a forward direction. As a concession to comprehensibility, the narrative of this paper will also proceed in that direction.

One other principle worth mentioning at the outset is that, where information is insufficient to determine the precise duration of any period, the best practice is generally to infer a duration close to the minimum required. In essence, this is an application of the principle of uniformitarianism. All accurately dated history shows that, considered globally, man never stands still; he is always making discoveries, challenging boundaries, building and destroying. Any scheme which elongates time to the extent that the rate of change becomes imperceptible ought to be regarded as suspect.

Uniformitarianism is fundamental to the modern reconstruction of prehistory. Frank Hole and Robert Heizer, for example, write:

> *'Without the concept of uniformitarianism —that the present is a guide to the past because the processes of geology (for example, uplift, erosion, deposition) are constant —geologists would not have been able to infer that it had taken millions of years for the layers now seen on earth to have accumulated and changed. The same principle is applied by prehistorians who regularly use analogy with modern peoples as a guide to interpreting prehistoric ways of life. With regard to human behavior in the past, however, it is now acknowledged that it may have no exact counterparts among modern peoples. This is especially true of fossil forms of man.'*[3]

It is also coming to be acknowledged that uniformitarianism is an inadequate principle by which to interpret geological phenomena. As late as the Quaternary, geological processes have been found often to occur on a scale much greater than they occur now, and often much more rapidly.[4] Even today much erosion, deposition and so on are in fact episodic. The most striking agents of geological change — floods, volcanism, and earthquakes — are intrinsically episodic, their occurrences unpredictable, their violence variable. As Hole and Heizer virtually admit, there is no basis for assuming that the occurrence and violence of such episodes in the past was similar to what we observe today. Except for the slender support of radiometric dating, the reasoning is tautological, not inferential: without the assumption that the earth's layers took millions of years to form, the inference that they took millions of years to form would not be possible.

Those authors are also incorrect in their characterization of the opposite of uniformitarianism.

> *'The alternative concept is that in relatively recent times all the evidence which we interpret to be indicative of a long history for the earth and its forms of life was spontaneously created.'*[5]

The actual alternative is to hold that the evidence believed to have been generated over an immensely long period indicates, or is at least compatible with, rapid processes, most of them occurring during, or resulting from, a universal deluge — the Flood recorded in Genesis. Nearly all fossils testify of sudden burial in sediments which were deposited rapidly. Far from tracing a gradual evolution from lower forms of life to higher forms, they appear without forebears and conserve their identity, until, in many cases, they become extinct. Nor have palaeontologists found any evidence to show that man evolved from another form. Man has always been man. The catastrophism of the geological record complements the uniformitarianism of the human record.

The Genealogies

As Whitcomb and Morris pointed out in their book **The Genesis Flood,**[6] it is unnecessary to suppose that the genealogy from Noah to Abraham records a continuous sequence of generations. The Hebrew formula 'X begot Y' or 'X was the father of Y' does not entail a father-son relationship. This is evident from the preceding Table of Nations, where Shem is described as 'the father of all the children of Eber'. Since at least four generations separated Shem from the children of Eber, 'father' here can mean no more than ancestor and 'children' descendants. Likewise, Genesis 11:12 reads, *'And Arpachshad lived thirty-five years and begot Shelah'*, whereas Luke 3:36 records another generation between Arpachshad and Shelah. In Exodus 6:16–20 four generations separate Jacob from Moses, whereas in I Chronicles 7:23–27 eleven generations separate Jacob from Nun, Moses' contemporary. The same practice continues in the New Testament, where the first words introduce Christ as 'son of David, son of Abraham'. Israel's genealogies simply betoken lineal descent and a continuity of tradition sufficient to preserve the genealogy. Their purpose is not primarily chronological but to demonstrate a connection between the present and events of fundamental significance in the past.

The abridgement of genealogies is also attested in other cultures, especially where there was little concept of historiography. Gaps occur in the Memphite Genealogy of the Priests of Ptah,[7] for instance, and in the genealogies of the kings of Denmark and Norway.[8] Because the Sumerian word for 'son' also means 'descendant', it is suspected that there are gaps in some Sumerian genealogies.[9] On the other hand, while we do not know precisely what has been omitted, the omission of a great many generations is, at best, improbable.

The names of the patriarchs from Shem to Terah, and their ages when they died, are as follows:

Shem	600 years
Arpachshad	438 years
Cainan	460 years (Septuagint Text)

Shelah	433 years
Eber	464 years
Peleg	239 years
Reu	239 years
Serug	230 years
Nahor	148 years
Terah	145 years (Samaritan Text)

Ten generations are mentioned, ending with Terah's three sons, Abram, Nahor and Haran, just as ten generations are listed from Adam to Noah, ending with Noah's three sons, Shem, Ham and Japheth. The arrangement appears to be schematic, with the actual number of generations from the Flood to Terah (if we put the Babel event around 2850 BC) probably in the high twenties. And since the purpose of the genealogy is to form a bridge between antediluvian history and later postdiluvian history, perhaps the most eligible generations to be omitted are those precisely half way through the genealogy, immediately after Peleg. Some support for this idea comes from the genealogy in Genesis 10:21–29, which runs parallel with that from Genesis 11:10 onwards and stops at this point.

The Model of Postdiluvian Dispersion

The chronology of the Hebrew record is clearly irreconcilable with a chronology which stretches prehistoric time over hundreds of millions of years. Those millions of years, however, are scientific inferences, not external facts. When the validity of radiometric dating methods is tested against the primary stratigraphic evidence, or compared with rates of processes which do not involve radioactive decay, these methods are invariably thrown into doubt; they have no independent corroboration. Moreover, what we know about man's early history after the Flood fits the Hebrew record well, so that this congruence also tends to invalidate the radiometric timescale. The main points of correspondence are:

(1) No evolution.

As demonstrated by Marvin Lubenow and others, the fossil record flatly contradicts the theory that man originated from the apes.[10] As authorities are beginning to recognise, *Homo erectus* and Neandertal Man were simply variant forms of *Homo sapiens.* On the other hand, *'Homo habilis'*, the supposed link between man and the australopithecines, was just an ape, as became apparent in 1986 when for the first time an almost complete skeleton of *'Homo habilis'* was found.[11] Its height measured only three feet, it had dangling arms, and at 1.8 million years old it was younger than the earliest specimens of *Homo erectus*, its supposed descendant.

(2) **Diversity of languages.**

Unlike traditions of the Flood, legends of the Tower of Babel and confusion of speech are not common.[12] That said, noteworthy support for the biblical account comes from Babylonia itself, where a damaged inscription reads:

> *'Babylon corruptly proceeded to sin, and both small and great mingled on the mound. . . . All day they founded their stronghold, but in the night He put a complete stop to it. In his anger He also poured out his secret counsel to scatter them abroad, He set his face, He gave a command to make foreign their speech.'*[13-15]

This appears to have some basis in an historical event and is very close to the biblical account. Likewise, the Roman mythographer Hyginus (*floruit* 10 BC) writes:

> *'Men for many generations led their lives without towns or laws, speaking one tongue under the rule of Jove. But after Mercury interpreted the language of men — whence an interpreter is called* hermeneutes, *for Mercury in Greek is called Hermes; he, too, distributed the nations — then discord began among the mortals.'*[16]

There is, by contrast, no plausible natural explanation either for the multiplicity of language families or for the origin of language itself. Over time the grammatical structure of languages becomes simpler, not more complex. Ancient Greek, for example, is more complex than Latin, or modern Greek; Latin is more complex than French or Italian.

(3) **Dearth of Human Remains.**

Fossil remains of the earliest humans — they appear in Europe c.500,000 BP — are extremely rare. In England the interval between the oldest (recognised) fossil and the next oldest is 100,000 years; in the Far East it is 800,000 years.[17-22] Paul Mellars remarks on the evidence for a 'very substantial' increase in population density, from very low levels, around the end of the Middle Palaeolithic (c.40,000 BP):

> '[While] *we must always allow for the possibility that occupation sites of the earlier periods have been subject to a higher degree of selective description, . . . the documented contrast in the total numbers of Upper and Middle Palaeolithic sites recorded in several regions can hardly be dismissed. Within the heavily explored region of south-west France, for example, it is now clear that there are at least four or five times as many cave and rock-shelter sites with substantial traces of Upper Palaeolithic occupations as there are for the preceding Middle Palaeolithic period. These contrasts become even more striking if we recall that the duration of the Upper Palaeolithic period is substantially less than half that of the Middle Palaeolithic period — implying a rate of formation of Upper Palaeolithic sites (per unit of time) at least ten times higher than that during the earlier periods. Similar contrasts in the total numbers of Middle and Upper Palaeolithic sites have been documented in central Europe, Cantabria, and the south Russian plain.'*[23]

A similar pattern also characterises the Egyptian record, except that in Egypt the oldest skeleton so far unearthed (from near Jebel Sahaba, Lower Nubia) is dated c.12,000 BP or later.[24] Even if the entire Palaeolithic period were reduced to a hundred years or less, it would still show extremely low levels of population density, consistent with the tradition that after the Flood the earth was repopulated through rapid migration from Sumer. In view of the new dates for *Homo erectus* in Indonesia, the idea that man originated from Africa (where the australopithecines are found) is seen to have no foundation.[25]

(4) Ancient Monuments.

If the aborted Tower of Babel was built in the Jurassic period (see below), any remains of it must lie beyond the reach of archaeologists. Nonetheless, the spirit which gave rise to the project continued to express itself in the building of many other grandiose monuments, notably the pyramids of Egypt and ziggurats of Babylonia.

(5) **The Great Cities.**

The first man of power after the Flood was Nimrod.

> *'The beginning of his kingdom was Babel, Uruk and Akkad, all of them in the land of Sumer. From there he went into Assyria and built Nineveh, a city of broad places, and Calah, and Resen between Nineveh and Calah, that is, the great city.'* (Genesis 10:10ff)[26]

Archaeology has confirmed that the first cities were built in Mesopotamia, and that they were, by ancient standards, uncommonly large. Uruk, for example, was encircled by a wall nine kilometres long and covered some 566 hectares. Archaeology has also established that in the 'Late Uruk' period (c.3500–3250 BC in the received chronology) the culture of Mesopotamia extended all the way to Anatolia (modern Turkey). In real time this fits well with the Genesis tradition.

(6) Egypt, India and China.

Again in harmony with the tradition that man was dispersed from Babel, the oldest civilization after that of Mesopotamia is Egypt's, and the more distant civilizations commensurately younger. That of the Indus Valley is believed to date to c.2500 BC (received chronology), that of northern China to c.1800 BC. The earliest civilizations of South America arose still later in the second millennium BC.

(7) **The Sudden Emergence of Civilization**

— a suddenness aggravated rather than mitigated by radiometric chronology. A. J. Spencer writes:

> *'One of the most impressive features of the rise of civilization in the Nile Valley is the acceleration of technical and social advance during the early Dynastic Period. For over 150,000 years a Stone Age way of life had persisted in the Nile Valley, followed by about two millennia of Predynastic settlement, but the next four hundred years saw the emergence of a powerful, unified State, the construction of great monuments and the consolidation of styles and symbols which were to remain characteristic of Ancient Egypt.'*[27]

The disproportion is even more striking when one considers that the oldest stone tools — those from the Kada Gona site at Hadar, Ethiopia — are radiometrically dated to at least 2,500,000 years ago.[28,29] In the context of the Genesis account, the rapid development of civilization was a process of remastering skills which had been developed already in the pre-Flood world. Not only did Noah and his family preserve a few representatives of all birds and animals in the Ark; they are also likely to have preserved as much as they could of the world's technology and to have transmitted their knowledge to their descendants. Thus, a few generations after the Flood, men were already making bricks to build a city and nothing seemed beyond their capacity (Genesis 11:6) — the history of the pre-Flood world was in danger of repeating itself.

The effect of the confusion at Babel was to disrupt communication and thereby slow down the rate at which civilization developed. Henceforth each people was to have its own history and culture, shaped by its own territory and by its relationships with other peoples. Those who migrated into Europe and Asia had to discover all but the most rudimentary accomplishments of civilization afresh. Inheriting little from the pre-Flood world, they progressed from stone-working to the use of metals, from hunter-gathering to plant and animal husbandry, over hundreds of years. That some civilizations developed swiftly in comparison with others may have partly to do with climatic and environmental factors. It may also be because those peoples which settled nearer the original centre were quicker to cultivate, and benefit from, a sedentary existence. It is surely not a coincidence that the first civilization to emerge after the disruption was that of Mesopotamia, the fertile land of Babel. Apparently within a few generations, Nimrod was again able to build cities in the region, so that any preceding palaeolithic stage must have been brief; his family may still have spoken the original language. Egyptian civilization followed close behind.

From the Flood to Peleg

The geological column which classifies rocks into time-zones (Cambrian, Ordovician and so on) according to the order in which index fossils regularly occur in the earth's crust represents a real succession. Facies characteristic of particular time-zones, as defined by their fossils, sometimes persist over entire continents,[30] and there is almost always evidence of overthrusting where the usual order of fossils is broken.[31] It is therefore untrue to suggest that the sequence is based on circular reasoning.[32,33] The column reflects the order in which certain fossils and certain rocks occur; it does not presuppose that order. Moreover, rocks in the Mesozoic and Tertiary also suggest a succession of climates, and there is compelling evidence that much land was then above water. Marine deposits from the Permian onwards are confined (with important exceptions) to the outlying regions of continents. Thenceforth sea and land levels fluctuate, with the sea repeatedly invading and retreating from the land until equilibrium is reached in the Pliocene. Strata from the Permian to the Cretaceous cannot, in general, be satisfactorily explained as Flood deposits.[34,35] Rather, the end of the Flood should be located around the end of the Carboniferous, and the succeeding deposits understood as formed during a period, centuries long, of continuing geological instability, ending with the Ice Age.

This being so, the splitting of the earth mentioned in Genesis 10:25 may refer as much to a geological event as to the division of mankind into nations. The verse reads:

GEOLOGICAL PERIOD	ORTHODOX DATE	PROPOSED DATE
Jurassic	208 –144 Ma	C.2850–2830 BC
Cretaceous	144 – 66 Ma	C.2830–2800 BC
Tertiary:		
Palaeocene	66 – 58 Ma	
Eocene	58 – 37 Ma	
Oligocene	37 – 24 Ma	c.2800–2765 BC
Miocene	24 – 5.3 Ma	
Pliocene	5.3 – 1.6 Ma	
Quaternary:		
Pleistocene	1.6 – 0.01 Ma	C.2765–2655 BC

Table 1. *The geological periods from Jurassic to Pleistocene as they effect Egypt. The end of the Pleistocene marks the end of the Ice Age, in the orthodox scheme about 8000 BC, that is, before the end of the Stone Age in Egypt about 4000 BC. In the proposed chronology the Stone Age gives way to the Predynastic c.2600 BC.*

> *'To Eber were born two sons: the name of the one was Peleg, for in his days the earth was divided* [palag], *and his brother's name was Joktan.'*

The Hebrew word for 'divide' here means 'split asunder,[36-38] not (as in Genesis 10:32) 'separate, spread out'. To this extent an event or process distinct from the scattering at Babel seems to be signified, when the earth's previously single landmass was divided into continents. It should not be assumed that the confusion of language was the only thing which caused men to be scattered over the face of the earth; if that were all that happened, the different language groups could have separated from each other a short distance and then learned to communicate with each other afresh. But the Hebrew describes a rapid movement over the whole earth — a scattering, as in Deuteronomy 4:27 — just as would have been the effect if the continents had disaggregated and in the accompanying convulsions the lands near the sea had been flooded. In the Jurassic and Cretaceous periods the Sumerian region was completely re-inundated, so that any peoples near Babel would have had no choice but to scatter. It is suggested, therefore, that the division of the earth began about the same time as the confusion at Babel, being its physical correlative, and that Genesis 10:25 refers to both events — the human and the terrestrial division — as though they were one.

Probably the sudden fall in human longevity at this time resulted from environmental changes associated with these disturbances. The record of patriarchal ages from Adam to Terah suggests that longevity fell in three stages: once at the time of the Flood, once in the days of Peleg, and once between Serug and Nahor. These were sudden drops; they were not preceded by a gradual decrease in the ages of the preceding patriarchs, such as might indicate gaps in the genealogy. The fact that Noah lived to be 950 despite post-Flood conditions suggests that longevity was determined primarily by the conditions prevailing in childhood, or indeed at conception.

Assuming no gaps between Arpachshad and Peleg, Peleg would have been born c.2870 BC. For reasons to be explained in a later article,[39] the scattering of mankind at Babel may be dated to 2846 BC, which would correlate with the early part of the Jurassic. Such a scheme would allocate approximately 170 years to the Permian, Triassic and Jurassic (see Table 1) — sufficient time to accommodate the multiplication of the reptiles and dinosaurs attested by the fossils of those periods.[40]

EGYPT DURING THE LATE MESOZOIC AND CENOZOIC

During the Jurassic, Egypt's shoreline stretched from what is now the Siwa Oasis eastwards to the Faiyum and the Gulf of Suez (see Figure 1). South of that shoreline, the geological sequence (from oldest to youngest) comprises a Basement Complex of Precambrian and Palaeozoic rocks up to the Carboniferous; Nubian Sandstone from the Cretaceous together with shales and chalk; Lower Eocene limestones; in the Nile Valley, deposits of Pliocene and Pleistocene age; and finally alluvium.[41]

Between the Basement Complex and the Nubian Sandstone there is a massive unconformity where Permian, Triassic and Jurassic deposits are missing. These (it is suggested) are absent not because erosion exceeded deposition for 180 million years, nor indeed because of a non-eventful interlude in the Genesis Flood, but because the Flood ended at the Carboniferous and thereafter, until the late Cretaceous, most of Egypt was dry land.

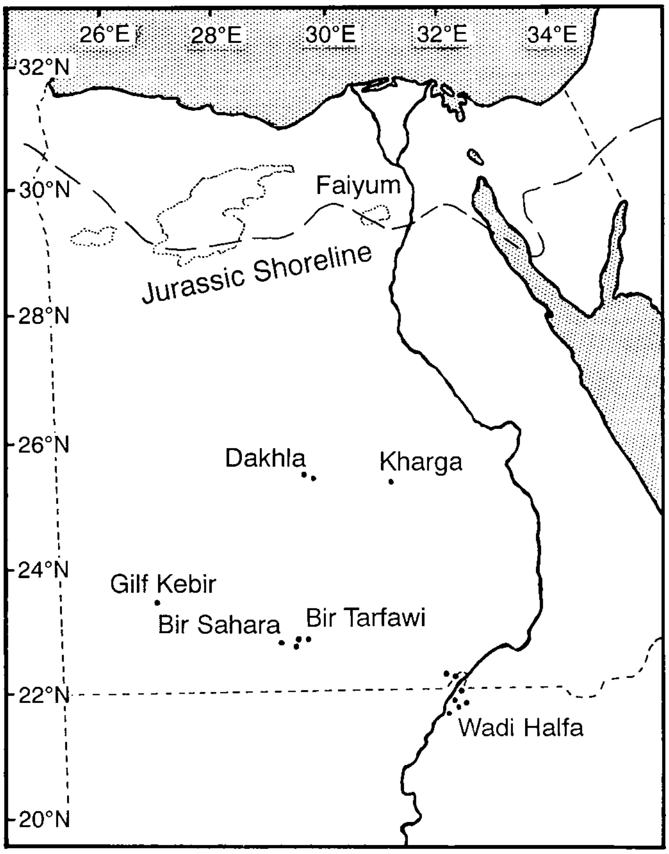

Figure 1. *Map showing known Acheulean sites in Egypt and northern Sudan, and the southern border of Jurassic deposits. Acheulean tools are also found along the Nile. Arkin 8 is among the sites near the modern town of Wadi Halfa.*

At that point the Tethys Sea (of which the Mediterranean, the Black Sea and the Caspian are remnants) transgressed onto North Africa, submerging nearly the whole of Egypt, and after a brief regression there was an incursion nearly as far south during the Lower Eocene.[42] Thereafter the sea regressed rapidly, as may be seen from the fact that the boundary of successively later marine deposits moved progressively northwards. (This is the sort of evidence which demonstrates the existence of land/sea boundaries throughout the Mesozoic and later.) Both lithologically and faunally the Upper Eocene rocks indicate deposition in a fast regressing and disappearing sea.[43] It was Eocene limestone that provided building material for the great pyramids at Gizeh.

The land level continued to rise in the Oligocene, when sands and gravels were deposited above Upper Eocene beds as the sea waters retreated. The drainage appears to have been rapid. Scattered among the deposits are massive tree-trunks, and as Rushdi Said observes, the alignment of the trunks and absence of twigs, fruits or other soft parts *'attest to the long journey they were exposed to before their silicification'*.[44] New river systems carved valleys and floodplains as wide as the present Nile Valley.[45] Egypt was also rocked by extensive volcanism. A broad belt of basaltic intrusions can be traced via isolated outcrops over thousands of square kilometres.[46] Towards the end of the Oligocene the two arms of the Tethys Sea — one passing from the Mediterranean through Mesopotamia into the Indian Ocean and the other along the Ural Mountains into the Arctic Ocean — both closed, so that the continents of Asia, Africa and Europe were partially re-united.

Massive erosion and torrential run-off continued into the Miocene, although in the north the sea made a brief return, depositing a uniform unit of reefal limestones. The Gulf of Suez and the Red Sea, which formed in the wake of the great East African rifts, were also flooded. In the Late Miocene the Mediterranean was cut off from the Atlantic and accumulated an enormous suite of so-called evaporites, varying in thickness from a few hundred metres to several thousand.[47-50] Where the Nile now flows, cataclysmic erosion downcut a canyon four times as long as the Grand Canyon of Colorado, reaching a maximum depth of two and a half kilometres.

In the Pliocene the Atlantic breached the rampart between Africa and Europe and the level of the Mediterranean rose. The Eonile canyon flooded, becoming a long estuary filled with marine sediments.

Finally, the Pleistocene and Holocene periods saw the transition from the turbulent conditions of the immediate post-Flood period to the comparatively quiet conditions of the present day. Although very brief in radiometric terms, their duration in real time is longer than the preceding periods. Depositional events are more sporadic, and the strata thinner, less common and less consolidated. The climate became cooler and wetter, producing vast sheets of ice in the higher latitudes and numerous pluvial lakes where there is now only desert. Glaciation over Europe and North America was primarily the result of massive volumes of snow falling and congealing *in situ,* rather than because ice-sheets expanded over these continents from the polar region.[51] Following from the collision of the continental plates in the preceding Tertiary, the land areas absorbing the impact buckled and formed great mountain ranges which rose thousands of feet, only to suffer massive erosion from wind and rain. Eastern Australia and the western Americas, as they came to rest, underwent considerable uplift. Archaeological evidence in Bolivia indicates that the Andes rose thousands of feet as late as the second millennium — after the Ice Age and well into the present era.[52,53]

In Egypt various periods of intense rain left a series of fluviatile layers along the Nile floodplain. In the Nile Valley these appear as gravel-capped terraces, the oldest being 350 feet above the present river and the later terraces successively lower. The lowest terrace, 10 feet above the river, is 'dated' to at least 70,000 years ago. In Upper (that is, southern) Egypt the higher terraces are well preserved and persist at a remarkably uniform height for hundreds of miles.[54,55] Corresponding sequences also occur along the wadis that run into the main channel.

As noted by Whitcomb and Morris, Pleistocene river valleys testify of heavy pluviation and rapid erosion.[56] The

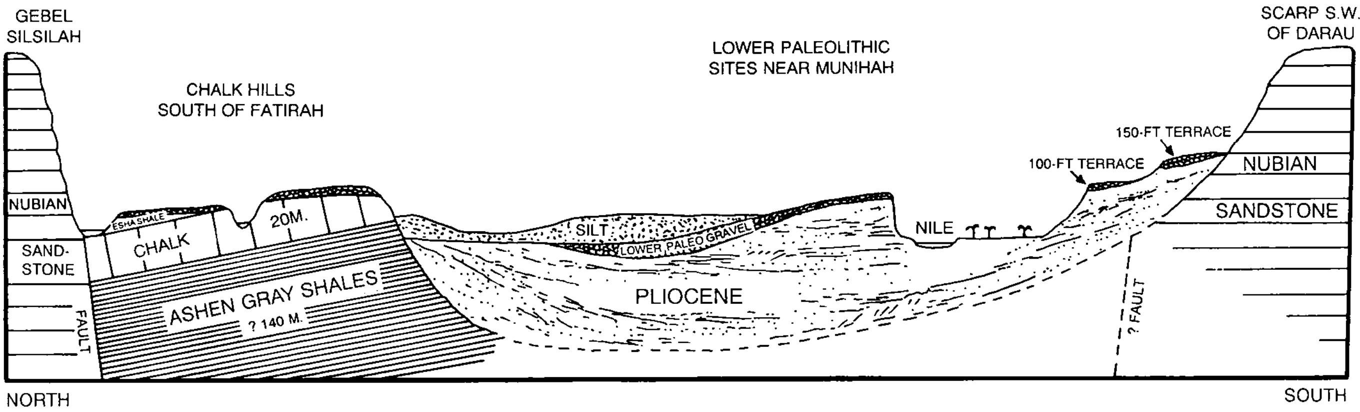

Figure 2. *Section across the Kom Ombo Plain, where the Nile flows east to west (from Sandford and Arkell, 1933, Ref. 55). Pliocene deposits fill the channel of the former 'Eonile'.*

Nile Valley is a typical example. The width of the stream passing through it is only a small fraction of the width of the valley, and as one goes down, the thickness of the gravels becomes progressively smaller (see Figure 2).[57,58] Each drop in level marks a sudden narrowing of the stream, resulting from an initial increase in current velocity, which increases the meander wavelength and reduces lateral erosion so that the river cuts downward. After a time the current abates and lateral erosion resumes, but because the current velocity is now less than before the downcutting, and because the widening of the river is soon interrupted by another episode of downcutting, the margins of its former bed are left stranded. The width of the river during these episodes was much greater than it is today, as it probably was during the intervening periods, and the successive terraces delineate a successive diminution. Although one of the largest rivers in the world, the present Nile is tiny by comparison with its ancestor.

That the episodes of downcutting were sudden is shown by the near horizontality of the terrace surfaces, since if they had occurred gradually, the terraces would be less pronounced and their surfaces would slope towards the river.

An increase in current velocity may be accounted for either by a rise in the level of the land or by a fall in sea level. The latter may occur as a result of glaciation or ocean formation, but these processes (which did occur in the Pleistocene) are unlikely to have occurred rapidly enough to account for the horizontality of the terraces. The more likely explanation is therefore a series of sudden rises in land level. This conclusion is supported by the evidence of coastal terraces around the world. Their patterns and distribution indicate differing elevations of landmasses from place to place, not universal falls in sea level. Tectonic evidence tells the same story:

> *'The Pleistocene witnessed earth movements on a considerable, even catastrophic, scale. There is evidence that it created mountains and ocean deeps of a size previously unequalled. . . . Faulting, uplift and crustal warping have been proved for almost all quarters of the globe.'*[59]

The effect of an elevation of the land is, of course, to increase the gradient between the river source and the sea, thereby initiating a period of downcutting which is most intense where the gradient is steepest.

Intense bursts of rainfall and vertical erosion, separated by periods of stability when the river erodes laterally, will also cause terraces to be formed, as has been documented from observation. Since 1882 Douglas Creek in Colorado has cut through more than nine metres and left several discontinuous terraces.[60,61] Six levels of terrace were formed along the Truckee River, Nevada, in only 44 years.[62] During a torrential rainstorm in 1965 the Waiho River in New Zealand deposited 70 feet of sediment over several miles and then cut into it a sequence of 10 foot high terraces in the space of a few weeks.[63] Thus the 700,000 years or more allotted to the terraces of the Nile on the basis of uniformitarian presuppositions have no empirical reality. So far as the geological evidence is concerned, the whole sequence could have formed within decades.

To inflate real time by a factor of many thousand is to distort our understanding of what was really going on. Geological effects are attributed to causes which originated millions of years earlier, and every discernible process or event is replayed in slow-motion. The absurdity of such a scenario is particularly striking when man makes his appearance.

THE PALAEOLITHIC

Until recently, the oldest stone artefacts found anywhere in Africa came from the Olduvai Gorge in Tanzania, with tools from the base of Bed I — designated the 'Oldowan Culture' — being dated to 1.9 million years ago. Oldowan-type tools which are not much later than this — from 1.6 million years ago — have also been found near Khartoum, where there was a sequence of all the types identified by Louis Leakey from the top of Olduvai Bed I through to the top of Bed IV (registering the 'Acheulean Culture').[64]

The earliest remains of man in Egypt are the crude stone tools found near the cliffs of Abu Simbel, in Upper Egypt, and are dated to the Armantian Pluvial of the Lower Pleistocene, according to Robert Bowen and Ulrich Jux some 1.2 million years ago.[65] The next earliest remains are sporadic finds from the 100 foot and 50 foot terraces of the Nile, dated respectively c.700,000 and 500,000 years ago. The terraces do not represent single points in time, however. At the 100-foot level the tools cover the full chronological range, both *'old and young Chellean types and even some that suggest the oncoming Acheulian technique'*, and much the same is true at the 50-foot level.[66-68] Such implements are also found on the wadi terraces. They *'lie virtually as they were dropped, since subsequent erosion and run-off of rain from the gentle slopes has been taken by rills and wadis'.*[69] Apart from these tools, several hundred thousand years of human existence have left no trace. Over a period several hundred times longer than that of historical Egypt, man's only progress was to become slightly more dexterous in the fashioning of hand-axes.

In the later stages of the Pleistocene the frequency of finds and habitation sites, and the rate of change, begins slowly to increase. The following phases have been distinguished:–

Lower Palaeolithic (Late Acheulean) 500,000–250,000 BC
Middle Palaeolithic (Mousterian) 250,000–100,000 BC
Middle Palaeolithic (Aterian) 120,000–30,000 BC
Upper Palaeolithic 30,000–8,000 BC

Again, all dates before the carbon-14 limit of c.45,000 years BP are recognised to be very approximate, since the gap between that date and the *terminus ante quem* of the potassium-argon method, c.400,000 years ago, is outside the range of any dating method applicable to the finds. These periods are punctuated by three pluvial episodes:–

Abbassia I Pluvial	480,000–410,000 BC
Abbassia II Pluvial	390,000–300,000 BC
Mousterian Pluvial	200,000–100,000 BC[70]

Even at this late stage of the Pleistocene the climate pattern does not conform to the uniformitarian expectation. The ages ascribed to the pluvials and intervening droughts are vast — in the case of the drought which preceded the first Abbassia Pluvial no less than 4,000 centuries. Avowedly uniformitarian though the basis of this chronology may be, there is absolutely no historical precedent for such durations, and no geological evidence for them. The periods of intense rain might have gone on for only a few months and left just the same geological remains.

Wendorf and Schild make some telling comments in this regard. In their chapter on the Western Desert of Egypt they note that the arid periods are deduced almost entirely from an absence of evidence:–

> *'The best evidence for past climate is always associated with wetter episodes. The arid phases, which tend to obliterate the preceding evidence, are represented either by no record at all or only erosion and/or eolian* [windblown] *sediments.'*[71]

The record left by the wetter episodes is confined to a few oasis basins, such as Dakhla and Kharga, and consists of fragmentary plateau and wadi tufas. At Kurkur the beds cover an area of 12 km^2 along the margins of the oasis and reach a maximum thickness of 15 m. Two major units are evident. All exposures are devoid of fossils, except for pollen and impressions of certain fig species. These are followed at Kurkur by two terraced wadi tufas, 4–5 m thick, separated by a 5 m period of dissection. At that point the pre-Acheulean Pleistocene record ends.

As creationists have pointed out, radiometric dating methods depend on the assumption that isotopic decay has always gone on at the constant rate which one observes today. This cannot be proven, any more than the creationist proposition that such rates were faster in the past can be proven. The latter idea, however, which would mean that radiometric dates — to the extent that the uniformitarian assumption was wrong — overstate the true dates, has positive support from the geological record, including that of the Western Sahara:–

> *'The record becomes progressively more complete through time, not only because of much greater preservation, but also because of the availability of radiocarbon dating and other techniques that provide better absolute and relative chronologies. For these reasons the paleoclimatic reconstruction is not equal for all periods, and the later ones appear to be much more complex than the earlier, although the actual complexity of the earlier periods may well have been at least as great.'*[72]

The explanations here consist entirely of assumptions. There is no basis for supposing that the later record is better preserved and more complex, other than the extraneous dictates and assumed validity of radiometric dating, which from the potassium-argon method onwards plots the intervals between contiguous conformations on a scale measured in hundreds of thousands of years rather than thousands.

The Acheulean

Thus at Bir Sahara and Bir Tarfawi, the sites which preserve the most comprehensive record, the Acheulean — estimated to have lasted some 250,000 years — is analysed as a sequence of three moister episodes, separated by two minor periods of deflation (wind erosion); the sort of sequence which might equally well occur in the space of a few years or decades. Although the rate of precipitation during the moist episodes cannot be estimated, it was sufficient to generate spring pools, lakes and numerous wadis. Remains of human settlement have been found at all such sites, together with evidence of considerable vegetation.

The general environment is thought to have been grassland. Here the settlers discovered that it was possible to sustain an easy living by hunting the large grazing animals — antelope, rhinoceros, wild cattle and the like — which roamed the plains within reach of the waterholes. The ostrich eggshells at Bir Sahara may have been used for carrying water on hunting trips, just as they are used today by bushmen of the Kalahari Desert.

Only at one site, Arkin 8, have the remains of any man-made shelter been found;[73] it is unlikely to have been domiciliary. Consisting of a solitary oval structure 1.8 m long by 1.2 m wide, and lined with a floor and wall of sandstone slabs preserved to a height of 30 cm, it seems to have been used for storage. An irregular circle of sandstone blocks may have been the remains of a tent ring used to hold down a skin over a wooden frame. Other Palaeolithic sites, wherever situated, also show no signs of permanent occupation. It is significant that no burials or human bones have been found.

The tools at Arkin 8 were distributed in eight subconcentrations, which the excavators interpreted as probably consecutive rather than contemporaneous. Each represented a place where the inhabitants built a hearth, manufactured their tools and scattered their debris. On the basis of the dimensions of each subconcentration (about 40 square metres) the excavators estimated that the community comprised about eight to 15 members — hardly more than a single family. Since this was the minimum viable size of such a community, and in the course of normal procreation their number would soon have doubled, the maximum length of occupancy cannot have exceeded a generation. In fact, the quantity of artefacts suggests considerably less than that. 3,409 'artefacts' were collected, representing perhaps a quarter of the total, but as on all such sites, the great bulk of these were chippings left over from the process of manufacture. Most of the tools could have been formed within one quarter of an hour, and because of their brittle nature are unlikely to have lasted more than a few weeks.[74,75] If the subconcentrations were contemporaneous and each represented a family, even less time would have been taken to produce the accumulations.

Much the same observations may be made of the other Acheulean sites excavated and reported on. Arkin 8 has been highlighted because it is well preserved and its concentration of artefacts is unusually dense. Most Lower Palaeolithic sites — and there are not many — are poorly preserved, and none are stratified; circumstances difficult to reconcile with the level of population one might expect men to have reached after hundreds of thousands of years. Since during the 180,000-year Abbassia Pluvial much of Egypt is thought to have been habitable, archaeologists must conclude that many sites have either been obliterated by heavy erosion or they lie beneath alluvial fans and the pediments resulting from erosion of adjacent buttes.[76] At Dungul, for example, most concentrations of artefacts lie upon bedrock. On the other hand, not one Acheulean site shows significant stratification, not even the well-preserved sites of Arkin 8 and BS-14 (Bir Sahara), and what evidence we have indicates that units of population were small. While overlying silt and sand might be swept away by deflation, stone tools embedded in them would tend to remain — as at Dungul — so that their number, types and distribution would still give us clues about the extent and duration of the community. Although numerous Palaeolithic sites may well have been buried beyond the reach of archaeology, there is no reason to suppose that any were once deeply stratified.

The Middle Palaeolithic

Following the Acheulean an arid interval of 50,000 years is thought to have supervened, during which the water table fell below its present level and high winds turned the lakes at Bir Sahara and Bit Tarfawi into dry basins. With the onset of the 'Mousterian Pluvial', the basins were again filled with water and abundant plant life returned. At Bir Sahara, three levels of Mousterian occupation are discerned (see Figure 3). The oldest level, of which only traces are discernible, is associated with dunes laid down at the end of the arid interval. Above these is a black manganese-stained layer of sand 20–40 cm thick, containing several *in situ* settlements and overlain by a sand unit which is topped with soil and shows further *in situ* settlement. In and just below the black layer a few animal bones were found. Thereafter came an arid spell, when the lake dried up and some of the earlier sediments were eroded. A layer of calcareous silt is interfingered by aeolian sand, above which lie the scant remains of a second lake but, apparently, no further settlement.[77,78]

It is difficult to estimate how much time is needed to account for this sequence. Since the tool assemblages from top to bottom record no significant technological development, the maximum is unlikely to exceed thirty years; the minimum time is perhaps a decade. Fluctuations in the height of the water table — as evidenced by erosional contacts in the silts, beds of burned sediments washed down by rainstorms after fire swept through nearshore vegetation, and the occurrence of human settlements within the water-laid sediments — are likely to have been seasonal rather than secular. A lake may form after a few weeks of heavy rain and disappear in as little time again. (At Bir Tarfawi there are no deposits corresponding to the lower lake at Bir Sahara.) A fire will usually burn itself out within days and, unless quickly buried, its charred remains will be scattered and broken down by wind action. The soil at the level of the latest Mousterian settlement consists of traces of root growth in a bed that is predominantly sand.

Radiocarbon dates for the lower lake ranged from 32,780 ±900 years ago to >41,450 years ago. The discrepancy of the youngest date was ascribed to recent carbonate contamination. Two samples from the upper lake yielded dates of 30,870 ±1,000 and 44,700 years ago — the latter taken to indicate that the whole sequence at Bir Sahara was beyond the radiocarbon threshold.

Inasmuch as men now employed the 'Levallois' technique, the Mousterian marked an advance in stoneworking. In this method the selected core was trimmed

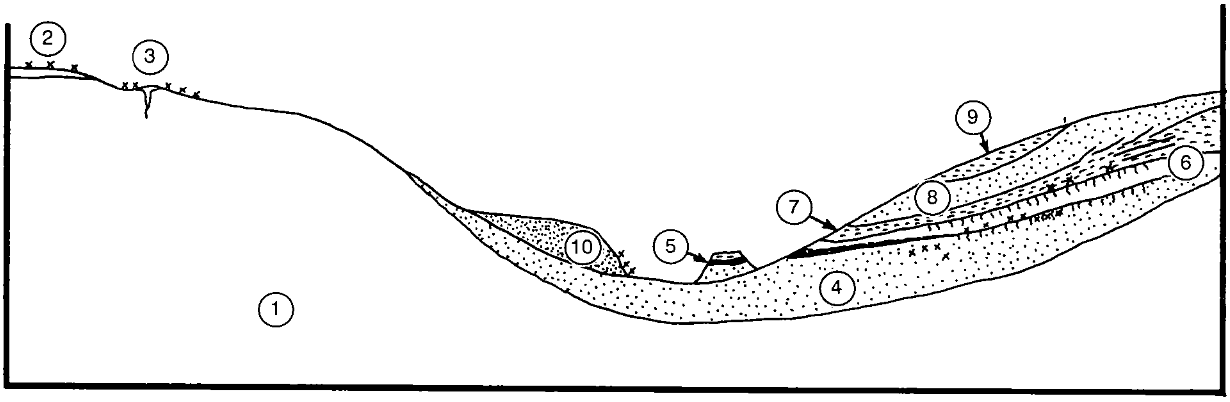

***Figure 3.** Generalised stratigraphy of Bir Sahara basin (after Wendorf* et al., *Ref. 77). Sequence of first lake: (1) pre-existent basin fill; (2) carbonate crust with Late Acheulean artefacts on surface; (3) spring vent (BS-13) with Final Acheulean artefacts in* situ; *(4) oldest dune sand with first Mousterian settlement in upper part; (5) swamp layer with several Mousterian settlements* in situ; *(6) grey sand unit with soil and latest Mousterian settlement at the top; (7) highly calcareous light-grey silt, with two lenses of burnt silt; (8) wind-blown sand interfingering with top of (7). The smaller, second lake has left only two silt units (9). (10) is a more recent dune with Old Kingdom settlement. Vertical scale greatly exaggerated.*

into the shape of a tortoise shell (or similar) and a flake reproducing the desired shape sliced off the top. The flake, rather than the core, was then worked into a tool. This method afforded the artisan greater control and facilitated the production of more specialised tools such as projectile points. There was also an improvement in the quality of workmanship.

Archaeologists represent these developments as technological innovations which would have taken hundreds of thousands of years to conceive. Yet the anatomical evidence of the fossil record indicates that man had been fully man since at least the beginning of the Pleistocene. As Leakey put it, speaking of his so-called *Homo erectus:*

> *'Suitably clothed and with a cap to obscure his low forehead and beetle brow, he would probably go unnoticed in a crowd today.'*[79]

Uniformitarianism has some validity, applied to human history. If man had the same intellectual capacity in Mousterian times that he has now, the Levallois technique might have suggested itself within a generation. The supposition that it took hundreds of thousands of years — 80 or more times the length of recorded history! — to progress from the more laborious Acheulean method lacks all plausibility.

The Aterian technology is a modification of the Mousterian, characterised by the addition of tanged points and long spear blades. Because the frequency of the distinguishing tools may be small, it is not always possible to distinguish Mousterian from Aterian.[80] The Aterian site BT-14 at Bir Tarfawi yielded a radiocarbon date of c.44,000 years ago, but it could in fact be 'older', since the slight traces of radiocarbon may be due to contamination. The later deposits from Bir Sahara belong to the same period, showing that Mousterian and Aterian overlapped somewhat.

After the Aterian there is, supposedly, a long break in the stratigraphic record. The next evidence of surface water or of human occupation anywhere in the Western Desert does not occur until the Early Neolithic, radiometrically dated 9,000–7,000 BC.

The Upper Palaeolithic

In the record of the Nile Valley there are also enormous gaps. On the basis of dates from Europe, the beginning of the Late or Upper Palaeolithic period is placed c.30,000 BC, although in Egypt it does not appear until 17,000 BC. Before then there are very few remains of human settlement, and the whole period from 45,000 to 17,000 BC is an archaeological Dark Age. One reason for the scarcity may be that most sites have been buried under deposits of silt or, as a result of changes in the course of the river, have been washed away. However, when one considers how many settlements must have accrued over such a time, this explanation does not seem sufficient. Within a Genesis-based chronology, on the other hand, the dictates of geological uniformitarianism have no validity and it becomes unnecessary to insert long periods when the Nile must have been comparatively placid. During the Palaeolithic its floods were often torrential and probably always unpredictable, so that the Valley would have been a much less hospitable place to inhabit than the southern wadis. The people of this time simply would not have settled in the Valley.

The first appearance of the Upper Palaeolithic is marked in Upper Egypt by the Halfan Industry, which — being still based on the Levallois technique — produced smaller, more finely worked tools, including the first microliths. In most places these tiny blades were produced by a different technique, and were inserted into wooden or bone shafts or handles to form compound tools, such as the harpoon and sickle. The earliest example of an arrow, however, does not appear until four or five millennia later, c.12,000 BC. The

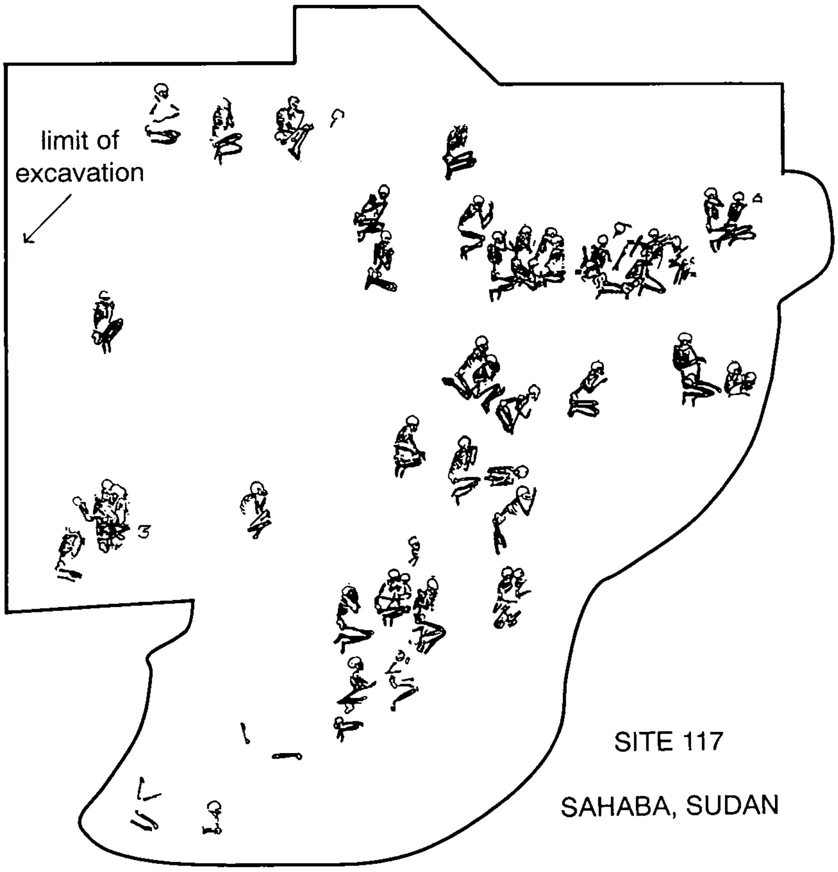

Figure 4. *Site plan of Site 117 cemetery near Jebel Sahaba (after Wendorf, Ref. 81).*

Upper Palaeolithic was also a time when the level of the Nile was raised by a series of unusually high floods. Geologists distinguish two episodes: the Ballana-Masmas Aggradation of c.18,000–15,000 BC and the massive Sahaba-Darau Aggradation of c.13,000–10,000 BC.

The earliest cemetery discovered is that known as Site 117 near Jebel Sahaba in Lower Nubia (see Figure 4), and belongs to the so-called 'Qadan culture'.[81] A total of 59 interments were counted, with a further 39 from a site across the river and 21 from Site 8905, near Tushka. The skeletons indicated a wide range of ages and roughly equal numbers of males and females. Despite expectations of high infant mortality, there was only one infant below the age of 3; other skeletons showed evidence of familiar disorders such as arthritis and tooth decay. They were dated some time between 12,000 and 10,000 BC.

Ordinarily, depending on the size of the population associated with it, a cemetery would represent a considerable period. However, here that conclusion cannot be drawn. Firstly, there is no associated settlement, no evidence of a permanent community in the neighbourhood. Secondly, the length of time encompassed by the cemetery is uncertain, since the site is dated solely by reference to the typology of the stone tools. On the radiocarbon timescale, it could fall anywhere between about 12,000 and 6,000 BC.[82] Thirdly, it is clear that many of the deaths were violent.

> *'One of the unusual features of the burials was the direct association of 110 artifacts, almost all in positions which indicate that they had penetrated the body either as point or barbs on projectiles or spears. They were not grave offerings. Many of the artifacts were found along the vertebral column, but other favored target areas were the chest cavity, lower abdomen, arms, and the skull. Several pieces were found inside the skull.'*[83]

These observations applied to just over 40% of the burials, both men and women, young and old. This is a very high proportion, and leaves open the possibility that at least some of the others had also died violently, from blows which left no weapons in their bodies, from fire, or from strangulation. Several of the graves were group burials, with two or four (in one case possibly eight) bodies interred at the same time. Hence,

> *'. . . it seems likely in the group burials where several of the members obviously had been killed that the same fate befell the other individuals buried at that time also.'*[84]

Some of the graves were dug into by later pits, so it is clear that not all bodies had been buried at once, though they may all have been buried within a generation. Wendorf suggests that several groups used the same cemetery, since most Qadan sites are small and do not indicate long or permanent occupations.

The Qadan sites are also significant in that they bear testimony to the earliest attempts at some form of agriculture. At Tushka, Lower Nubia, dated shortly after 13,000 BC, sickle blades and heavily worn grinding stones were numerous. To what extent grain was actually cultivated cannot be determined, since most implements of husbandry would have been made of wood, and this (like basket-work and clothing) rarely survives in the archaeological record. The development has been linked to a marked increase in population. Wendorf and Schild remark that in the Isna area

> *'. . . the sites are surprisingly large, without any indication of internal clustering, as might be expected if they represented numerous repeated occupations. They seemingly represent a constant and long-lasting settlement of a large population.'*[85]

As the authors imply, according to the primary evidence the occupation of the sites was brief; only the extraneous demands of radiometric chronology make it seem 'constant and long-lasting'. Nor is it very plausible to attribute the growth in population to the rise of a primitive agriculture. In a land where game is plentiful and the climate oscillates erratically between drought and heavy rain, it may be easier to live by hunting and foraging than by planting and tending crops, which require a large investment of time and labour and a relatively stable climate. Mortality is supposed to have been high and birth rates low in these early times only because the remains of human settlements are distributed over a vast stretch of time. The perception of rapid growth in population c.12,000 BC is the result partly of earlier gaps in the record and partly of the exponential deceleration of the radiometric clock. In reality, the population had always been growing rapidly. The rapid settlement of the Nile Valley in the Predynastic period may be due to the same factors. Men turned to agriculture in response to the pressures of an already rapidly growing population, and if their first attempts had to be aborted (as is supposed), this may have been because the climate had not yet become sufficiently dependable.

EARLY NEOLITHIC TO PREDYNASTIC

The period from 9,000 to 4,000 BC is marked by three wet episodes separated by shorter intervals of aridity. Most of the evidence for these comes from the Nabta and Bir Kiseiba areas in the desert west of Abu Simbel. Here playa sheets — the remnants of pluvial lakes formed during the period — range in size from a few to several hundred square kilometres. Apparently the northern portion of the Western Desert was more arid than the southern, and its moist phases were not synchronous.[86] By contrast, the fluctuations of the Nile correlate with the climatic pattern of the Western Desert rather well.

On the Red Sea Hills lying east of the Nile Valley the rain was sufficient to support trees and grazing land. The vegetation in turn supported considerable numbers of elephant, giraffe, rhinoceros, ostrich, wild ass and cattle, as well as antelope, gazelle, ibex, and deer. Numerous rock drawings up to 65 miles from the River, deep within the Red Sea Hills, speak of a substantial population of herders, farmers and boatmen.

The Neolithic is marked by two important innovations, the manufacture of pottery and the herding of cattle. The earliest ceramics come from the El Adam playa near Bir Kiseiba and are dated c.8,500 BC, more than 3,000 years before the earliest ceramics from the Nile Valley and as old as those from Mesopotamia, the apparent cradle of civilization.[87] The examples found are not crude. Indeed, the quality of construction and variety of decorative designs have led to the suggestion that the technology may have been introduced from elsewhere.[88,89] However, evidence for this is lacking. The expectation of a dull imagination and poor workmanship is based only on a tacit analogy with the hundreds of thousands of years man is supposed to have needed to reach a similar level of development in the manufacture of stone tools.

The emergence of pastoralism was equally sudden. As Hoffman puts it,

> *'The Saharan hunters became herders with a speed and thoroughness reminiscent of the switch from farming to horse and gun nomadism made by the Indians of the North American Great Plains in the late eighteenth and early nineteenth centuries.'*[90]

Again, they appear to have adopted herding somewhat before the inhabitants of the Nile Valley, although the oldest cattle bones probably came from wild cattle.

The temporary camps with which settlement began on the Nabta playa were soon succeeded by the first 'villages'. One example (E-75-6) consisted of fourteen or more houses built in two parallel rows. Some sites were located within the playa itself, to which families transferred when the water dried up.

> *'Sites of this type are characterised by exactly superimposed houses indicating that traces of the houses remained from one year to the next, and that each house was reoccupied by the same social group.'*[91]

By far the largest site, E-75-8, continued to be inhabited into the historical period. Today, however, the whole region is one of the most barren and inhospitable places on earth, receiving virtually no rain and suffering daytime temperatures commonly above 40°C.

Lower Egypt

From c.19,000 BC until c.6,000 BC in the received chronology, the Mediterranean rose from 120 metres below its present level to 15 metres below, replenished by the melting of the ice sheets (see Figure 5). In the same period the energy of the river abated and the gradient of the Nile between the delta's southern apex and the coastal shelf decreased, as alluvial sand accumulated. A rise of 105 metres over 13,000 years corresponds to an average rise of 8 mm per year. Thus, with rates of this order, the gradient should have decreased slowly and in the geological record the facies of a high-energy river should have graded smoothly into the facies of a comparatively low-energy river. In fact, analysis of radiocarbon-dated cores from the delta shows that the change was rapid.[92,93] Around 5,000 BC sand-dominant deposits were abruptly replaced by silt and mud, and from then on silt-rich deposits with a high proportion of organic materials built up continuously. It should also be noted that, before the sudden deceleration in rate c.6,000 BC, the sea appears to have risen from 120 to 67 metres (19,000–10,000 BC) at only half the rate that it did from 67 to 15 metres (10,000–6,000 BC).[94-96] Again, this anomalous pattern is the effect of measuring time by a decelerating clock. Since the ice would have melted first and most rapidly from the lower latitudes, deglaciation should have slowed down as the ice retreated.

Between 6,000 and 5,000 BC the entire northern hemisphere experienced a sharp change of climate.[97] Egypt was afflicted by severe drought, and the level of the river fell so low that deposition in the delta virtually ceased, as can be inferred from the drill cores. There is also a hiatus in Egypt's archaeological record, probably because the peoples of the

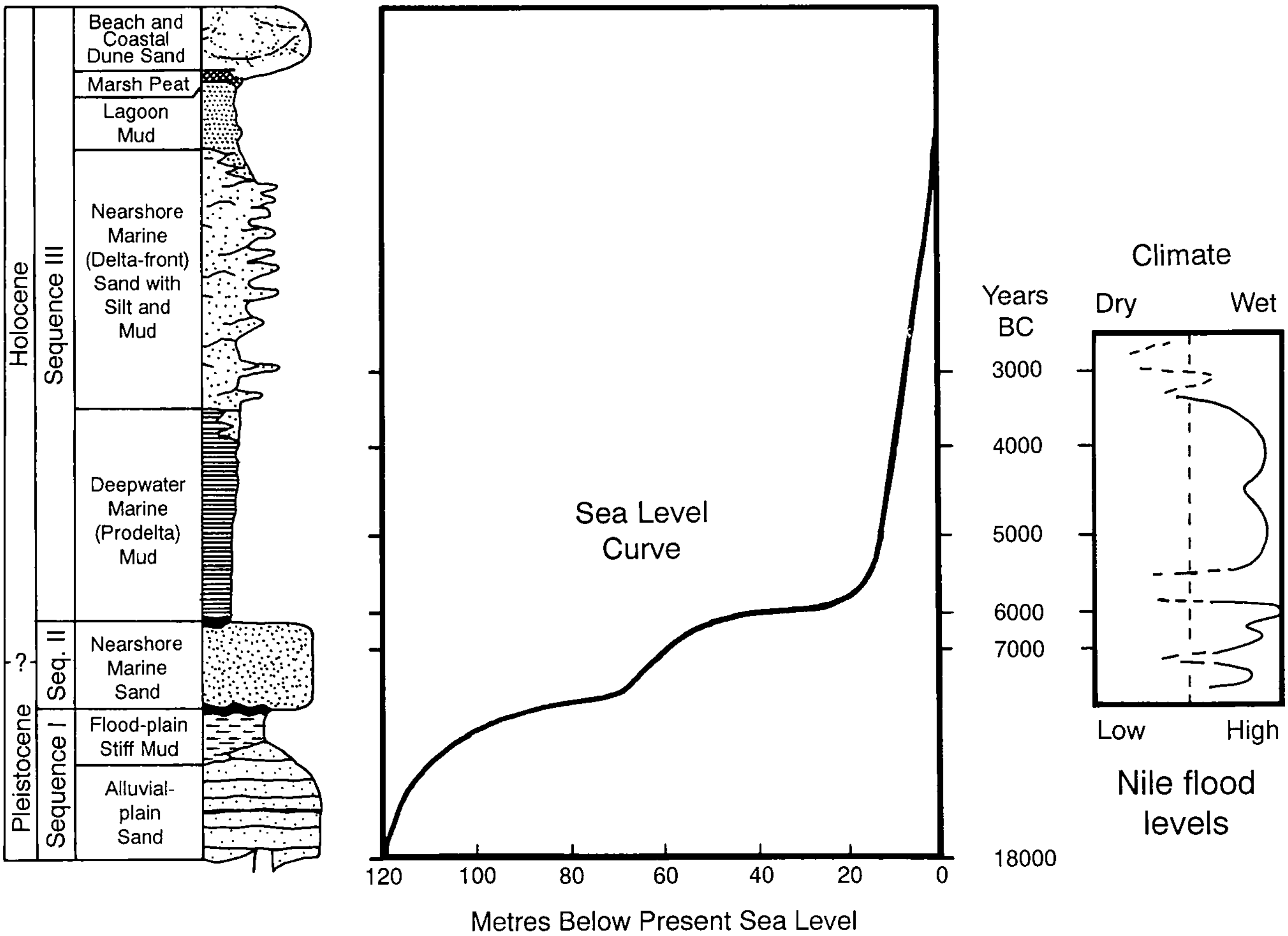

Figure 5. *Late Quaternary facies recorded in drill core from eastern Nile Delta (sources: Stanley and Warne,[92] Fairbanks,[94] Hassan[98]). Horizontal axis shows metres below present sea level. Years BC = calibrated C-14 date. The thick black lines between facies each mark a C-14-inferred diastem, or time-gap, probably reflecting a severe drought. Note the disproportion in depth of deposits between the period from the present back to 6,000 BC and the period from 6,000 to 18,000 BC, even though the latter period was geologically much more active.*

now waterless Sahara were forced to migrate to the constricted banks of the Nile, and when high floods returned their camps were obliterated.[98]

In Lower Egypt, agriculture, pottery and animal domestication make their first appearance at Merimde. Situated on the edge of the delta 50 km north-west of Cairo, Merimde is Lower Egypt's biggest and longest-lived example of a village until dynastic times, with a final population of up to 5,000.[99,100] Here grain was reaped in sufficient quantity to be stored in large jars and woven baskets. The most common domestic animals were pigs, longhorned cattle and sheep, while the Nile fed the population with various fish and shellfish, turtles, even the occasional hippopotamus or crocodile. Donkeys were kept for transport.

Merimde is one of the very few prehistoric settlements that are well stratified. Excavated by Hermann Junker in the 1930s and more recently by Joseph Eiwanger in the seasons from 1977 to 1983, it consists of five strata, with a typical depth of about 2 metres.

The oldest deposits (Stratum I) consist preponderantly of wind-borne sand with traces of ash, ending in a thin but densely layered zone of sand particles which became encrusted as a result of heavy rain. Layers of pebbles indicate that part of the site was flooded. The mostly horizontal top of the stratum appears to have been levelled by wind. In some places it is covered by a sand layer which is culturally sterile, in other places Stratum II is missing and instead one finds a layer of sterile sand.[101] The site may have been briefly abandoned at this point, an inference supported by some discontinuity in the pottery and stone tools.

As Eiwanger reports, the oldest two strata

'are separated, one below the other, by material of aeolian origin, and are clearly distinguishable from the more recent strata by their colour. By contrast, the boundaries in the upper half of Merimde's stratigraphy are not always easy to see. For one thing, there are no archaeologically poor or sterile intermediate strata; for another, the entire upper assemblage is darkened by a high proportion of ash and decayed organic matter. This single dark-grey to dark-grey-brown colouring is

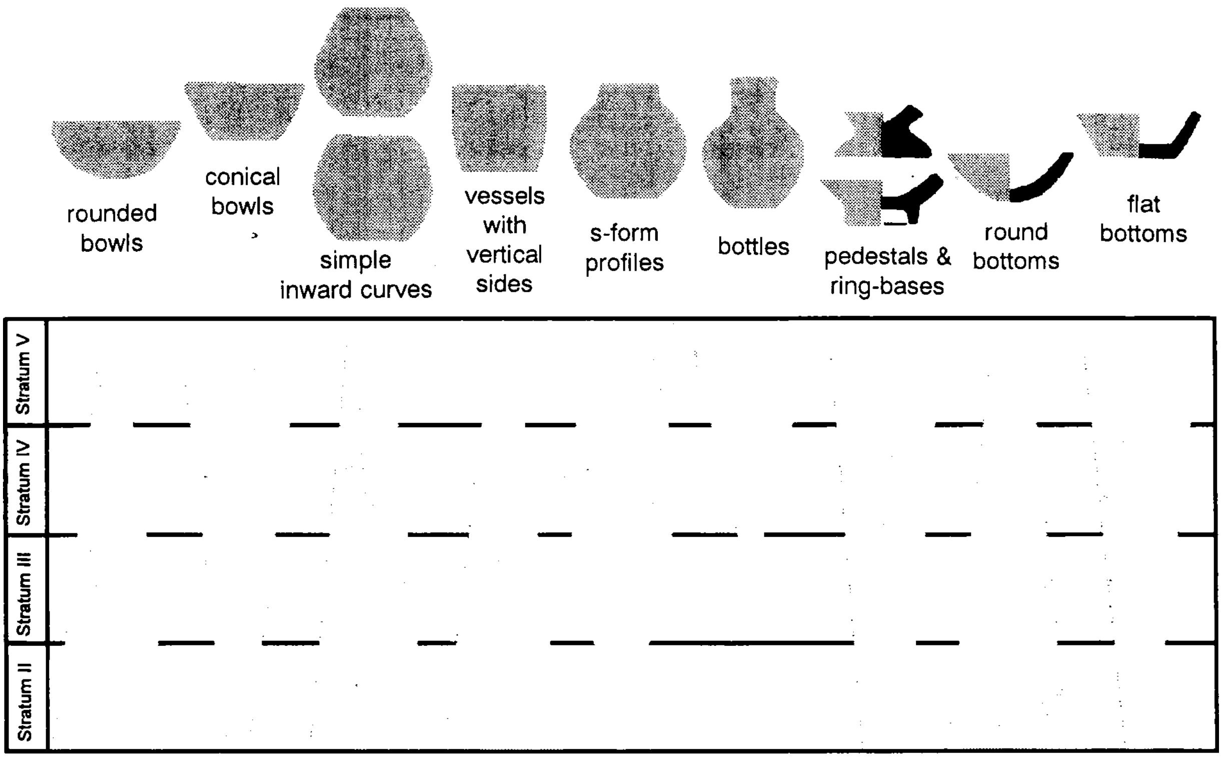

Figure 6. *Comparative frequency of types of polished ware found in Strata II–V, Merimde (after Eiwanger, Ref. 102). All types except bottles are common to all strata.*

deepened by ground water from the not infrequently heavy downpours in the delta. In Stratum IV the proportion of organic matter is exceptionally high and possesses in places an almost turf-like texture. Introduced mud from the Nile is also abundant, most of which must have derived from the disintegration of the oval houses found in the more recent strata.'[102]

The stratigraphy does not speak of a long period. The first two strata are imprinted with the action of desert winds — these being able to transport great thicknesses of sand — and bursts of heavy rain. The lack of organic admixture suggests that deposition was rapid, while the thickness of Stratum II in some places is matched elsewhere by its total absence. Higher up, the proportion of organic matter increases and the strata are thinner, largely because here the site was more densely settled and the houses impeded the invasion of sand. As shown by the dark grey staining of the strata, there was still substantial rainfall and probably river flooding, and hence mud accumulated rapidly as houses decayed and were rebuilt.

This interpretation accords with other evidence concerning the climate of early Egypt. Except for a few brief periods of drought, throughout the Neolithic and Predynastic the climate was wet and Nile floods were high.[103] Indeed, records from the First Dynasty confirm that floods were high and erratic well into the historical period.[104]

Nor does the pottery accord with the thousand years or more allocated to the site. The vessels are plain and handmade (distinct from wheel-made) and simple in form, ranging from jars and bowls to carinated vases, and from Stratum II onwards nearly all forms are common to all strata (see Figure 6). Change occurs slowly.

'In Stratum III of the site — a transitional phase only in a very limited sense — black polished ware constitutes a new element. . . . Among the burnished and red polished type, possibly foreshadowing the rich plastic decoration of the ware in Strata IV and V, vessels appear with protuberances around the rim. Single examples of this sort occur already in Merimde's middle culture [Stratum II].'

'. . . In Strata IV and V the shapes of the main types continue unchanged. Diagnostic of Merimde III, where they are innovations, are numerous decorated pots, which, while already of ample dimensions in Merimde IV, gain further weight in Merimde V. . . .'

'At the beginning of the sequence vessels occasionally appear with widened pedestals. In Stratum II they are supplemented by genuine ring-bases. Both forms of stand increase markedly in Strata IV and V.'[105]

As Midant-Reynes notes, all the essential characteristics of the culture are present from Stratum I.

'The equipment of the following levels in no way modifies that initial image, serving only to accentuate the activity of farming with its glossy sickles, which become more

and more abundant, to underline the aspect of hunting with its arrowheads and spearheads, which are more and more finely worked, to give definition to the techniques of fishing with its hooks, its harpoons, its net-weights.'[106]

In sum, Merimde was a short-lived settlement, established by semi-nomadic migrants from the Valley when the delta was silting up and becoming cultivatable. It did not survive into the later phases of the Predynastic period. It sprang up quickly and, when the margin of the delta had receded inconveniently far, ceased suddenly.

Similar observations hold true for other Predynastic settlements excavated in Lower Egypt, for example those at El Omari and Maadi.

El Omari consists of three settlements situated a few miles south of Cairo. Omari A, the oldest site, lies on a gravel terrace at the mouth of the Wadi Hof. Omari B lies three miles to its north on a terrace 300 feet above the wadi floor, near two catchment basins. The youngest site is situated in a side branch of the wadi, within a mile of Omari A. Neither site is stratified. In Hoffman's opinion,

'Although the three sites may overlap somewhat in time, it is most likely that each peaked in succeeding periods as the focus of local population shifted in response to environmental, economic, and political pressures.'[107]

In fact the sequence suggests that the factors were primarily environmental, as rain and flooding became progressively less intense.

At Omari A (as also at Merimde) the dead were buried either within or immediately beside the settlement, and grave offerings were scarce. At Omari C, by contrast, the dead were buried in separate cemeteries. On the strength of radiocarbon dates and affinities with the pottery and stone artefacts at Faiyum A and Merimde, the earliest village is thought to have been founded c.4500 BC.[108,109] The youngest site almost certainly extended into Dynastic times.

Maadi is located on a narrow ridge in the mouth of the Wadi el Tih, a few miles north of Omari, and is dated approximately 3900–3500 BC.[110] In historical times the Wadi el Tih was the main route to the copper mines of Sinai, and there is evidence that the people of Maadi imported copper ore in order to process it and trade their products for goods from southern Palestine (conveyed in jars of Early Bronze Age I design). There were also trading links with Egyptian villages to the south.

The deposits consist mostly of sandy soil, including large amounts of ash and bits of straw and reed. Typically their thickness is about 40 cm, but where material was dumped from other parts of the site the thickness increases to about 1.5 metres. According to the radiocarbon measurements occupation continued for some 400 years. On the other hand, the culture of the site is static, and more compatible with a brief occupation. Rizkana and Seeher consider the thickness of the soil:–

'The accumulation of soil in such a habitation area is mainly dependent on three factors: the Nile mud used as plaster for buildings and pits, floors, and hearth constructions; animal dung; and ashes and stones from the fireplaces. Especially the amount of ashes must have been considerable, since probably not so much wood as reeds were burnt. The latter leaves a large amount of ash compared to its actual volume.'[111]

Fires would be used for cooking, winter warmth, pottery-making and the smelting of copper ore. Numerous grinding stones, some weighing more than 50 kg, accentuate the impression of a farming and herding economy. Of the dwellings — oval wickerwork huts 4–5 metres long by 2–3 metres wide — only posts and post-holes survive. Since the outline of the huts is often obscured by posts driven into the ground after others had been removed, it is clear that the site represents more than a temporary camp.

The abandonment of Maadi, as of most other sites in the region, coincides with the expansion of Upper Egyptian culture into Lower Egypt, and appears to have been sudden. If the site was only briefly occupied, the quantity of the ash and the burnt condition of some posts may indicate that part of the village was deliberately set on fire. Some storage jars were still filled with food and with valuables such as carnelian beads and stone vases, never to be retrieved.

The strongest evidence that occupation was short-lived comes from the cemeteries. Before the publication of the final report in 1990, most archaeologists considered that the village's burial ground was the cemetery one kilometre away in the mouth of the Wadi Digla, where 471 graves had been found — a relatively small number. Assuming that the whole village area was occupied contemporaneously, Fekri Hassan has made two possible estimates of the population size: 500 persons, and 900 persons.[112] If the average life expectancy was 40 years (a high estimate), 471 people from a stable population of 500 would die in just 38 years. However, it is now apparent that the Wadi Digla graves belonged to a neighbouring village (or villages) and that Maadi's cemetery was a closer site north of the wadi. Here only 76 burials were found, to which must be added the three women and 54 infants and miscarried babies who had been buried within the settlement. While the number of adult graves and the number of babies buried separately within the settlement are consistent with each other, they are not consistent with the radiocarbon chronology.

The archaeology of Upper Egypt during the Predynastic will be considered in a future article.[113] Its material culture was in every way richer than that of Lower Egypt, and it was from the south that Egypt, just before the First Dynasty, was unified. However, since El-Hemamieh, in Upper Egypt, is the only well-stratified Predynastic site in the country apart from Merimde, we shall consider it here.

El-Hemamieh

Hemamieh was excavated by Gertrude Caton-Thompson in the early 1920s, and found to extend from the Badarian period through to the Gerzean (see Figure 7). The excavated strata consisted principally of midden deposits, above which

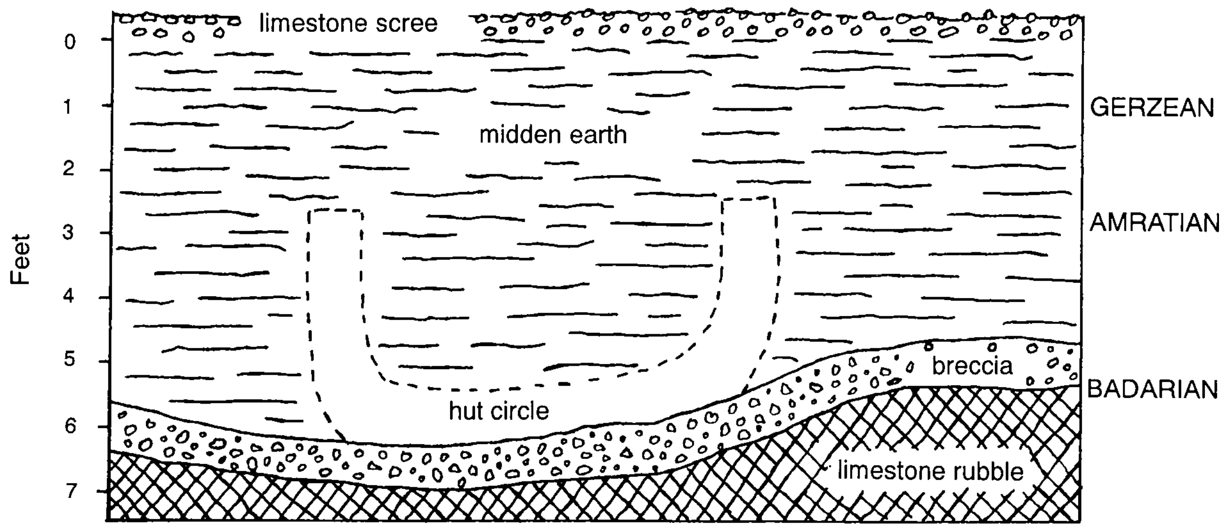

Figure7. *Stratigraphy of the Predynastic village at El-Hemamieh (scale in feet: 1 foot = 30.5 cm).*

was a wash of limestone scree and below it a layer of breccia — that is, a limestone scree bound by redeposited carbonate of lime. Beneath the breccia was an unconsolidated layer of limestone rubble and dust, *'as devoid of ash or extraneous dirt as the day it was washed there from the cliff slopes above'.*[114] The purity of this detritus indicates that it was deposited rapidly in the course of heavy rainfall.

The oldest cultural remains — a few Badarian sherds and three flints — came from immediately below the breccia, where there was no midden waste. Caton-Thompson considered whether much time had elapsed between the 'passing presence' represented by these sherds and the occupation immediately above the breccia:–

> *'Geologically the point is not easy of determination, and the time allowance necessary for the formation of a 10-in. layer of breccia must be purely a matter of individual geological judgement. Personally I am prepared to believe it might have been formed in a few seasons. The formation of limestone desert surfaces, of hard floors cemented by a calcareous matrix, due to redeposited carbonate of lime and the rapidity of evaporation, has been carefully described by Dr W.F. Hume in Geology of Egypt, Vol. I. Given the required combination of circumstances, it does not appear to be a process which requires length of time. This view of the matter accords with the archaeological witness. The Badarian sherds from below the breccia are, to my mind, too closely the counterpart of those from above it to permit of a long break in time between the two.'*[115]

The reasoning seems sound. The presence of Badarian artefacts both below and above the breccia indicated that *'the required combination of circumstances'* for its rapid formation had obtained. Nor were they just a local phenomenon. Caton-Thompson noted that breccias of geologically recent formation occurred in various places in the Nile Valley — some apparently as recent as the Early Dynastic.

The thickness of the midden material ranged from about six feet in the centre of the settlement to just under three feet towards the edge. It consisted of a grey, more or less homogeneous mass streaked by darker seams of ash, charcoal and dung fuel and interbedded with patches of scree which had been washed down from the nearby cliffs.

The lowest level (maximum depth 1 foot) appeared to be the remains of a temporary Badarian camping-ground. Apart from some sherds and a few flints,

> *'nothing of this earliest post-breccia period was found — neither habitation, nor the various objects of their daily life and art so well represented in their cemetery at Badari.'*

Indeed, this was the quality of the entire Badarian record.

> *'No trace of copper or metalliferous ore was found in the lower levels, and were it not for the two examples from graves, the Badarian civilization, on the settlement evidence alone, might erroneously be ascribed to a completely Neolithic status.'*

Moreover, despite the fact that a much better grade of raw material was available in the cliffs, the tools were fashioned from rough nodules of weathered chert and flint from off the ground, suggesting to Caton-Thompson that the Badarians were unfamiliar with the area's resources. Diane Holmes has argued that it would have been a waste of effort to obtain flint from the cliffs when the ground flint was adequate for the Badarians' range of tools.[116] But this presupposes that their horizons and needs were restricted by their technology, and that they would not have recognised the potential of the better flint; an idea of a culturally sluggish people which again derives from an over-extended chronology. Even if one allows for some cultural inertia, it is difficult to imagine that it would have taken the Badarians long to discover and utilize the better grade of flint — probably less than a generation.[117]

The archaeological evidence indicates that the Badarian deposits, ranging in depth from about 1 foot to 2 feet 6 inches, span perhaps 20 to 30 years. On account of the radiocarbon evidence, archaeologists assign the deposits some five centuries.[118-120] That this duration is much too long is also indicated by Badarian sites such as El-Matmar, El-Mostagedda and El-Badari, where the depth of deposits is only a few centimetres.[121] Much of the grey 'midden' material at Hemamieh is in fact non-organic grit and gravel eroded from the cliffs.

Further up, between 2 feet 6 inches and 4 feet above the breccia, the deposits contained sherds and flints which Caton-Thompson ascribed to the Amratian culture; also several bone tools, two copper pins, spindle whorls, and the remains of various farm animals. Up to the level of 3 feet to 3 feet 6 inches there were also Badarian remains, suggesting that Badarian and Amratian types overlapped. The Amratian is believed to have lasted some 500 years, from 4000 to 3500 BC.

Over that time one might expect to find evidence of multiple occupations. All that Caton-Thompson found was the mud walls and bases of nine so-called hut circles. Of slightly concave construction, the bases rested upon the breccia and were sunk originally below ground level, although how far the walls protruded above the ground could not be gauged. Beneath the filling the beaten floors remained firm and distinct. Similarly, so far as one can judge from the diagrams and photographs, the tops of several of the walls, up to 2 feet 9 inches above the floors, were almost intact — that is, not significantly eroded.

The walls appear not to have supported any superstructure, nor were they interrupted by any doorway. Since the internal diameters did not exceed seven feet and sometimes did not exceed three feet, the circles are unlikely to have functioned as dwellings, despite the existence of a hearth in one of them (which may not have been a domestic hearth). In another circle desiccated dung must have been stored as fuel, and as Holmes has observed, low-walled circles of similar dimensions are still used by modern villagers in the region for enclosing goats.[122] A mud wall running across the site and terminating at a circle which was partially destroyed by its erection may have served as a windbreak.

That the Hemamieh site was used for some mode of habitation is clear from the remains of several hearths and from the plentiful sherds. If the circles were not dwellings, the Amratians must have dwelt in tents.

Nothing in the site indicates that the Amratian level spanned a long period. If it had lasted five centuries, remnants of hundreds of mud structures ought to have been found. Mud is soon eroded and destroyed by rain, whereas the structures on this site, with walls at least 1 foot thick, were largely undamaged. Nor did the bases show any of the thickening which, in time, would have resulted from mud washing down from the sides. (Erosion at an appreciable rate would have occurred even if the walls had been surmounted by straw roofs.) Thus the period during which the circles were in use appears to have been short and the rate of deposit accumulation rapid.

In 1989 Holmes dug two test pits at Hemamieh: a 1 x 1 metre pit to the north-west of Caton-Thompson's excavations and a 1 x 3 metre pit on the edge of her strip H, including about a third of hut circle 268.[123] Like her predecessor, Holmes found a sequence without occupational or stratigraphic breaks. However, Amratian material was extremely scarce. Badarian graded immediately into Gerzean — a pattern which also emerged from an analysis of the Badarian flints collected from the area.[124] These flints fell into two groups, an earlier and a later Badarian, and those of the later group were similar to Gerzean flints. Since there is little that can be designated Amratian anywhere in the Badari region,[125] it seems that the Badarian should be considered not so much a chronologically distinct phase as a regional culture largely contemporary with the Amratian. B. G. Trigger remarks of the Amratian that, *'in general, the level of cultural development appears to be little different from what it was in Badarian times.'*[126]

The top of the wall of circle 268 was found to have collapsed in antiquity, as could be seen from loose clods of mud that had broken away from it.[127] The fact that the clods had not disintegrated, however, only confirms the impression that the circles were buried not long after their disuse.

DISCUSSION

Although the dates produced by radiometric methods are sometimes referred to as 'absolute dates', they are in fact imprecise and erratic, and based on uniformitarian assumptions which science must test independently. In the case of radiocarbon dating, the most basic assumption is that the rate of carbon-14 production has always been approximately equal to the rate of carbon-14 decay. A higher rate of decay at any time, or a lower rate of carbon-14 production, would result in the true age being overstated.

Independent evidence has in fact been provided by tree-ring sequences, which (when joined up) are claimed to go back some 9,000 years. On the assumption that one ring is formed per year, the source trees are carbon-dated and the two chronologies compared. The result is that radiocarbon dates are found not to match with tree-ring dates. Thus, since it has seemed safer to assume that the tree-ring dates are more reliable than the carbon dates, the latter are adjusted by means of a calibration curve.[128] It could be, however, that the carbon dates are more reliable than the tree-ring dates — as, indeed, for historical times, appears to be the case.

As we shall see later,[129] uncalibrated Egyptian carbon dates as far back as c.2500 BC are broadly in harmony with the evidence of historically recorded time. Only before that date do they begin to diverge from real time — in the period when the climate appears to have been much less stable, and when geological stability cannot be assumed without also assuming the vast lengths of time which are at issue. That is, uniformitarianism becomes a precarious assumption just when it begins to matter — when we leave the relative security of historical time and are obliged to evaluate radiocarbon dates in the light of other criteria.

Isolated from the preceding record of the Palaeozoic and Mesozoic, the geological evidence gives little indication of real time. We find periods of planar erosion which could, in principle, have been long or short — by definition, the geological evidence in these places is absent. Conversely, while the terraces of the Nile show forth the effect of episodic vertical erosion and appear to have been formed rapidly, the length of the periods when silt was deposited between these bursts of intense erosion is difficult to gauge.

It would, however, be wrong to consider the Pleistocene record in isolation. As has been demonstrated elsewhere, Palaeozoic deposits up to the end of the Carboniferous — representing a radiometric period of 280 million years — show unambiguous evidence of rapid formation and are plausibly interpreted as the effects of the universal Flood recorded in the first book of the Pentateuch and in hundreds of myths throughout the world. In these rocks it is impossible to deduce long periods of erosion. A noteworthy example is the alleged unconformity between Redwall and Muav Limestone in the Grand Canyon, representing a gap of 155 million years but in reality probably no more than a few months.[130] The succeeding deposits of Mesozoic — 220 million years of radiometric time — also show evidence of rapid formation and, in the main, can be satisfactorily interpreted as after-effects of the Flood, continuing over some two to three centuries.

In radiometric terms the gaps become longer as one goes back in time. In the Palaeozoic they measure millions or hundreds of millions of years. In the Pleistocene they measure thousands or hundreds of thousands of years. As noted by Wendorf and Schild,[131] the record appears to become progressively more complete as one approaches the present. Hence the possibility must be considered that later periods appear more complex than earlier ones because the radiometric clock was slowing down. Although allocated only 1.6 million years, the Pleistocene may represent a considerably longer period than the Cambrian to Carboniferous periods, which are allocated a total of 280 million years. A 50,000-year hiatus in the Upper Pleistocene may represent an actual interval of several years; a 155-million-year hiatus in the Palaeozoic may represent only a few months.

Moreover, the geological record is not the only indicator of time to be considered. The Pleistocene is also notable as the first period in which extensive human remains occur, and these must be allowed to speak independently of the radiometric chronology which has been imposed on them. There is no logic in accepting radiometric chronology on the grounds that millions of years are needed for man to have evolved from the apes, if one's reason for believing in man's evolution from the apes is that radiometric chronology shows man to have existed for millions of years.

It has become clear in recent years that circular reasoning is the only basis for holding that man evolved into existence. Variability in cranial shape and size is not diagnostic of separate species of *Homo,* as is evident from the fact that considerable variability in shape and size is still observable today.[132,133] Whether the cranium of Egypt's earliest settlers was, morphologically speaking, '*Homo erectus*' or '*Homo sapiens*', is not known; no skeletons have been found from the Palaeolithic period. But elsewhere in Africa, unambiguous evidence of man, such as the Laetoli footprints and the Kanapoi elbow, predates the australopithecine apes that are supposed to have been our ancestors. So far as we can tell from the fossil record, man has always been man and did not evolve from another animal of inferior intelligence. Technological progress is therefore an aspect of cultural, not cerebral, evolution, and in recorded history cultural evolution has always been swift. To believe that it took 2.5 million years to progress from the crude tools of the Oldowan industry to the skilfully worked tools of the Neolithics is to fly in the face of everything we know about our own capacity — to enter a world where, having believed that, it is possible to believe anything.

The oldest tools found in Egypt are the Acheulean hand-axes which occur sporadically in the terraces of the Nile, dated on geological, not typological grounds. As Guichard and Guichard observe, '*an isolated biface has never dated anything*'; it would not be out of place even in a Mousterian context.[134] Tools cannot usually be assigned to a definite era unless they are part of an assemblage, enabling the archaeologist to take into account their relative frequency as well as their typology. This is because stone tools did not evolve in a simple linear succession. Indeed, Acheulean assemblages are especially difficult to date, since throughout the hundreds of thousands of years attributed to this phase lithic technology remained almost static. Thus John Wymer comments on the Acheulean tools at Olduvai Gorge:–

> '*The long vertical succession through Beds II to IV show conclusively that there is no evolutionary "improvement" in them from the bottom to the top. There are considerable variations, but the industry in the middle of Bed II is best matched by another in Bed IV, and the most elegant specimens come from an intermediate layer.*'[135]

Cultural stasis, allegedly, for over 1 million years! Hoffman writes similarly in relation to Egypt:

> '*Unfortunately, the artifacts found on most Egyptian and Nubian late Acheulean sites are not stylistically sophisticated and, especially in the absence of local, stratified sites (like Olduvai in eastern Africa), most archaeologists feel that it is nearly impossible to date Lower Palaeolithic sites in relation to one another.*'[136]

Were it not for radiometric dating, one would interpret the non-development of stone technology, the lack of stratification and the paucity of artefacts as all indicating a very brief period of occupation.

Like the complexity of the geological and climatological record, the rate of cultural progress appears to accelerate with time. Nonetheless, even in the last 100,000 years, it remains infinitesimal. The earliest traces of a shelter anywhere come from Olduvai, where Mary Leakey found the outline of a stone circle.

> *'In general appearance'*, she wrote, *'the circle resembles temporary structures often made by present-day nomadic peoples who build a stone wall round their dwellings to serve either as a windbreak or as a base to support upright branches which are bent over and covered with either skins or grass.'*[137]

It was the same age as the earliest tools — 1.9 million years old. Yet the similarity to modern structures belies its alleged antiquity. No one suggests that, on the cultural evidence, African nomads are two million years closer to the apes than their European contemporaries.

The earliest traces of shelter in Egypt come from Arkin 8, dated to the Abbassia Pluvial c.480,000–300,000 years ago. There the excavators found a stone circle, just as at Olduvai, and an oval pit lined with slabs. Similar stone circles have been found at Neolithic sites,[138] and domed huts which might have rested on a stone base are depicted in Neolithic rock drawings. The remains of oval or circular huts with sunken floors were also found at Merimde, Omari and Hemamieh.

In order to relieve the monotony of the Palaeolithic record, archaeologists distinguish within the Lower, Middle and Upper Palaeolithic numerous so-called 'cultures', magnifying minute differences between one assemblage and another. Hoffman momentarily suspects the status of these cultures, but then prefers the interpretation which gives fancy free rein:

> *'Perhaps the puzzling number of Mousterian variants now being reported is more an artifact of our meticulous taxonomic "splitting" of stone-tool assemblages and perhaps it reflects the multiethnic and multicultural roots of the Middle Palaeolithic.'*[139]

Anthony Marks distinguishes a 'Khormusan' culture — understood now to be contemporary with the Aterian — according to such relative criteria as predominance of oval to pointed oval-shaped cores, a wide range in tool size, the rarity of notched flakes, and the absence of microblades.[140] On similar grounds, other archaeologists have distinguished — all in the Kom Ombo area — contemporaneous Sebekian, Sebilian and Silsillian industries (c. 12,000 BC). Other regional cultures have been fathered upon other times. Some, like the Qadan, represent a marked decline rather than the expected improvement in quality of workmanship.

A further aspect difficult to reconcile with a long chronology is the frequent overlapping of cultures. At Olduvai, for example, the Acheulean is thought to have overlapped the earlier Oldowan for 700,000 years. If the invention of the bifacial hand-axe was such a revolutionary step forward, why did it not immediately supplant the chopper-core tradition? Why do Turkana tribesmen — indubitably *Homo sapiens* — use Oldowan-type tools for cracking nuts even today?[141] The 'Levallois' technique was anticipated during the Acheulean phase,[142] Upper Palaeolithic blades in the Mousterian. Middle Palaeolithic cultures continued into the Upper Palaeolithic, Palaeolithic into the Neolithic.[143] The whole record is one of new techniques and tools being invented ex *nihilo* in response to need, and often simply added to the repertoire, rather than new techniques and tool-designs evolving imperceptibly out of old.[144] Thus Wymer acknowledges,

> *'once the idea of a hand-axe had been realised . . . new techniques were probably mastered rapidly.*
>
> *. . . Evolutionary "improvement" was the learning process of individuals and not scores of generations.'*[145]

Since the conception of a hand-axe, and the new technique associated with it, itself does not intrinsically require a long gestation prior to its occurrence, the notion of great tracts of time is redundant. The bow and arrow, likewise, could have been invented within a few years of the stone-tipped spear, rather than 30,000 years later.

If the Genesis record is correct, civilization not long after the Flood was disrupted. No longer speaking the same language, men were split into small groups and forced to relearn the rudiments of civilization in isolation, in lands whose resources were unknown. Their earliest technology was therefore inevitably a simple stone technology. There is nothing particularly favourable to the evolution model in this aspect of the archaeological record.

Likewise, technologies which use stone for their raw material will inevitably precede metal technologies. A variety of operations is involved in large-scale metal-working. The ore has to be mined, transported, smelted, the metal refined and cast — operations which depend on a certain level of population and of social organization. Manual labour must achieve a certain specialisation, and its application must be controlled and planned. There must be networks of trade through which neighbouring societies may profit from each other's labour. What is certainly not true is that any individual operation in the production of metal tools requires more skill than the fashioning of flint tools does. Indeed, the earliest metal artefacts were fashioned, not from copper ore, but from copper that was found in a naturally metallic state. Copper became an advantageous alternative to stone only when the manufacturing process became more efficient;[146] the advantages of the material itself were not always evident. In fact, owing to its softness, for some purposes copper was inferior to flint.

Thus, there is no sudden transition from stone-tool to metal-tool technologies. In the Levant, arrowheads, burins, axes and microlithic drills fell into disuse during the period from terminal Neolithic to the end of the Chalcolithic — flint arrowheads because of the decline in hunting. At first, many copper axes had a purely ritual function. It was not until the Early Bronze Age, when the simpler technique of moulding from pure copper replaced the technique of lost-wax alloy casting, that they were commonly used for utilitarian purposes. Thereafter stone-tool manufacture continued without further decline — predominantly in village economies — until the beginning of Middle Bronze II, when for the first time bronze (a metal alloy much harder than copper) became commonly available. Flint sickles did not fall into disuse until the middle of the Iron Age.[147]

The picture is similar, though not identical, in Egypt. The rise of metallurgy coincided with the appearance of marked differences between rich and poor, which were consequent on an increasing division and diversification of labour during the middle Predynastic. The larger communities moved away from a subsistence economy to produce surpluses of diverse goods which were traded with other communities, sometimes over long distances. Among the artefacts made of copper were daggers, axes, fish-hooks, needles, finger-rings, domestic vessels and mirrors. Copper tools were particularly useful for woodworking, a craft which properly came into existence only at the end of the Predynastic. They tended to supplement rather than replace flint tools, which, in the villages, were still widely used in Dynastic times. While hunting was on the decline, flint continued to be a normal material for manufacturing knives, spearheads, scrapers, sickle blades and so on. As Spencer observes,

> *'The use of flint for small tools continued in Egypt for longer than is generally realised, and flake implements were still being produced as late as the fifth century AD.'*[148]

The terms Stone Age, Bronze Age and Iron Age can therefore be misleading. Bronze does not replace stone on a large scale until several centuries into the Bronze Age — in the second millennium — and long after the rise of the earliest civilizations. These civilizations rose while the use of stone was still common and they developed metallurgy as a consequence of their growth — the growth, not least, of their populations. The development of metallurgy was not, therefore, the prime-mover of historical development, and the history of man prior to the rise of civilization was not determined by a failure to develop metallurgy; stone technology exercised no retarding influence. The idea that civilization rose suddenly out of a darkness to which hundreds of thousands of years must be attributed has no basis. Rather, there was a continuum, and the pace of change during the historical period indicates that the prehistoric period was short.

But how short? One of the constraints on determining the duration of the prehistoric period is Egypt's population at its close, the best clue to which comes from an engraved macehead found at Hierakonpolis.[149] Narmer, first king of all Egypt, is depicted with the red crown of the conquered north and sits enthroned in the company of the standard-bearers of his army (see Figure 8). Before him captives do obeisance, and numerals represent what is presumably Lower Egypt's population: 120,000 men, plus 400,000 oxen and 1,422,000 goats. These appear to be genuine census figures. If we suppose that wives but not children were counted, 120,000 adults might correspond to a total population of around 250,000, with a somewhat higher figure for the south. On the same evidence, Trigger has estimated Egypt's population at 2 million.[150] Butzer, on the other hand, drawing upon estimates of Early Bronze Age Greece's population per square kilometre, arrived at a much lower 870,000[151] — probably about the maximum consistent with the known archaeological evidence. As will be shown in a future article, the First Dynasty came to power c.2530 BC. Are the 300 years from the dispersion enough to account for a population of, say, 600,000?

The number of people who migrated from Babel to Egypt is not stated. Perhaps a reasonable hypothetical estimate is about 70 (cp Genesis 46:27). At first, only natural disasters are likely to have inhibited population growth, since many of the factors which inhibit growth today, such as wars, disease, shortages of food, contraception, are characteristic of an already high density of population. In the generations immediately after the dispersion these factors would have been negligible and would have inhibited subsequent growth only gradually. Moreover, according to the genealogical

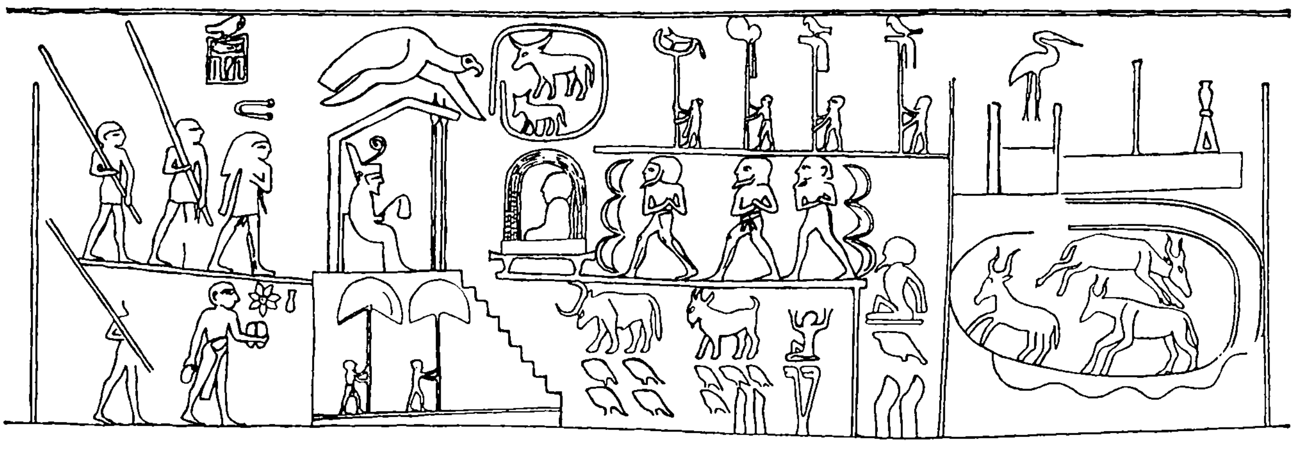

Figure 8. *Macehead engraving from Hierakonpolis showing Narmer (probably first king of First Dynasty) receiving captives and booty. The four standard-bearers on the top row, right of the cattle corral, represent the nomes (administrative divisions) of Lower Egypt. Below them are three bound captives running between boundary markers, and below them the census figures.*

DATE	GENERATION	TOTAL	ARCHAEOLOGICAL CORRELATION
2846 BC	70		
2822 BC	35 x 7		
2798 BC	122 x 6		
2774 BC	366 x 6		
2750 BC	1,098 x 5	5,490	Lower Palaeolithic
2726 BC	2,745 x 5	13,725	Middle Palaeolithic
2702 BC	6,863 x 4	27,452	
2678 BC	13,726 x 3	41,178	Terminal Palaeolithic
2654 BC	20,589 x 3	61,767	Neolithic
2630 BC	30,884 x 2.9	89,564	
2606 BC	44,782 x 2.8	125,390	Badarian/Amratian
2582 BC	62,695 x 2.7	169,276	Gerzean
2558 BC	84,638 x 2.6	220,059	Protodynastic
2534 BC	110,030 x 2.5	275,075	Dynasty 1

Table 2. *A population density calculation for Egypt beginning with those who migrated from Babel.*

record of Genesis 11:10ff, human longevity was initially much higher than it is today. Thus, coupled with the archaeological evidences of time and population density, the calculations in Table 2 seem plausible.

These figures exclude unpaired or infertile people and children who died prior to child-bearing age. Assuming that the average lifespan eventually declined to sixty years, the total population at the time of Narmer would have been a little over 600,000 — the sum of the last two and a half generations plus the categories excluded. The total number of deaths in Egypt prior to Narmer, allowing for the excluded categories, would be approximately 450,000, and this would also be the absolute maximum number of graves. Not every one, of course, would be buried in a cemetery. Communal burial is unlikely to have been practised until village economies began to replace hunting and gathering, in the Neolithic.

Table 3, by contrast, is the pattern which might be reconstructed for the radiocarbon model, encompassing just the last 2,000 years. For ease of calculation, these figures assume an arithmetical increase of 5,000 per generation of 25 years, from an initial population of around 400,000. With these assumptions, and an average lifespan of 50 years, Egypt's population at the time of Narmer would have been about 1,250,000 and the total number of deaths since c.5,000 BC around 29 million. The total number of graves ought also to be close to 29 million, since throughout this time Egypt was a village society, and the archaeological evidence indicates that a cemetery grave was the normal method of burial. On the basis of the other model, the total number of Predynastic graves would be approximately 200,000. The number actually found is approximately 20,000.[152,153] As noted above, the archaeological record has not a single skeleton to show for the alleged 1,200,000 years of human habitation in Egypt/Nubia prior to c.12,000 BC.

There are good reasons why, thousands of years later, modern archaeologists should not expect to be able to trace a high number of Predynastic graves. Some cemeteries will have been obliterated by natural erosion. Some may have been ploughed up or built over. Some may lie buried under sand, beyond detection. Nonetheless, all known cemeteries of the period either have been excavated or are being excavated now, and to plead these reasons as a sufficient explanation of the disproportion between graves discovered

DATE	GENERATION	ARCHAEOLOGICAL CULTURE
5,000 BC	160,000	Merimde
4,500 BC	270,000	Badarian
4,000 BC	380,000	Amratian (Naqada I)
3,500 BC	490,000	Gerzean (Naqada II)
3,000 BC	600,000	Dynasty 1

Table 3. *The pattern of population increase during the Predynastic period according to the radiocarbon model (intermediate generations omitted).*

and the number of graves predicted is like pleading the imperfection of the geological record in order to explain the absence of the innumerable transitional fossils predicted by evolution theory — a plea that has long been discredited.[154] Archaeologists are indeed aware of the problem:

> *'The quantity of graves concerned is really very small when given the apparent spans of time involved and the extent of the settlements. The argument is usually advanced that Predynastic cemeteries, like Predynastic settlements, were generally sited on the edge of the cultivation and hence have been long since buried beneath the accretions of centuries of occupation and agriculture. There may well be some truth in this but it is disconcerting none the less that a great early dynastic site like the one at Helwan, to the south of Cairo, can yield some 10,000 graves of officials and the like whilst there are no comparable burials known from the immediate predecessors of the Helwanites in anything like the same quantity.'*[155]

The Dynastic evidence serves as a control on the extent to which the disproportion can be attributed to the destruction or non-detection of Predynastic graves. As Michael Rice acknowledges, the essence of the problem is not the size of the cemeteries in relation to their associated settlements, but the length of time attributed to both. Locked in their false chronology, archaeologists are continually having to imagine what to all appearance is not there.

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