A Long History of Home-bases, Huts, Houses, Villages, Towns, Cities and Megacities

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Abstract

This review traces the lengthy record of human habitation on our planet. So long has the process of homemaking been that it includes constructions made by prehuman ancestors, upwards of a million years ago. Efforts towards the building of shelters and the founding of settlements have involved lengthy periods of relative stasis, punctuated by leaps to new and more complex systems. The first home-bases were simple fireplaces, around which our ancestors gathered, prepared food, and made tools. During the Pleistocene, occasional vestiges of curvilinear huts are found, and during the Late Glacial period, substantial groups of houses appear on the plains of Eurasia. The transition to sedentary life was accomplished by Natufian hunter-gatherers in the Levant, near the end of the Ice Age. There followed the establishment of village life across the Middle East by Pre-Pottery Neolithic farmers in the early Holocene, and the first cities around 3,500 BCE in southern Iraq and south-western Iran. Urban systems had spread across the globe by 3000 BCE, from China, to Peru in the Americas. The Classical cities of the Mediterranean developed regular urban grid plans in the fifth century BCE and introduced new types of civic amenities. In terms of complexity and size, the ancient city reached its zenith in imperial Rome. Occasionally, premodern cities such as Angkor became much larger than it in area through the establishment of low-density residential populations. New sources of energy were unleashed by the technological revolution of the nineteenth century that utterly transformed the city. In short order, they led to the mega-conurbations that currently spread over large tracts of the earth. This review considers factors of community interaction and communication that have both retarded and permitted breakthroughs in settlement strategies through time. It also examines the idea of non-verbal syntactical grammars that govern the patterning of human settlements, and the relative contributions of adventitious organic growth versus deliberate planning and retention of community ideals in settlement planning

Introduction

One of the most fundamental human traits is the instinct to make a home. Virtually all cultural products emanate from such places. The practice has been going on for a very long time indeed and includes efforts by our pre-human ancestors that extend back nearly a million years. This review attempts to retrace this process from earliest times until the modern day. As such, the article is well-situated within this issue's particular Big History threshold, 'Laying the Foundations of Big Economic History'. In order to recount the antecedents of the human condition, Big History seeks to combine the fruits of the major scientific disciplines, commencing with physics and astronomy and leading to geology and biology, before arriving at the traditional historical disciplines.[1] Lodged between them, archaeology (and its cognate discipline of palaeoanthropology) is the only means of investigation of human affairs for the period up to the advent of written records.

Settlements were dear to the people who made them and reflect much about their culture. Ancient settlements have also influenced later peoples. So, the specifics of ancient settlements are useful to explore how these reactions arise. Material configurations provide templates for successive generations. and subconsciously influence their future decisions.[1] On the other hand, communities also consciously manifest their beliefs and ideals in the design of their settlements. They often commit to maintaining their built environment over long periods. Therefore, residential trajectories around the world show distinctive continuities. The history of human settlements then, like culture in general, is bound up in the interplay between tradition and countervailing constraints and forces.[2]

To understand the nature of habitation in general, the architect Doxiadis sought to establish a science of human settlement, which he termed 'ekistics.' In his massive, wide-ranging treatise on the subject, Doxiadis,[3] does not pause to provide an etymology for the word, but its original meaning in ancient Greek is germane to consider in this discussion. The oikistēs was a citizen chosen by a polis to supervise and institute a new Greek urban colony. The idea presupposes that the setting out of an ordered town would involve elaborate planning and systematics. Yet, settlement patterns may also arise through the existence of non-verbal

spatial grammars. As Hillier and Hanson have observed, "it seems to be a characteristic of the human mind that it is extremely good at using relational systems - all languages and symbolic systems are at least complex relational systems - but rather bad at knowing how to talk about them."[4] So, it is not clear that overarching administrations always plan settlements, as opposed to their emergence via the innate conceptions of spatial relations held by community members, by idiosyncratic understandings about how things should be built, or by boundless, small conversations between neighbours. After all, bees manage to produce exquisite, hexagonal honeycombs. Their existence leads us to question whether human beings also have a genetic propensity for spatial relations, or an innate 'syntax of space.'[5] In other words, is there a Universal Spatial Grammar, just as Noam Chomsky proposed that a Universal Grammar, hard-wired in the brain, underlies human language capacity? [6] There is still no clear evidence for such a genetic basis.[7]

This review begins with the first fireplaces, and then moves on to consider early shelters, and subsequently the appearance of clustered huts towards the end of the Palaeolithic, or 'Old Stone Age' era (during the Pleistocene geological epoch).[8]

The Hearth as Home

According to ethnographic evidence from small, mobile hunter-gatherer groups and the archaeological record, the hearth[9] constitutes the original home-base for human society.[9] People have crouched around hearths from ancient to modern times, sharing food and stories while contemplating the flames.[10] In recent history, the disposition and number of hearths varied according to the size of the group[11] The first unequivocal use of fire occurs at Gesher Benot Ya'aqov on the Jordan river, 790,000 years ago.[12] Distribution studies at the site show particular focuses of burnt material, which may indicate the setting of fires. The earliest clearly attested hearths occur at Qesem cave in Israel, 300,000 years ago.[13] In these cases human ancestors were the innovators*; Homo erectus* in the former case, and probably Neanderthals in the latter instance. Modern humans were using fire by 164,000 years ago,[14] and in the following millennia its use became widespread.

Earliest huts

To begin with, we should lay to rest the myth that humankind emerged from the caves towards the end of the Palaeolithic. People have always lived in the great outdoors, founding basecamps in the open air.[15] Apart from hearths, there are subtle traces of lean-tos and circular huts interspersed through the long traverse of the Pleistocene. Most were built of perishable materials and so have not survived. Scatters of stone tools and butchered animal bones mark the whereabouts of most. Occasionally through, anaerobic conditions of preservation have preserved the remnants of such structures. In other cases, we discern their outlines when durable stone fragments were used to form their footings.

A stone ring at Olduvai Gorge in Kenya dating to 1.6 million years ago has been interpreted as the footings of a shelter.[16] However, certainty is precluded by the possibility that the space within the ring may have been cleared by the uprooting of a large tree. A later example at Arkin 8 in the eastern Sahara (Egypt) is said to represent the remains of a hut, but the most impressive example of ancient capabilities are wooden logs shaped to connect to each other, found at Kalambo Falls in Zambia and dating 476,000 years ago.[17] These simple habitations occurred through such a long time period that several different species of human ancestors were involved in their collective construction. They run, potentially, from *Homo habilis* to *Homo erectus* and onto *Homo heidelbergensis*, and to the Neanderthals and the Denisovans in Eurasia. The Acheulian site of Terra Amata at Nice, dating 400,000 years ago, comprises a series of superimposed living floors with scattered postholes, indicating the use in habitations of perishable materials.[18] A precocious stone structure built by Neanderthals lies on the surface of a chamber deep in Bruniquel Cave, France. It takes the form of an oblong arrangement of stalagmite fragments, dated 176,500 years ago.[19] Given its dark underground location, it may represent the vestiges of a ritual practice, rather than a quotidian habitation.

Near the end of the Middle Palaeolithic period, the first major habitation sites appear in the Dniester River Valley in Ukraine, at Moldova I, also associated with Neanderthals.[20] Loosely organised structures there consist of mammoth bones and teeth, enclosing masses of stone tool debris and animal bone remains. These were cold-adapted residences, offering protection from strong winds. In all, constructed shelters are rare before the Upper Palaeolithic, when modern humans entered Europe (around 44,000 years ago). Thirty thousand years on, somewhat similar constructions appear in the same region. But now they are impressive huts, such as Gontsy in the Dnepr Basin, Ukraine (ca,

15,000 BCE),[21] built from stacked piles of mammoth skulls and long bones. They were probably covered with animal skins.

From this time, we also see critical steps taken in the Levant towards the development of the house. At 21,000 BCE, hunter-gatherers constructed oval, brush huts at the late Upper Palaeolithic site of Ohalo II, on the shores of Lake Tiberias.[22] Due to the site having been submerged under anaerobic conditions until its recent exposure, it yields a rare glimpse of what Ice Age camp sites may have generally looked like. Vestiges of its perishable materials have survived, including twisted fibres and brush wall materials. The house is provided with a central hearth, and rarely, for that age, fragments of stone grinders for processing cereals. The emergence of a kind of emotional attachment to the dwelling is evident in the form of an interred man, buried next to the hut. These subtle vestiges represent what Moore has called 'the prehistory of the home.'[23]

The Earliest Village People

The Natufian culture (12,700 - 10,300 BCE) forms a critical juncture in human settlement history. Significant subsistence and settlement intensification occurred in the Early Natufian period in the Levant, with the appearance of stone houses organised into small villages (around 12,500 BCE).[24] Whereas previous sites are short-lived, Natufian sites are larger and contain clusters of stone huts, rebuilt on the same spot over hundreds, and in some cases, over thousands of years. Notable exemplars are Wadi Hammeh 27 in Jordan[25] and 'Ain Mallaha in Israel.[26] Natufian hamlets were founded on cemeteries, a physical linkage which consolidated a community's attachment to its home territory.

Natufian hunter-gatherer settlements are associated with new artefact types for processing plant foods, such as well-made sickles and large numbers of mortars, pestles and grindstones. Remains of carbonized plant foods include wild barley, lentils, chickpeas and almonds. Whether Natufian hamlets represent year-round, and year-on-year, habitations, has remained an ongoing focus of research. Hunter-gatherer communities make substantial constructions but usually vacate them for part of the year, in order to fallow resources in their home territory and exploit food resources in more distant regions. As noted above, our forebears did not always live in caves, but there is an interesting caveat we must pause to consider for the Natufian. The earliest Natufian house constructions are indeed set in caves and rock shelters. They occur around 13,000 BCE, for example at El Wad cave at Mount Carmel range on the coast of the Mediterranean.[27]

Whether the natural walls and boundaries of caves stimulated these people to build in stone is an interesting consideration. Communities who occupied subterranean cavities were not always just passive squatters in them. At Nawarla Gabarnmang rockshelter in Australia's Northern Territory, variable dissolution of rock led to the creation of a forest of natural stone supports, stretching from the floor to the ceiling over a wide area.[28] The effect is impressing, reminiscent of the sensation created by standing in the pillared hall of the Great Mosque of Cordoba, where columns disappear into the gloom in every direction. The Indigenous occupants of Nawarla Gabarnmang, occupied over 50,000 years until the recent past, did not build architectural features within the rockshelter but they transformed it by clearing debris and removing some of the columns to render the chamber more amenable for residential activities.

The Agrarian Village

At the end of the Pleistocene (*ca.* 11,500 cal BCE), an intense glacial period known as the Younger Dryas episode returned rapidly to plunge high-latitude regions beneath sheets of ice. Its effects were also felt in lower-latitude regions such as the Middle East.[29] Temperatures and rainfall were lowered, and vegetation patterns altered. The end of this period also came quickly, ushering in Mediterranean climate with its seasonal rhythm of long summers and moist winters. This change coincides with the appearance of agricultural villages. Across the Levant around 10,000 years BCE, the shift to sedentary village life occurred during the Pre-Pottery Neolithic A (PPNA) period. It saw the construction of true houses in stone and mudbrick, and a surge in the size and complexity of settlements. The basket of these early villagers was boosted by 'pre-domestication agriculture', or the cultivation of wild cereals such as wheat and barley.[30]

The PPNA was spectacularly discovered by Kathleen Kenyon in her excavations at Tell es-Sultan (Jericho) in the 1950s.[31] Directly underlying the first Neolithic village was a Natufian hut. Its location at the base of the first *tell* or city mound, underscores the significance of the Natufian as a knickpoint in human settlement history. The period marks the origin of property tenure over specific plots of

land. From this time, not only home territories but specific villages and individual houses were reoccupied through many generations. That Kenyon named the next period 'Pre-Pottery Neolithic' reflects prevailing expectations derived from the European Neolithic; namely, that early farming villages should possess pottery. But the Jericho PPNA phases lacked ceramics, despite the occupants' knowledge of baked clay.

The PPNA houses were small, round, and cramped; yet still an advance on Natufian construction methods. They were built from courses of bonded mudbrick laid on a timber frame. Steps led down into a sunken interior, which was provided with a central hearth It is in the non-domestic architecture where Jericho's departure from previous settlements is most evident. Its conical stone tower, reaching nearly nine metres into the air, is an extraordinary occurrence for 10,000 BCE, and unique upon the earth for this period. The tower was built of mortared stone. It was equipped with an internal staircase of carefully dressed stone slabs with corbelled vaulting to protect the ascending passage, which gave on to a flat roof. Nearby, at the margin of the village, a large stone wall had been raised, flanked on its external side by a deep ditch. Initially, at least, the tower could not have been a defensive structure because it stood free and was not originally connected to this wall. Moreover, the view from the tower's summit did not give any better view than the normal groundline further back into the interior of the village. The tower is likely to have been constructed for a ritual use – but one thing it does speak to is a previously unknown level of community activity.

Jericho exerted a strong influence on scholars' conceptions of the earliest villages. At four hectares in area, it was significantly larger than previous settlements. For Kenyon, PPNA Jericho phase heralded an unanticipated complexity for settled life, and she announced it as 'the oldest town in the world'. A town wall seemed to be a defensive installation, although there is no other significant evidence for intercommunity conflict during this period. Another idea was that the wall and associated ditch were intended as flood control measures[32] against seasonal waters issuing down the steep valley of Wadi Kedron, but recent finds of sections of the town wall on the other side of the mound now render this idea unlikely.[33]

Of all the many PPNA sites subsequently excavated, Jericho is still unique for its time. It stands as some four times the size of the next largest settlements, such as Netiv Hagdud to the north in the Jordan valley [34], or Wadi Faynan 16 in south Jordan.[35] Wadi Faynan 16 is one of the few additional sites in the south to have yielded a large, special building. Although not ostentatiously grand to the naked eye, the saucer-shaped Structure 101 is at 18 metres across, the largest PPNA building yet discovered in terms of area. It contains a stepped series of interior platforms, modelled in adobe, which may have functioned as a theatre for community rituals.[36]

PPNA settlements e spread across the Levant and into the foothills of the Taurus Mountains in southern Türkiye. The region around *Şanlıurfa* has recently yielded a remarkable series of settlements with monumental constructions. They comprise oblong buildings enclosing rings of massive T-shaped pillars, such as the hilltop site of Göbekli Tepe[37], dating from 9,500 BCE. This 7.5- hectare complex features oblong buildings enclosing five-metre-high carved pillars, adorned with complex arrays of geometric symbols and figured scenes. There are some seventeen such sites now known in the region. One of them, Sayburç, features a rock-cut house interior embellished with a scene carved in relief. Its centrepiece is a standing man holding his penis, flanked by leopards.[38]

Sites with elaborate and monumental productions such as Göbekli Tepe have become a contested area in archaeology. Some scholars minimise the role of subsistence change and alternatively foreground community decisions and ideology as the drivers of change. Others believe that food production enabled the development of staple finance and labour, which enabled community members to engage in such concerted productions. Some scholars thereby argue that Göbekli Tepe was built by cooperative groups of hunter-gatherers, before the origins of agriculture, and this indicates an ideological shift which paved the way for the subsistence changes. However, despite the fact that it has not yielded significant amounts of carbonised grain, Göbekli Tepe has produced large amounts of cereal phytoliths[39] and abundant groundstone tools for processing plant food.[40] Furthermore the site dates to a period when crop cultivation was underway in adjacent areas.

The subsequent Pre-Pottery Neolithic B (PPNB) phase in Southwest Asia sees the decline of eye-catching large monuments. But at the same time, villages expand in size again, and become more sophisticated architecturally. Between 8,700 and 7,000 Cal BCE the agrarian PPNB farming village way of life spread extensively and became entrenched across the Fertile Crescent. Many

large, crowded settlements of rectangular houses emerge, founded on economies of domesticated cereal and legume agriculture, and goat and sheep herding.[41]

From Round to Square: the rectilinear revolution

The PPNB period ushered in a major development in settlement history; the shift from curvilinear (round and oval) houses to rectilinear (square and rectangular) ones.[42] The rectilinear revolution may not be as well-known as the agricultural, urban and industrial ones, but it was just as consequential for the shape of human settlements. Before this transition, there were virtually no rectangular houses in the world. After it, virtually every large established village or town (with a few tenacious exceptions) was comprised of rectilinear building units. The change is best seen at Jerf al-Ahmar in north Syria, which spans the PPNA-PPNB transition.[43] At the outset, houses appear as single, circular cells. In the next phase, two circular units are joined. Subsequently, curvilinear buildings with rectilinear partitions appear. Finally, fully rectilinear homes with square rooms are developed. It is not clear why the curvilinear to rectilinear revolution occurred. It is unlikely to have been a perceptual revolution, whereby artificial rectangular forms first had to be first imagined, since they didn't occur in the natural world. Many geometric rectilinear forms occur naturally, such as crystals, jointed rock formations, honeycomb, fossils, and animal epidermises (for example, the scute patterns on tortoise-shell). In the Natufian period, over 3000 years earlier, rectilinear geometric shapes were often carved in bone and stone.[44]

It is more likely to do with effort expended for anticipated return. Once long-term residency in a locale was anticipated, rectilinear architecture provided many practical advantages, conferring the ability to readily add on rooms, to build upper stories, to arrange building units in neighbourhoods demarcated by streets (along which drains might efficiently flow), and to provide ready axes of orientation. Rectilinearity enabled the construction of repeatable units.[45] It is thought that the shift from curvilinear to rectilinear architecture characterises the rise of truly sedentary communities.[46] Some communities practise seasonal agriculture while living in rectilinear villages, such as in the Deccan peninsula of India. But in other seasons of the year, they switch to mobile pastoralism and revert to living in circular houses.[47] Thus, it appears that anticipated, long-term residence underpins rectilinear architecture. While rectilinear planning goes well with permanence and large settlements, local tradition may override these types of general trends. In parts of West Africa, agrarian Mousgom villagers (in Cameroon[48]) still live permanently in villages of round adobe houses because they value their architectural traditions.

The architectural sophistication achieved in the PPNB period is best apparent in a series of settlements that arose in Jordan after 8,300 BCE. Plaster was a pyrotechnological innovation of the greatest importance in this period, providing a durable and mouldable building material. It was also useful as a medium for artistic expression.[49] Plaster had been known, on and off, since the Natufian period. But in the PPNB, it came into its own and PPNB builders fell in love with it. At 'Ain Ghazal, the walls and floors of houses were routinely coated with kiln-fired plaster and often painted red. Good preservation of deposits at Basta in southern Jordan has also revealed the extent of PPNB architectural sophistication.[50] Stone houses with quoined corners reached double stories, and were endowed with tall window frames. A street passed through the settlement. At Wadi Ghuweir 1 in south Jordan, a stepped area led to a plaza. Nearby houses were even provided with passive air conditioning, in the form of shafts and vents built into the stone walls.[51]

By this period, the house had become more than just a utilitarian shelter. Communities were devising new interior domains to reflect their conceptions of the world, and to create the delights and comforts that homemaking brings.[52]

The Early village: global comparisons

From the Middle East, agrarian villages spread northwest into Europe and southwest into Africa (specifically, into Egypt). The earliest agricultural village on the Anatolian plain was founded at Aşikli Hüyük, from 8,200 BCE.[53] The settlement then developed, according to the well-known formula, into a village of rectangular buildings, crammed cheek by jowl. The next major expansion to the west involved the settlement of Çatalhöyük (7,500 - 6,500 BCE), located on the Konya Plain in southwest Anatolia.[54] Çatalhöyük is a huge site covering an area of twenty hectares; a Neolithic tell of mudbrick, twenty metres high. Several of its layers were extensively burned, leaving it as one of the best-preserved early village sites in the Middle East.

In its heyday Çatalhöyük stood as a high town surrounded by seasonal swamps. The settlement consisted of arrays of rectilinear houses distributed around small courtyards.

Houses had individual walls, but continual rebuilding led houses to be crammed against their neighbours, so that ingress was eventually only possible via ladder entry through the roof. Subsistence was based on goat husbandry, but in continuing earlier traditions of villages in the northern Levant, images of aurochsen (wild cattle) feature strongly at Çatalhöyük. The most arresting features are a series of bovine-themed internal furnishings and wall fixtures which occur in selected houses. Modelled clay bulls' heads were set into calls, incorporating real pairs of cattle horns (bucrania). Rows of flaring bucrania were also set into benches on floors; arrangements that seem anything but practical. There are clay breasts modelled into walls, enclosing skulls of foxes, pigs and vultures - opposed symbols of life and domesticity, versus untamed nature and death. Portable baked clay figurines occur too, some emphasising female fertility. A major piece is the 'Seated woman from Çatalhöyük' (sometimes known informally as the 'panther goddess'). It features an obese woman, apparently giving birth while sitting naked on a kind of throne, the arms of which terminate in panther heads.[55]

Although Çatalhöyük represents the high point of the Neolithic village way of life, its houses are all similar in size. They do not have specific or specialised functions, but incorporate a complex combination of quotidian areas, including 'clean' and 'dirty' areas, ritual and religious iconography, and buried kinsfolk lying beneath floors. With their evocations of past traditions and kinfolk, some of the residences have been interpreted as 'history houses'. Çatalhöyük is instructive in considering the differences between the archaic village and the modern city. As with Jericho, Çatalhöyük's exceptionality has led it to be cast as one of the world's first cities, although it lacks major characteristics of urban systems.

After its arrival on the Greek mainland around 6,500 BCE, the farming village then spread through the Balkans and across the northern European plain. By preference, The first farmers in western Europe settled on rich alluvial loess soils in river valleys. They are identified with the so-called Linearbandkeramik (LBK) / Linear Pottery culture, named for the characteristic pottery found in their settlements.[56] The LBK culture spread across the northern Europe plains rapidly between 5,500 and 5,200 cal BCE. At Bylany, in the Czech Republic (5,500 cal BCE), house plans were recovered from the impressions of postholes in the ground. Large, rectangular long-houses were built with massive timber posts down the middle. The substantial foundations could support load-bearing walls and second storeys. Secure habitations were needed for protection against the cold of the northern winter. Interpretations of the floor areas indicate tripartite interior divisions into stock-pens and storage areas, as well as living quarters.

Farmers arrived in Britain around 4,000 BCE, but for many years their living quarters have been thin on (or under) the ground. On the contrary, henge monuments such as Avebury and Stonehenge (dating from 3500 BCE) are spectacularly evident. Until recently, no occupations had been discovered at Stonehenge, and so it was thought that people might have visited it from their domiciles far afield. More recent excavations have shown that during the main phase of Stonehenge's construction, around 2400 BCE, a massive village of at least 300 houses existed at nearby Durrington Walls.[57] The village remains lie under shallow topsoil and houses have been identified from subterranean floor plans, interior features and postholes. They are essentially square, or squarish, and contain quantities of utilitarian grooved-ware pottery. There are also masses of pig-bone refuse which indicate seasonal feasting. The excavator believes that Durrington Walls was a seasonally occupied encampment. People arrived from far and wide across Britain to participate in great mortuary ceremonies at Stonehenge. From time to time, while there, they rebuilt or renovated the monument as well. Chemical analyses of residues from pots demonstrates feasting on pork, beef and dairy products. The wider regional significance of Stonehenge as a cult centre is also demonstrated by strontium-isotope analyses, which show that cattle were led to Durrington Walls from all over Britain. The monument seems to have been a major pilgrimage destination; a kind of prehistoric version of Chaucer's *Canterbury Tales.*

The houses at Durrington find parallels with one of the only other major Neolithic villages excavated in Britain, at Skara Brae in the Orkney islands. Almost without rival in the annals of prehistory, the owners of these well-built stone houses provided their interiors with an extraordinary range of stone constructions, looking like regular furniture, and sometimes interpreted as 'cupboards', 'dressers', 'beds' and 'shelves'.[58] Mike Parker Pearson believes that they may have functioned as ritual containers, rather than the furnishings of houseproud homeowners in the modern secular sense.

Looking southwest to Africa, the farming way of life did not spread to nearby Egypt, only a few hundred kilometres away, for over five thousand years after its inception in the

southern Levant. This may have been because the annual inundation of the Nile River provided a regular source of water and predictable conditions for mobile bands of hunters and gatherers, nullifying the effects of variable seasons. When food production did arrive from the north-east, it leapfrogged the Nile valley and landed first in the Eastern Sahara, where mobile pastoralists began to herd imported cattle, and sheep and goats, between 6,100 and 5,400 BCE.[59] During this period, moist climate transformed the desert into verdant grassland.

The village way of life arrived in the Nile Delta around 4,750 BCE at the site of Merimde beni-Salame,[60] some 25 hectares in area. The site contains a network of small, round, mud houses, and yielded pottery and food-processing implements. Local resources such as native African sorghum and a wide variety of local fish and waterbirds continued in use. Additionally, southwest Asian food imports were present: domesticated emmer wheat, barley and bitter vetch were cultivated, and domesticated sheep, goat, cattle and pig were herded. Whereas the various constituents of the farming village in Southwest Asia developed episodically and over millennia, the Levantine package arrived all at once in the Nile Delta. Conditions there were ideal for farming and so the settlement at Merimde bloomed quickly, far outstripping its Southwest Asian predecessors in size. It was not long before the fecundity of the Nile propelled the region into a sophisticated civilisation, founded on riverside cities and temple complexes.

To the north-east, recent fieldwork projects have extended the range of PPNA and equivalent sites around the hilly flanks of the Fertile Crescent, with the excavations of Qermez Dere in Iraq[61] and Chogha Golan and Sheikh-e Abad in Iran.[62] Descending from the Hindu Kush into Central Asia, village life appeared later than in the Fertile Crescent, but in no less impressive form. Mehrgarh is located on the alluvial Kachi Plain, by the Bolan River, in Baluchistan.[63] Consisting of a complex of associated and overlain mounds, it is a huge tell which attained 200 hectares in area. The aceramic phase 1A alone (7,000 BCE) is reported to be 7 metres thick. For its time, Mehrgarh stands in splendid isolation in the Indian subcontinent. The site has yielded a series of precocious developments: the cultivation of four species of cereals, the use of date palm and cotton by 6,000 BCE[64] and the cultural control of sheep, goats and cattle. Large, compartmentalised storage buildings occur by the same date, handmade pottery by 6,000-5,500 BCE, and wheel-made pottery, specialised ivory and steatite crafts, and copper metallurgy, all by 5,000 BCE.

Recent research has demonstrated China as an important cultural counterweight to the Middle East, in terms of the complexity of village life. Xiachuan Upper Palaeolithic campsite yielded grinding slabs and flint blades bearing silica gloss, resulting from the harvesting of cereals at 24,000 BCE.[65] This find implies that consumption of cereals was occurring in China some 10,000 years before the appearance of farming villages there. This progression is rather like the Levantine sequence, for example at Ohalo II. However, a point of departure from the Middle East comes in the form of pottery, one of the great surprises of recent years. In China, Japan and the Russian Far East, pottery dates from 15,000 to 13,000 BCE.[66]

Discoveries in China have proceeded at a rapid pace. The dating of Shangshan in the Lower Yangzi Valley pushes back the sedentary village with pottery and rice to 9,000 BCE. Pile dwelling F2 at Shangshan is already in rectilinear form.[67] The use of raised houses in marshy areas continued as a tradition in the south from these early times. Hemudu in the Hangzhou estuary near Shanghai revealed a 4-hectare village site (5,000-4,500 BCE) in an ancient swamp, which conferred good organic preservation.[68] Hemudu featured rectilinear wooden houses, up to 23 metres long and 7 metres high, built up over the water on stilts. The wooden buildings were with advanced carpentry techniques, such as mortise and tenon joinery. Judging by the debris scatter, rubbish was dumped into the swamp beneath the houses. So, by the Neolithic, an architectural adaptation to living by water had been achieved in eastern Asia. Pile dwellings, whether extending over the networks of rivers and canals of the Asian mainland, or the "world of islands and inshore waters"[69] of peninsula Southeast Asia, is an architectural style that has continued down to the present. Needs for sanitation, aquatic food resources, transport and the provision of unlimited volumes of water are neatly accommodated in this way of life.

In northern China, the Yellow River (Huang He) basin was a major centre of Neolithic village life; the wellspring of the earliest Chinese civilisations. By 5,000 BCE, the Yangshao culture had formulated complex village structures and achieved technological sophistication.[70] Yangshao period agriculture was not based on rice, as in the south, but on millet; a durable and cold-resistant panicle grass. Protein was obtained from the north Chinese triad of

domesticated animals: pig, dog and chicken. The best known Yangshao site is Banpo, a large oval mound five hectares in size. Banpo was large and well-planned, with internally differentiated areas demarcated for special functions. In the central sector were located houses, along with storage pits and animal pens. A defensive moat encircled the village, and pottery kilns and cemetery lay outside this perimeter. Houses were semi-sunken with central wooden posts, and finished in wattle and daub. Besides a majority of circular pit-houses, Banpo also yielded larger, more carefully built square pit-houses, possibly for elite leaders.

Cultural trajectories in the New World, provide both sharp contrasts to the Old-World sequences and challenges to the idea of universal theories of human development. Mesoamerica has an unusual dearth of domesticable animal species. There are no large mammals available for transport or traction. On the other hand, the region has bequeathed to the world a wide range of important plant crops: maize, beans, squashes, gourds, chilli peppers, avocadoes, amaranths and chocolate are some of the many Mexican food plants that have conquered the world.

In Mesoamerica, the development of agriculture is not accompanied by the kinds of socioeconomic intensification that we see in most other places. The first simple huts appear as long as 6,000 years after the first domesticated plants, which occur as early 8,000 BCE. So, the question remains, where was everybody? New, earlier dating of humanity's presence at Chiquihuite Cave in Mexico (24,000 BCE)[71] and human footprints in New Mexico (USA) at 23,500 BCE[72] have doubled the length of human occupation in the Americas. These new discoveries render the long time-lag leading to earliest food production and village life even more intriguing.

The arid highland valleys of Oaxaca and Tehuacán are two locales of earliest food production in Mexico. At Oaxaca, domesticated squash is evident in Guilà Naquitz rockshelter before 8,000 BCE, whereas the first houses appear only in the Tierras Largas phase (1,730-1,520 BCE).[73] They are simple affairs, with floors represented by dark-stained earth. Fragments of clay daub preserve the imprint of the canes used to build the walls, and the ropes used to lash them together. A one-room temple on a large stone platform occurs then at San José Mogote in the Oaxaca sequence at 1,150 BCE. Domesticated food plants in the Tehuacán Valley[74] appear at similarly early ages to Oaxaca. Here, also, simple pit houses occur much later in the Abejas phase (3,825–2,600 BCE), and constructed houses not until the Ajalpan phase at 1,000 BCE. Developments in the lowland rainforests occurred at a similar rate. Remains of thatched houses at Cuello, Belize, are evident by 1,200 BCE, evidenced by postholes set into lime-plastered surfaces.[75]

A second, independent hearth of food production occurred in South America. Again, the developments occurred with a distinctive suite of plant and animal resources, many of which - peanuts, potatoes, tomatoes, quinoa (and last but not least, the coca leaf) - have become global favourites. If Mesoamerica proved to be a challenge for general theories about the origins of village life and cities, then South America seemed at one stage to make a mockery of them. Until the last few decades, the continent has virtually remained *terra incognita* for research, yet discoveries made in the twenty-first century are some of the most revolutionary ever to have been made into the origins of village life and civilisation.

For decades, the early settlement of Monte Verde in southern Chile[76] had remained an anomaly. Its habitations were built as rectilinear structures from the very beginning. There, tentlike structures with fabric or hide superstructures were anchored by rows of posts and planks. Monteverde's early date of 12,850 BCE was somewhat incongruous, given the absence of human occupation further north in South America. Now, an Ice Age human presence in South America is graphically attested by extensive rock-art panels, found at Serranía de la Lindosa in the Colombian Amazon. They include images of extinct megafauna such as sloths, horses and mastodons, and date from at least 10,650 cal BCE.[77]

In Peru, excavations in the Ñanchoc Valley have demonstrated cultivation of squash (7,200 BCE) peanut (5,800 cal BCE), quinoa (6,000 cal BCE) and cotton (3,400 cal BCE).[78] The remains were recovered from sealed house floors and hearths accompanied by stone hoes and grinding stones. Agricultural plots were located adjacent to the site, fed by irrigation canals dating back to 5,500 cal BCE. Coca leaves and burnt lime for the plant's processing were found in subsidiary huts, dating 6,000 cal BCE. Apart from domestic habitations, paired mounds, up to 25 metres long, were discovered in the Ñanchoc Valley, associated with lime production areas. The mounds date to 6,000 BCE and contain ritual items. So, we see that as in the Middle East and parts of Europe, non-domestic, arcane or ritual construction has been a central interest of human communities since the earliest settlements.

It has usually transpired that elaborate constructions were founded on a base of food production. But in North America, an extensive series of mounds and an unusual earthwork feature was raised by hunter-fisher-gatherers on a plain over 370 hectares in area, at Poverty Point, near the Mississippi River in Louisiana.[79] Dating between 1,700 and 1,100 BCE, the centrepiece of the system is a crescentic array of six curved ridges formed by raised earth deposits, intersected by five, low paths emanating from the focal area of the arrangement. The long axis of the curved earthen arcs extends for more than a kilometre. Viewed from the air, the monument is reminiscent of a giant, ancient Greek theatre. Poverty Point undoubtedly had symbolic or ritual meaning for its makers and it was also a place that they occupied frequently.

Paradise lost

Sedentary village life involved settling down in one place. There was much security in this way of life, but it also involved entering into a form of devil's bargain. Vacating territories to allow them to recover was no longer possible when the world had filled up and each parcel of land was accounted for. Sedentary tenure was accompanied by some significant challenges. There was the chance of drought and pestilence from year to year. Longer-term problems emerged through land clearance, and consequent soil erosion.

The most intriguing evidence for such changes occurs at the PPNB village of 'Ain Ghazal (situated in the northern suburbs of modern Amman).[80] Habitation there began around 8,700 BCE. Following its foundation as a 1 to 2-hectare settlement, 'Ain Ghazal underwent periodic expansion, represented by four major archaeological phases. The village grew successively from five hectares, to ten, and reached thirteen by its end. The earliest phase features large, single-roomed structures with plastered floors and large posts. Post sizes decline through time and room sizes concomitantly shrink with the disappearance of long spans of timber. Large numbers of trees were consumed to provide the posts. In addition, the surrounding forests were heavily exploited to fuel kilns which produced lime plaster. Houses were painstakingly plastered and re-plastered on an annual basis. Studies show that each house-plastering required large quantities of wood for fuel. The oak forest would normally regenerate; however, increasing numbers of herded goats provided the knockout environmental punch. Initially, 'Ain Ghazal hunters took over fifty species of animals, but the diversity of wild animals nosedives by the late phases. The decrease coincides with a noticeable increase in the numbers of goats and sheep. Grazing pressure by goats short-circuited the normal regeneration of vegetation, clearing habitats for a range of the wild animals that the villages had formerly hunted and precipitating the onset of soil erosion According to this model, early villagers may have contributed to their own demise by unwittingly setting off a feedback loop of environmental problems. Alternatively, the end of the PPNB adventure may have been exacerbated by a climatic downturn during the '8.2 ka spike',[81] recorded in Greenland ice-cores; a brief but dramatic cool and arid event occurring between 7,300 and 7,000 BCE.

Before leaving the world of villages, it is interesting to consider how their archaeological signatures vary on different continents. There is great variability in archaeological preservation around the globe. Virtually any ancient village excavated in the Middle East yields robust vestiges of mudbrick or stone houses, crammed with artefacts and enveloped by thick deposits. Yet, in North America and Australia, even well-established traditional settlements have left only evanescent traces. *Síi Túupentak* was a substantial Native American Ohlone village in the San Francisco Bay area, before its forced relocation in the nineteenth century.[82] Although members of the Muwekma Ohlone community whose forebears lived there had specific knowledge about individual buildings, the archaeologists investigating the settlement could find no trace of them in the ground. In Australia, Bruce Pascoe has argued that sedentary village life did exist before Europeans arrived in the continent,[83] based on observations made by early European explorers. It is an issue that has become prominent in Australian social and political debate.

To date, no secure evidence has demonstrated that Indigenous Australian hamlets, villages, or house clusters were occupied other than on a seasonal, semi-sedentary basis.[84] Stone architecture intermittently occurs, especially in fields of fragmentary rock where rubble could be cleared and stacked to produce hut foundations. The oldest examples date to 9,000 years ago on Rosemary Island in the Dampier Archipelago, off the Pilbara coast of Western Australia.[85] Footings of Indigenous dry-stone houses are still extant further north on High Cliffy Island in the Buccaneer Archipelago.[86] Other examples occur intermittently across the continent, with remains of circular basalt hut footings found at Tae Rak (near Lake Condah) in

southwestern Victoria.[87] Reports of round huts, reinforced with stone and sod bases, used in living memory, derive from the Sydney region and in South Australia, houses of the Yawarawarka people with stone slab roofs were reported in the early twentieth century.[88] By and large though, Aboriginal houses were largely or solely built of perishable materials and these types disappear over time. For example, William Thomas in 1840 described and drew a substantial Aboriginal settlement of domed huts at Caramut in Western Victoria, but archaeological investigation of the site showed little trace of it.[89] Known mainly from the evocative drawings and brief textual reports of early European explores, the Indigenous village is a research area that may be further rewarded by fine-scale archaeological excavation beneath the topsoil.

Cities and Civilisation

Cities are regarded as being synonymous with civilisations, so it is useful to consider the concepts developed about the State-level societies that anthropologists call civilisations, and which build cities, in order to provide some context when we endeavour to interpret ancient urban remains. The term 'civilisation' is derived from the Latin verb, *civis,* "to be a citizen". This tells us about the point of civilisations; namely, to take part in a great, collective social organisation. The Romans were good at both building cities and organising large numbers of disparate peoples into their own version of civilisation. But the word 'civilisation' is construed to mean different things in common parlance. The Oxford Dictionary defines 'being civilised' as "to bring out of a state of barbarism, to instruct in the arts of life; to enlighten and refine." Another definition is 'intellectual, cultural and moral refinement. So, lurking behind the word is the suspicion that civilized people and civilisations are more sophisticated than other types of societies; that people in them practice high culture – drama, poetry, painting, opera, or that they eat with good table manners - in short, they're civilised. It is no wonder then that some traditional and indigenous peoples treat the term with misgiving, particularly when they are left out of the definition altogether. Even a highly reputed dictionary can define people without civilisation as 'barbarians'. A common response to this sort of semantic jousting is to proudly include oneself in civilisation.[90]

Anthropology and archaeology grew up with industrial civilisation in Europe. Nineteenth century Europeans were impressed with their own success, and they thought of themselves as the natural successors to certain earlier peoples. Academic schemes of social evolution were developed, such as those by Lewis Henry Morgan and Edward Tylor.[91] These frameworks saw civilisation as the dominant form of urban society, straddling lower forms of social organisation. They were categorised, in turn, as 'savagery', denoting small-scale bands of mobile people (generally, hunter-gatherers) and 'barbarism', denoting simple farming communities. Each of the stages were equated with newly discovered traditional peoples that colonial explorers encountered around the world, and by the earlier twentieth century, with archaeological sites and phases too.

By the mid-twentieth century, Elman Service had done away with subjective labels and provided a revised, four-stage scheme,[92] with 'bands' describing small-scale, mobile, hunting and gathering societies, and 'tribes' referring to larger societies with charismatic leaders (usually of small-scale village farming societies). Chiefdoms referred to larger polities where leaders with 'ascribed' hereditary status could ascend to power, due to kinship links with prior elites, even if personal qualities were uncertain. 'State' or 'State-level' societies are equivalent to the 'civilisation' stage. States have much larger populations than chiefdoms and are often territorially based. They are city-based (urban), with power enshrined in a permanent office of rule. Order is maintained by coercive state forces. There are a range of social classes and specialisation of labour roles. States are usually literate and more technologically developed than smaller-scale societies.

With a few tweaks, this system has held up tolerably well, except that the stages of any such classificatory system are abstracted. Some societies appear to span categories, and even developmentally, to jump stages. Then there are other forms of possible governance. Timothy Pauketat is skeptical about the ubiquity of archaic chiefdoms.[93] With an absence of evidence of many obvious personal status symbols in the Neolithic of Southwest Asia, it is possible that the evolutionary scheme from tribe to chiefdom to state is not applicable. Oligarchies and theocracies are likely alternative social systems for the ancient Middle East.

The Social Constitution of the City

For an entity so large, manifest, visible - and perhaps to many of us - so natural, the city has been the subject of many different types of explication. Of the genre of urban studies, Watson and Gibson observe that, "People are

entitled to be confused, even a little intimidated by the way towns and cities are studied today. Contemporary courses in urban studies cover just about every conceivable aspect of the urban experience. Some approaches are relatively self-contained and coherent but most into shade into each other."[94] These overlapping interests include the ecological setting of cities[95] but mostly the social landscape of cities; for example, how differential access to opportunity is played out according to race, social class, and the demographics of age.[96] The urban context is also of great interest in popular literature. Bryson's account of the modern home[97] sets out to be entertaining, but stands nonetheless as a detailed compendium of the technological history of the house and its contents, and parallels the interests of Big History.

It is noticeable how few specialists of urban studies take into account the historical perspective offered by the ancient city, a research avenue which has been utilised extensively by archaeologists.[98] This review also proceeds from an archaeological standpoint, and it emphasises the functional and social mechanisms that enabled urban systems to develop. A useful place to start is with 'The urban revolution' by V. Gordon Childe.[99] This paper has been billed as the most cited article ever written by an archaeologist. Childe, working in the early twentieth century, was then the most prominent investigator of nascent village and urban life.

Childe proposed ten criteria that characterise urban systems: 1) cities are much larger and more densely populated than even the most overgrown of early villages, 2) the roles of residents in cities are more specialised than those which occur in villages, with specialist professions and skills supported by surplus production drawn from a rural hinterland, 3) significant capital could only be accumulated by taxation imposed upon peasant farmers by a ruling class, 4) all early urban centres feature truly monumental architectural complexes, such as temples and palaces, rather than just large monuments, and these places are the seats of power, 5) the average person was robbed of political and cultural agency by a ruling class, which, on the other hand, provided organisation and security, 6) early urban societies were impelled to develop writing and accounting systems to organise communities and account for expanding resources, 7) the establishment of writing and number systems promoted the advance of technology and evidence-based science, 8) a result of the increasing specialisation of labour was the advent of a professional class of artists, whose products increasingly became tied to the political representations of a ruling class, 9) the accumulation of capital funded elites to engage in long distance trade, especially in precious metals and stones, and 10) the increasing specialisation of various labour classes led to their functional interdependence, with a way of life increasingly based on residence and locale, rather than kinship relations.

In order to maintain a system where a few at the top garnered most of the resources, state-based religions were promulgated, emphasising the divine rights of leadership, reinforced by the building of temples. At these imposing buildings, the populace could pay obeisance to the deities that guaranteed the prosperity of the city. Increased numbers of people living in one place, according to various specialized branches of knowledge and skills, should have accelerated the degree of social differentiation. Gregory A. Johnson conducted an analysis of statistical patterns of present communities of varying sizes, concluding that an increased degree of social differentiation should have rapidly occurred in the early village. His analysis of populations in the early cities showed an even stronger degree of hierarchization.[100]

Childe's treatise influenced urban studies greatly, whether by its acceptance, or by scholars moving to reject some of the points. In recent decades it has become evident that social organisation and community ideology (usually manifest as religious control by elites) count much more than a checklist of traits in determining the rank of a state or the level of a city. For example, the Inca of Peru lacked extensive metallurgy, writing, money or wheeled transport, and yet they developed a high-level civilisation numbering up to ten million subjects in a huge territory stretching from modern Ecuador to Chile.

Modern city planners and politicians consider the city from a functional perspective. But the ancient view of the city may have been quite different. Norman Yoffee argues that ancient communities held much stronger emotional bonds to their city than most recent people do to theirs.[101] The ancients believed that their city represented the wellspring of their community, and physically housed the deity that they worshipped. At the dawn of history, such conditions were evident at cities such as Nekhen (Hierakonpolis) in Upper Egypt.[102] Nekhen, 'The City of the Hawk' was considered to be where the god Horus lived, in his temple. The actual spot was sacred, and the city's functions sprang up in relation to it. It is still startling, as a secular citizen of a western city, to visit surviving temples

of this type in Egypt, such as the Horus temple at Edfu, to approach its great portico, and be confronted by the giant statue of a sharp-beaked bird.

The City Bursts into Being

After the Pre-Pottery Neolithic B period, Middle Eastern villages remained limited in size for some 5,000 years, never exceeding 30 hectares in area.[103] Around 3,500 BCE, a rapid shift to a new settlement form occurred in southern Iraq - and the city was born. That it happened in an instant, so to speak, against the backdrop of geological time, suggests that a ceiling of limits had been broken, and a new community scale achieved. These events took place on flat plains where life and possibilities were nourished by the two rivers flowing to the Gulf; the Tigris and Euphrates. The place that became known to us in the earliest writings as Sumer saw the advent of the first earliest urban civilisations, representing a profound transformation of human life. Communities were grouped into city-states, located along the rivers and on canals that were dug between them. A crucial prerequisite was the advent of extensive irrigation canals in the village-based societies of northern Iraq. The age of the earliest ditches, at 5,900 BCE, has been determined by radiocarbon dating organic materials at their base, at the site of Choga Mami.[104] When transferred to the southern plains the new infrastructure unleashed the productive power of water, brought to rain-starved soils.

In the south, the site of Uruk underwent a series of dramatic increases in size around 3,500 BCE, expanding to 250 hectares in only a few generations, and resulting in the creation of the world's first city.[105] It was a huge establishment, with walls 10 kilometres around. Uruk was principally made of mudbrick, with large temples and palaces at the centre. The imprint of this, the world's first city, still remains. Its massive walls and great gate are still visible on Google Earth. One has just to type in its modern Arabic name, 'Warka' (the Erech of Genesis) to arrive at it. No less remarkable is that its name has survived for over 6,000 years, when we consider that the long initial vowel 'U' in 'Uruk' also stands for the consonant 'W' in Arabic, and that short vowels shift around in Arabic words.

The ancient cities of Lower Mesopotamia now lie stranded in the desert by changes in the course of the rivers, and the lowering of the water-table through the regression of the Persian Gulf. In the fourth millennium BCE, the water-table was higher, and the head of the Persian Gulf was located far to the north of its current position. The ancient city of Lagash still lies far enough south to retain its position on fresh water.[106] It was one of the largest Sumerian cities. Its surviving mound, Tell el-Hiba, reaches 3.6 kilometres long, and the ancient city attained the size of 600 hectares. Recent work by archaeologists from Sapienza University in Rome have found the oldest harbour from ancient Sumer at Abu Tbeirah[107], which was still in operation around 2,000 BCE. Even, at that time. Abu Tbeirah was a seaside city, since the ocean stretched 200 kilometres further north into Iraq than it does now.

Temple administration seems to have held sway in the first cities. In southern Iraq, the earliest Sumerian city was the temple complex at Eridu, (5,900-2,000 BCE).[108] To the Sumerians, as we know from later literature, Eridu was a holy city, revered as the source of the 'Abzu', the mythological sweet waters upwelling from the earth. According to the Sumerian king list, kingship first descended from heaven at his place. Here, a sequence of sixteen successive temples were built over 3,000 years; the first just a tiny chapel with fish bone remains strewn remains around an altar. Interestingly, a later historical-period temple was dedicated to Enki, the Water-God. The holy buildings grew successively larger, until huge mud-brick temple platform remains called ziggurats supported formalized temples. This example shows the continuity and tenacity of religious belief, from earliest settlement into historic times.

At the heart of Uruk lay massive temples, large administrative buildings and substantial storage facilities. In the Kullaba area of the site, the 'White Temple' rose above a great brick platform, or ziggurat. The temple in historic times was dedicated to the God Anu. The complex would have provided a shining symbol of power, and a familiar landmark in a flat land. These cities were not originally brown, drab and dusty as they appear now. Facades of some buildings were finished in gaudy patterns, by inserting large ceramic cones terminating in coloured enamel, an ingenious way of maximizing limited local resources. Beside the White Temple lies a great stone storage building providing the economic basis for the temple's power.

Did ancient Egypt have cities?

One of the challenges to Childe's conclusion that civilisations were invariably urban in character came from early Egypt, a place where the world's first territorial state[109] emerged around 3,000 BCE. The nascent Egyptian

state is known for its mortuary architecture, a tradition that developed initially in Upper Egypt (by 3,500 BCE) at Hierakonpolis and Abydos. After the centre of power shifted to the north (Lower Egypt), mortuary buildings continued to grow in size, with large benchlike structures called mastabas built in the Early Dynastic period. Then came King Djoser's revolutionary Step Pyramid (2,600 BCE), and finally the straight-edged pyramids, crowned by the group on the Giza Plateau. In their time, these buildings were the largest and most imposing on earth. Yet, for decades it was believed that there had been no nucleated cities to accompany them, and that the ancient Egyptians had lived in dispersed, rural communities along the Nile. It is now realised that the apparent absence of built settlements along the valley is largely due to their concealment by the deposition of alluvial sediments on the Nile floodplain through time, (averaging up to a metre every thousand years).

Recent research has shown that cities had appeared already by the Predynastic period (*ca.* 3,500 BCE). Excavations at Hierakonpolis (Nekhen)[110] in Upper Egypt have revealed housing and large, specialised workshop areas, such as pottery kilns. Industrial-scale fermentation vats were capable of producing 390 litres of beer per brew. There was an immense ritual field, surrounded by posts and dumps of sacrificed animal bones. Here, also in the late nineteenth century, was discovered the predecessor to the temples raised to the god Horus. The first version was a revetted oval stone enclosure, and within it was discovered a foundation deposit filled with precious symbols of power. They comprised ceremonial maces and inscribed slate palettes dedicated to the first leaders, one called King Scorpion and then - in bridging the gap to when Egyptian writing can be read - another called King Narmer. Narmer's revolutionary palette, claiming the conquest and unification of all Egypt, serves as the entree to Egyptian history, just as it now greets the visitor to that heritage in the foyer of the Egyptian Museum at Cairo.

Memphis was the first hub of a newly unified Egypt around 3,000 BCE, located strategically at the point where the Nile meets its delta. Here, the new capital symbolically bound the two regions of the country together.[111] Located on the west bank of the Nile at Saqqara, the ancient city was positioned close to the first series of tombs and pyramids. The ancient Egyptians called their city 'White Walls' (*Inbu-hedj*). Excavations had not until recently found occupation earlier than the Middle Kingdom (before 2,000 BCE), but the antiquity of the city was suggested by an inscription relating the journey of a Predynastic leader, Iry-Hor, to Memphis around 3,200 BCE. Now, the great walls themselves have been discovered - eight meters wide and rendered on both faces with gleaming plaster.[112] Memphis was the quotidian companion to the Great Pyramid of Khufu, shining in the sun under its dazzling skin of Tura limestone.

African Urbanism, further south

Beyond Egypt, comparatively little is known about early urbanism in the diverse continent of Africa. Cities came later to its southern regions than they did to Egypt, but there they developed into a number of distinctive forms.[113] The relative lack of research into African settlement history has been underlain by the disdain for African culture held by some prominent European scholars[114] and some of the world's most powerful First World politicians - even into the late twentieth century,[115] and even into the present day.[116]

To the south, beyond Ancient Egypt (and even it is not always exempted from the purported roll-call of African civilisations without history[117]) arose many rich civilisations. Jenné-Jeno. Located on the Niger delta in Mali (200 BCE - 900 CE), was the earliest of the great cities of the Sahel. Jenné is famous for its great adobe mosque, replete with triple minarets and layers of protruding palm wood planks used as scaffolding. Before the coming of Islam, the city grew rich by exploiting its fertile valley for rice agriculture and engaging in trade to the east. Jenné-Jeno lacked clear signs of elite hierarchy and appeared to develop through the cooperative efforts of a series of local communities.[118] Further to the north in Mali, Timbuktu emerged as a green and canal-lined city in the thirteenth century, fuelled by a lucrative trans-Saharan trade in local salt, exchanged for gold.[119] In its heyday, this isolated place became a major intellectual centre, boasting one of the world's earliest universities. An unusual tradition arose here with private libraries dotted through the city amassing some 700,000 manuscripts, ranging from classical scholars such as Plato and Aristotle, in Arabic translation, to writers of the Islamic period.[120]

During the same period, a dynamic hybrid culture arose on the Swahili coast of East Africa. In trading cities such as Kilwa and Lamu, local African cultural elements were merged with a host of traded goods and influences arriving across the Indian Ocean.[121] Grand mosques and mansions

were erected in these cities, entered by distinctive doors of the Swahili architectural tradition. So disregarded was Africa, that the most exceptional and idiosyncratic production of the south, Great Zimbabwe, stimulated European settlers to deny its indigenous origin. That Great Zimbabwe was built by local Shona people was demonstrated twice by archaeologists in the early twentieth century, culminating in the investigations of the great field archaeologist, Dorothy Caton Thompson. From the ninth to the sixteenth centuries Great Zimbabwe became enmeshed in the lucrative trade links of the Swahili coast, which stretched across the Indian Ocean to China. It was an unusual centre, distributed widely over more than seven square kilometres, and included impressive dry-built, stone enclosures and towers, which shielded private ritual areas and adobe houses.[122]

Cities in the Subcontinent

Together with Austen Henry Layard (the excavator of Nineveh and Nimrud), Henry Rawlinson, (the great nineteenth century decipherer of Mesopotamian cuneiform languages), discovered another important early urban centre at Susa in Iran.[123] Susa is located on the Khuzestan plain in the east of the Shatt al-Arab waterway, in the country that became known as Elam. As Uruk expanded, Susa came under the cultural and political influence of its more westerly Mesopotamian neighbour. Further east again, another great urban tradition arose on the Indian subcontinent.

The Indus (or Harappan) civilisation developed in Pakistan and Western India. It flourished between 2,600 and 1,900 BCE, and was unknown to the modern world until discovered by archaeology in the nineteenth century. By the standards of the ancient world, it may have been a pretty good one to live in. Unusually for those times, The Indus civilisation has neither yielded obvious signs of war, evidence for coercion, conspicuous consumption and extreme social inequality; nor evidence for oppressive ruler cults. Burials are never filled with elite, expensive goods, or accompanied by sacrifices. By the standards of the Bronze Age, the Indus civilisation made far-reaching investments in urban planning and public amenities. Cities were carefully planned in a grid pattern, with well-built apartments organised in residential districts. Despite lack of signs of military activity, the Indus civilisation ranged over a huge territory, more than controlled either by early Sumer or Egypt.[124]

Harappa and Mohenjo-daro were the first investigated and the two largest Indus cities, both located in Pakistan. Principal evidence has come from Mohenjo-daro, the centre of which spread over 250 hectares at its height. The city had massive gates and walls set up on thick mudbrick foundations. Mudbricks were made in two standard sizes: small for interior city construction, and large for city walls. The walls were thought to be for protection against unpredictable Indus floods, and indeed the unprecedented Pakistani floods of the last year have recently done great damage to this ancient settlement.

Mohenjo-daro was a well-planned city based on a grid system, with large city blocks and street grids oriented to the cardinal directions. Neighbourhoods were supplied with running water and sewers, and houses and apartments were supplied with bathrooms and toilets. Residential apartment blocks were built with thick external walls, shielding inhabitants from the noisy life of the street outside. Many buildings, including many private residences, were equipped with deep wells, some up to 14 metres deep (over 700 have been recorded). A system of minor drains led from small streets to major drains in broad thoroughfares. The regular occurrence of these features in cities of the Indus Civilisation has led some archaeologists to propose a unified state administration, or at least a regional system of shared cultural values**.**

Some larger public buildings were also found in Indus Valley cities such as the so-called 'granary' at Harappa. There is no actual evidence from the building to support this function. It may alternatively have been an administrative building, a public hall, or elite residence. Clearer in function was 'the great bath' at Mohenjo-daro, a twelve-by-seven-metre sunken brick pool with stepped entry, waterproofed with plaster and tar. It is unlikely to have been a kind of municipal baths for swimming laps, and was more likely intended for ritual purification.

In analysing plans of Mohenjo-daro architecture, Massimo Vidale has discovered that not all building units were small apartments or houses.[125] He has identified large residential compounds, including one with its own version of the Great Bath at its centre. This, together with the evidence from elsewhere, led him to conclude that Indus Valley society was not necessarily egalitarian, but perhaps dominated by wealthy mercantile families or clans. High-quality, low-bulk Indus jewellery, gold and semi-precious stones such as carnelian and lapis lazuli, were traded widely, as far away as Mesopotamia. But the most characteristic

product of the Indus civilisation was its varied output of carved stone seals. They feature a short inscription in the undeciphered Indus script, and are accompanied by intaglio animal images such as bulls, water buffaloes, elephants, and rhinoceroses, and sometimes mythical unicorns.

Round Heaven, Square Earth: the Chinese Conception of the City

During the Han dynasty (*ca*. 50 BCE), Chinese scholars set down the ideal characteristics of the Chinese city in the *K'ao-kung Chi.* It should be a large symmetrical square oriented to the cardinal directions, fortified by great walls punctuated by three gates per side, and divided internally into sectors by nine broad avenues, crossed perpendicularly by nine others. Paul Wheatley has interpreted the ancient Chinese city as a ritual conception, intended to reflect the nature of the celestial world.[126] Many Chinese cities reflected something of those proscriptions but the one that adhered to them most closely was the T'ang Dynasty capital of Chang-an (*Xi'an*), which crystallised in mature form around 750 CE. T'ang period Chang-an augmented and redefined earlier versions of the city. The site had been occupied as early as Neolithic times, and included the abovementioned Yangshao village of Banpo.

Even if the conformation of the Chinese city was born from a sacred vision, the result was superbly practical in terms of town-planning and the allocation of resources. For ritual reasons, and according to local geography, Chang-an varied from the ideal of a square city, but it included the required three gates, punctuating each side of its massive walls that were entered across a wide moat which lead to broad, tree lined-avenues. At its height, Chang-an's walls enclosed 80-90 square kilometres, and judging from contemporary written records, the city was one of the biggest in the world, boasting over a million inhabitants. A series of walled palaces, and a restricted imperial city were located on its north side. The metropolis was provided with two large market squares and several temples were distributed throughout its rectilinear precincts.

The Yellow River (*Huang He*) Valley in northern China has long been considered as the birthplace of Han civilisation in Chinese historiography. The Shang Dynasty is its earliest historically attested administration. Shang kings were first identified from 'oracle bones', recovered by the thousand from the capital of Yin, near Xi'an (also *Yinxu* or 'the ruins of Yin'). This practice of fortune-telling involving the burning of inscribed ox scapulae (and tortoise plastrons). Around 1,250 BCE these inscriptions become legible as the earliest Chinese writing. Also located near Xi'an in the Yellow River heartland, Yin comprises a complex series of sectors and constructions that developed gradually. The most arresting feature of the site was the royal cemetery, including eleven large, subterranean tombs. More than two thousand sacrificial victims were buried with the Shang kings. As at Ur in Mesopotamia, the First Dynasty in Egypt, and other centres in the Americas, we witness this inhumane practice as the power of early elite leaders outstripped their sense of human rights.

So omnipotent were the Shang kings, that it was formerly thought that Shang urbanism consisted of the preeminent capital of Yin, supported by a subordinate rural hinterland of minor agricultural villages. Then, in 2006, the Shang period of village of Guandimiao was excavated, 200 kilometres south-west of Anyang.[127] The work at Guandimiao represents one of the most comprehensive excavations ever conducted in China, with over two hectares of the 2.5-hectare site investigated. The results have revealed a specialised settlement of unsuspected economic sophistication. The populace inhabited square and rounded semi-subterranean houses with perishable superstructures. Areas were set aside for specialized bone tool and pottery industries, and a full range of Shang ceramics were fired in updraught kilns. Mortuary customs included human and animal burials, and a local version of the Shang oracle-bone tradition. There is a general lack of weapons at Guandimiao, in contrast to the purported Shang obsession with warfare.

In recent years it has become evident that Chinese urban development extends back a millennium before the Shang Dynasty, and that the ritual conceptions of the historical period have deep roots in the country's Neolithic traditions. By the second century BCE, scholars of the Han court had developed a strong sense of historical inquiry. Sima Qian (145- 90 BCE) produced a detailed account of China's past by travelling the countryside, investigating material relics such as tombs and monuments as well as collecting historical documents. Like other Han scholars, he sought to find his society's honourable ancestors, and to show that his society was the legitimate descendant of these shadowy societies from the past. Sima Qian produced a detailed account of China's past, commencing with the legendary Xia Dynasty, founded by the mythical 'Yu the Great'.

Excavations that commenced in 1959 at Erlitou revealed a new archaeological culture, lying in time between the

Shang and the earlier Neolithic (1,800-1,500 BCE). While there is no actual historical confirmation available, Erlitou lands in the right time and place for the Xia Dynasty. By then, it was already a large city, a square kilometre in area, arranged with residential zones and manufacturing quarters.[128] Four roads led to the cardinal points of the compass, and converged at the city's centre. Erlitou controlled sources of critical raw materials such as copper, lead, salt, stone and kaolin clay, which were imported to the city from long distances. Its bronze workers had already developed a mastery of kiln technology and produced ceremonial bronze vessels antecedent to the typical Shang types. They were to become standard ritual items in the Chinese repertoire for thousands of years. Compared to the preceding Longshan period (in the late Neolithic period), the Erlitou-phase settlement pattern is more complex and includes four size-classes of settlements. This factor hints at the establishment of state-level society, with a single capital city pre-eminent over subordinate cities and villages, even though clear evidence for literacy is lacking. Further excavations at Erlitou have revealed the first palaces known in Chinese history, set within large compounds.

Research in China has continued to push back the origin of the city, with the excavation of the settlements Liangchengzhen (at 273 hectares in area), Taosi, (at 280 hectares) and Yaowangcheng (at 368 hectares). These settlements date to the late phase of the Neolithic Longshan culture (2,600 BCE – 1,900 BCE).[129] These centres are bordered by massive, rammed-earth ramparts, are internally differentiated with domestic, elite and industrial areas, and in the case of Taosi, a solar observatory for tracking the rising sun through the year.

Outside the Yellow River heartland, discoveries continue to provide new understandings. Shimao (2,300 -1,800 BCE), located to the north-west of the Yellow River Basin, is a stone-walled city-mound 400 hectares in area, founded in the Late Neolithic period.[130] It was the largest city of its region and one of the biggest in the world for its time. It is of quite a different order than the archetypal Chinese cities unearthed to date. Its palace centre was sculpted from a loess hill as a unique, eleven-level, stepped pyramid, with a base of 24 hectares, and an eight-hectare palace on top. The city's inner stone wall enclosed an area of 210 hectares, encircling the pyramid and its surrounding urban area. The outer rampart (erected *ca.* 2,100 BCE) enclosed an additional 190 hectares. A sculpture carved in relief in stone, positioned at the base of the step pyramid complex, may represent an elite ruler. Shimao was provided with sophisticated fortifications. Its eastern gate, flanked by two towers, incorporates a U-shaped, stone barrier thirty-three metres long, blocking direct entry.

So, prehistoric cultures external to the Yellow River region played important roles in the development of Chinese civilisation. The Hongshan culture in north-eastern China dates 4,500-3,000 BCE, and at this early date we already see the naissance of elite ritual used later by Chinese elites to legitimise their rule. It is likely that prehistoric Chinese leaders ruled by positioning themselves as the arbiters of complex cosmological schemes, presaging the social discipline that characterised later Chinese society. There is no more vivid example of ritual conceptions manifest in architectural form than the Hongshan mortuary complex at Niuheliang.[131] It included adjacent altars designed in the form of the tortoise; respectively, the lower, square plastron, and the upper rounded shell. This is the basis of the conception of 'Round Heaven, Square Earth', developed further in later times. Elite personages were buried at Niuheliang, with sacred jade items ancestral to later historic types of known function, such as the *bi* disc, jade 'Goddess' masks, and jade tortoise figurines.

Pyramids and plazas:
pre-Columbian cities in the Americas

Idiosyncratic trajectories towards urbanism arose in the Americas, based on different presumptions than those conceived in the Old World. Here, complex, state-level societies arose that variously lacked metallurgy, coinage, wheeled transport, beasts of burden, and in some cases, writing; yet they created a series of spectacular and well-functioning cities. It had long been accepted that American cities first appeared in the highland valleys of Mexico, and that subsequently the Maya then developed them in the lowland forests of Mesoamerica. Now, recent discoveries along the Pacific Coast of Peru have upended previous convictions.

In the 1970s, Michael Moseley developed the 'Maritime Foundations of Andean Civilization' model.[132] His idea was based upon the presence of large temple complexes such as El Paraĩso (1,800 BCE) on the northern coast of Peru, which not only appeared to precede city life but also appeared to be unrelated to any supporting residential settlement. This state of affairs was the opposite of the Old-World scenario, where the temple was embedded at the heart of the city. More radical again was Moseley's claim

that the Peruvian examples had been built by hunter-fishers lacking food production. They were said to have done so by exploiting an unusual set of complementary resources existing on the Peruvian coast; native cotton used to make nets, and gourds used as floats, which enabled coastal fishermen to accumulate large surpluses from the most abundant *anchoveta* fisheries in the world. However, later excavations at El Paraîso indicated that while 90 per cent of protein was derived from fish, and that cotton and gourds were indeed important crops used to make nets, there were also many cultivated food plants, including squash, chili pepper and a variety of beans.[133] So, another attempt to divorce the economic realm from the social and ideological ones was refuted. As a regrettable epilogue to this topic, the material heritage underlying this saga has itself been demolished. In 2013, developers constructing a housing estate bulldozed the temple complex at El Paraîso.[134]

Even earlier urban complexes have been discovered on the northern Peruvian coast. They count as the earliest in the Americas and some of the earliest in the world, and they are always accompanied by food production. The administrative centre at Caral[135] in the Supe River Valley stretches over a kilometre in length, and includes a cluster of mounds, sunken circular plazas, and pyramids, some dating to 2,600 BCE[136] - as old as the Great Pyramid in Egypt. Even earlier monumental architecture occurs at Aspero (3,000 - 2,500 BCE), a complex with six truncated pyramids overlooking seventeen mounds, spreading over thirteen hectares.

Complexes with similar conformation have been found in the lowland forests of the Amazon. Previously, such regions were virtually impenetrable to traditional archaeology. The use of airborne Lidar in 2019 revealed a huge urban complex at Cotoca in Bolivia (500 - 1,400 CE).[137] Lidar is a recently developed mapping technique where laser beams are reflected off the ground to produce detailed and accurate plans of the earth's surface. Lidar is able to penetrate dense foliage, and has proved to be a revolutionary tool for delineating urban systems hitherto cloaked in dense rainforest. By this method, numerous habitation clusters were discovered at Cotoca. Two of them attain sizes of 100 hectares and consist of walled compounds linked by a network of elevated causeways, and containing seven-metre-high earthen pyramids.

Although food production had commenced in Mesoamerica as early as in South America, urban centres took much longer to appear in the north. Whether or not any cultural influence flowed from the south, the Mesoamerican cities developed along broadly similar lines. In the highlands of Mexico, large pyramids were set on wide avenues, complemented by huge plazas and ceremonial features such as ball courts. These cities were carefully planned according to symbolic and ritual considerations. The Zapotec capital of Monte Albán was the first to emerge around 300 BCE, persisting until 1,000 CE.[138] Its Main Plaza is a large, levelled platform, measuring 300 by 500 metres. Glyphs of the Zapotec script carved on many monuments demonstrate that Monte Albán was home to a literate people. The 'danzante' stelae erected in the city labs feature disfigured and contorted naked men, apparently sacrificial victims or prisoners of war. Some of them may be identified by accompanying inscriptions.

Teotihuacán, located north-east of Mexico City, was a progenitor for other Mexican societies.[139] The scale of Teotihuacán, covering up to 30 square kilometres in area, can be appreciated by considering the extent of the 40-metre-wide Avenue of the Dead. It traversed the central part of the city for a distance of four kilometres between the Temple of the Feathered Serpent (*Quetzalcoatl*) and the Pyramid of the Moon. Teotihuacán's other great monument, the Pyramid of the Sun, measured 75 metres in height and 225 metres on a side. Large, multi-storeyed apartments lined the main avenues. The name Teotihuacán is a Nahuatl word given by the later Aztecs, who believed that this was the place where the gods created the universe. At its floruit (100 BCE – 550 CE), the diverse material culture of the residential districts suggests that Teotihuacán may have comprised a multiethnic community. Human skeletal remains from a district showing Zapotec affinities provides corroboration, where strontium stable-isotope analysis of bones and teeth show that some of its people originated in the Oaxaca Valley.

Teotihuacán was built with regard to the concept of 'Five Great Mountains'. Lines of sight marked by the 'pecked cross motif' were placed on the tops of neighbouring mountains and aligned with the central avenue of the city and with pyramid complexes. The Pyramid of the Moon complex itself was constructed as a representation of the Five Great Mountains, with four smaller stepped platforms disposed symmetrically in front of the main building. Far away in the lowlands, some Maya elites used the *Ho'-No-Witz* (Five-Great-Mountains-place glyph as a status symbol, borrowing this ritual conception from Teotihuacán. Along with vigorous trade of goods including highland obsidian,

Maya texts also record attacks by Teotihuacano factions on the lowland city of Tikal in modern Guatemala, during the fourth century CE.[140]

Tikal was one of the pre-eminent Maya city-states that flourished in the lowland forests of Belize, Honduras, Guatemala, and the Yucatan peninsula of Mexico during the Classic Maya period (200-900 CE).[141] Tikal prospered between 200 and 600 CE, and rose to dominate several neighbouring polities. Its North Acropolis is dominated by stone temples set on high pyramids that are ascended by steep staircases, which overlook palaces and administrative buildings. The University of Pennsylvania excavation team cut narrow trenches into the pyramids of the North Acropolis, which enabled them to unravel the complex history of the monument. Maya temples were considered sacred and, like Principal Temple D at Tikal, they were enlarged and embellished over the centuries.

Throughout the twentieth century it was believed that Maya settlements did not conform well to Childe's urban criteria, consisting of reasonably small central administrative hubs with pyramids, palaces, ballcourts and plazas, but with most of the populace living in dispersed hamlets in cleared rainforest, following agricultural pursuits. Lidar survey has recently provided some dramatic revisions to this idea. Aerial imaging carried out over the Mirador-Calakmul Karst Basin of northern Guatemala has revealed a constellation of over one thousand densely packed urban settlements, distributed over nearly 1,700 square kilometres, linked by causeways.[142] Research employing Lidar and traditional excavation at the settlement of Aguada Fénix near the Gulf Coast in Mexico has yielded a rectangular platform over 1.4 kilometres, at unexpectedly early dates of 800 - 1,000 BCE.[143] Even larger centres of his type have been found to the west.

Complex datasets indicate many reasons why Maya city-states declined and disappeared in the 9th century. After 810 CE, the city of Copan in Honduras unraveled, and evidence indicates that deforestation, soil erosion and soil fertility decline resulted from agricultural over-exploitation of the fragile rainforests, leading to subsistence collapse. More recent paleoclimatic evidence indicates that the Maya city-states of the Terminal Classic Period between 800 and 1,000 CE were subject to a series of severe droughts.[144] Long-term pressure on resources, exacerbated by unsustainable farming regimes or steady deterioration of climate, may culminate in apparently sudden political crises. Historians read about warfare and rapid collapse in deciphered texts, whereas the archaeologist and paleoenvironmental scientist trace the long-term pressures that resulting in abrupt social chaos. The practice of Maya chroniclers in recording precise dates, combined with fine-scale archaeological excavation, has yielded some compelling examples. Dos Pilas in Guatemala was a thriving metropolis in 760 CE, but after an attack by a coalition of enemies, it lay in ruins in 761 CE. In a last defensive effort, the inhabitants stripped the major buildings of stone to throw up a concentric series of ramparts. It was to no effect, as the city was abandoned from that time on.

Further dramatic testimony of overrun and fall comes from the Maya city of 'Baking Pot' in Belize. A lengthy inscription on a smashed container known as the 'Komkom Vase', dated to the 23rd April, 812 CE, describes a series of inter-city battles that culminated in the destruction of Baking Pot.[145] It was one of the last Maya texts ever written. When an urban system falls apart, there follows the dissolution of economic organisation and professional life. As formalised cultural practices become incoherent, so written language, developed as the preserve of political elites and their scribes, also disappears. But the common people do not fade away. They disperse and take up village life again. They often tenaciously uphold their culture, and of course, their spoken language. It was for this reason that notes taken about Yucatec Maya speech by Diego De Landa (the conquistadors' bishop) in the sixteenth century enabled the modern epigraphers of the 1960s and 1970s to decode the Maya script. As for the Komkom Vase, it relates how the king of Yaxha fled from his city to a place 'where mosquitos abound'. The unnamed victor featured on the vase then performed a 'frog-like turtle dance' in celebration - a curious epitaph for a great tradition.

The Aztec capital of Tenochtitlán, the last great indigenous Mesoamerican city, was witnessed by the conquistadors under Hernan Cortes in 1519. In *The Conquest of New Spain,* Bernal Diaz described the awe of the Spanish invaders as they first set eyes on the city, apparently floating in the midst of Lake Texcoco.[146] The Azteca (Mexica) emerged in the Valley of Mexico as a distinctive people around 1,325 CE. Based at Tenochtitlán, they began to carve out their empire from 1,426 CE. The city was built on an island in the brackish Lake Texcoco, now concealed by the urban sprawl of modern Mexico City, and it spread over thirteen square kilometres, The landmass was augmented by heaping up sediment to build the characteristic *chinampas* or floating gardens. In

his mural, *The Great City of Tenochtitlán*, Diego Rivera captures the vigour and glamour of the capital at its height; conjuring the bustle of the markets, the sound of drums and trumpets, the glistening, green quetzal feathers, and the colour of the floral arrangements of which the Aztecs were so fond. Three causeways connected the city to the mainland and fresh water was transported into it along terracotta aqueducts. Major thoroughfares crisscrossed the city in a grid, dividing the city into ordered neighbourhood wards. The populace was highly regulated according to class and station. At its centre, the major square housed the market, palaces, various temples and the high temple dedicated to *Huitzilopochtli.* The emperor Moctezuma II's palace held one hundred rooms, each with a private bathroom. A distinctive feature of the city was its network of canals, giving rise to Tenochtitlán's description as the 'Venice of the New World'.

Despite its magnificence and its status as the key remaining exemplar of indigenous American urbanism, the victorious Cortes set about systematically levelling Tenochtitlán as soon as he could. The Metropolitan Cathedral of the Assumption of the Most Blessed Virgin Mary into Heaven was built over the top of the great Aztec temples. The core values of society are located at the heart of its cities. Down through the ages, it has been a practice of conquerors to decapitate the vanquished society and replace its holy places with their own. The Spanish conquerors of Peru did the same at Cuzco, building the Church of Santo Domingo over the Inca *Coricancha*. Perhaps the most contested space of this type in the world occurs in Jerusalem. Within the Old City, the place that Muslims call al-Ḥaram al-Sharīf and Jews call Har ha Bayt, symbolises the shared and contested succession of cultures and faith. Here, in Roman times, Herod constructed his massive temple to cover the ruins of the Iron Age temple to Yahweh. The later Dome of the Rock mosque was built over it in turn.

By the 1960s, little trace of the Aztec capital was left. A program of urban renewal undertaken in the 1970s led to disinterring some of the major monuments, which now stand in the Zócalo, Mexico City's main square. It is home to the architectural products of three cultures: the Aztec city, the Spanish colonial makeover, and twenty-first century Mexico.

The sprawling settlement of Cahokia (900 -1,350 CE), located on the Mississippi River opposite St. Louis, Missouri, is a final example of the American conception of the city, replete with plazas and pyramids.[147] Cahokia's houses, halls and administrative buildings have not survived, since they were built of organic materials. However, it is clear from its earthen monuments that the city was of a similar order of magnitude as Tenochtitlán. The well-planned settlement extended over 16 square kilometres. It comprised all the elements of urban life, including administrative buildings, residential quarters, and work areas. Its focus was a massive central plaza spreading over 16 hectares, but Cahokia's most conspicuous features are a series of great earthen mounds. The largest of these, (Monks Mound) traced out a footprint of sixteen hectares and rose thirty metres into the air. It is the biggest earthen monument ever constructed in the Americas.

A Vision for the West: the classical cities of the Mediterranean

Classical Athens was not particularly large compared to the cities we have considered. and it is dwarfed by some polities that are not generally accorded the rank of state-level societies. Using their large war canoes and aggressive warrior castes, for example, paramount Tongan chiefs expanded their control from Tongatapu over huge areas of the Pacific Ocean in the fifteenth and sixteenth centuries CE, eventually holding sway over some 800,000 square kilometres and tens of thousands of people.[148] Their polity was some 250 times bigger than the small city-state of Attica, administered from Athens.

Ancient Athens had grand buildings enough, but its interest as an ancient metropolis lies not so much in its size, but in the rich social and intellectual capital that it developed during a period of dynamic social and cultural change. Between about 630 and 430 BCE, a new kind of society was born, the first to really consider the individual's place in society, and to search for a new conception of human rights.[149] These considerations had scarcely troubled earlier civilisations. Many of the concepts we now take for granted were invented or developed in the Greek city states of this period; many of them in Athens. The list is impressive and includes concepts and inventions such as democracy, philosophy, theatre (including drama, tragedy and comedy), lyric poetry, astronomy, geometry, history, coinage, naturalism in painting and sculpture, the gymnasium, sporting carnivals and the marathon.

After the second Persian invasion of 480 BCE, Athens and other Greek states allied to form the Delian League in 478 BCE, in order to guard against another attack. This was

a kind of precursor to NATO, a treaty organization to which all the members contributed funds, stored in a treasury on the island of Delos. But as their power and influence grew, the Athenians convinced the wary allies to transfer the treasury to Athens, in 454 BCE. The associates were right to be suspicious, because the Athenian leader Pericles manoeuvred to use the Delian League funds to rebuild Athens, large parts of which had been destroyed in the Persian Wars. By these means, many marble buildings on the Athenian Acropolis were erected. They are considered the zenith of classical Greek art and architecture.[150] With the naturalistic sculptures of its pediment, metopes and frieze, surmounting a Doric-order colonnade, the Parthenon is considered as the high point of Classical architecture. Such is the Acropolis' national significance to Greece that a costly restoration project launched in 1975 was continued through to its recent completion. Internationally, the efforts by the Greek government to secure the return of the Parthenon marbles from the British Museum constitutes one of the major disputes in heritage politics.[151]

A colonnaded gateway called the Propylaea led up to the Acropolis, which held a number of votive temples and statues. Off to its right stood the small Ionic temple to Athena Nike. Another small temple called the Erektheion featured statues of draped women (*caryatids*), ingeniously formed as pillars. To the north-west, the Erektheion overlooked the Agora, the civic centre of Athens, nestled beneath the Acropolis.[152] Throughout its various phases, this space accreted shrines, temples, altars and fountains, and a number of stoas or colonnaded walkways (which came to function as ancient shopping malls). But it is the administrative and legislative foundations that disclose the level of public involvement in the running of the state. They include the Bouleuterion (council house) where the 500 elected representatives of the city conferred; the Archeia, or the original offices of the archon (an elected magistrate); the circular Tholos, a meeting place for elected officials: and the Heliaia, the law court of the city. The Panathenaic way meandered diagonally through the space.

Each new foundation in the Agora was welcomed in its own right, without much regard for a preconceived plan. Buildings are crammed next to each other and oriented at odd angles, either to fit in with incumbent structures, or to achieve desired orientations. The effect was far from the unremitting axiality of a Roman city. This mindset is also evident on the Acropolis where the major temples could be viewed effectively from different directions. This is not to say that the Athenians lacked planning sense, and ran up important buildings without forethought. On the contrary, archaeology reveals the Athenian interest in building nationalistic symbols into its architectural projects. Ruined column drums and other damaged architectural elements were built into the north wall of the Acropolis, either side of the Erektheion, even though they constituted an unattractive pile of rubble, when a fine new wall could have been constructed. The debris was gathered from the ruins of the Persian sack of 480 BCE, and the new civic buildings in the Agora were aligned to provide an unobstructed view of it. The outlook was designed as a reminder of the horrors of war and the vigilance required to avoid it.[153] Moreover, the gateway of the Propylaia on the Acropolis, was oriented to frame a view of the Bay of Salamis, where the Athenians recorded their great naval triumph over the Persians. The view was focused on the Kynosoura Peninsula where a monument to the Athenian victory had been erected.

Of all the ancient civilisations, it was inevitable that Renaissance antiquaries discovered Rome first, because its impressive ruins stood all around them. Over the former territories of the empire, from Britain to Arabia, Roman models of architecture, town planning, and even virtually complete cities remained.[154] In Rome itself, one could walk around the corner and run into the bronze equestrian statue of the Emperor Marcus Aurelius (161-180 CE), still erect.[155] Or, one could enter the portico of an intact Roman temple, the Pantheon, and behold its superb, cylindrical chamber. It is not a ruin, but remains a complete and functioning building. The Roman city of Pompeii, destroyed by volcanic eruption, was one of the first ancient cities excavated, from 1738 onwards. Its exposure and the excavation of many other cities led to an understanding of how Roman cities worked. Along with its legacy to Europe's language, culture and history, the architectural influence of Rome has been profound.

In the Renaissance, ancient Rome inspired the Medicis to rejuvenate Mediaeval Florence. Down to the twentieth century, western European governments have built Roman-style cities, based on gridded street plans and adorned with splendid classical buildings. Colonial Melbourne was also designed along such lines and classical templates are all around, even if we are not always aware of them. The Shrine of Remembrance (National War Memorial of Victoria) provides an example. Modelled on the Mausoleum of Halicarnassus (an ornate tomb designed for Mausolos, the ruler of Caria in south-western Türkiye, *ca.*353 BCE), it

is no accident that the Shrine is aligned with Swanston St and that the view down that street, between tall buildings, frames the Shrine neatly. The orientation conforms to the Roman taste for axiality. An important building, such as a temple, was positioned so that one had to approach it head-on, along a defined axis, but from no other direction. The Pantheon in Rome necessitated a frontal approach through its impressive portico, and there is no other point of ingress. Its rear wall, built in plain brick and now visible in a narrow alley, is drab and uninteresting. A Roman architect would never have considered that a pedestrian might want to wander around there to look at it.

The architectural philosophy of Roman city-planners conformed to a set of clear ideals, and this is why, at first glance, all Roman cities seem to look much the same. Nevertheless, the blueprint was embedded in varying landscapes and by different cultural groups, and that is why, on the other hand, each Roman city has something different about it. The example of Jerash (ancient *Gerasa*), a provincial Roman city in Jordan, can be used to illustrate these urban characteristics.[156] Jerash had a standard Roman street plan, with a main street called the *cardo,* crossed by transverse streets called *decumani.* These roads were lined with shops and other affairs, and they required the pedestrian to walk along predetermined paths. Jerash's oval, colonnaded 'piazza' was an unusual solution to the more usually rectilinear Roman kind of forum, or civic meeting space. Its plan integrated the frontages of several preexisting buildings lying at odd angles. The city was provided with two theatres; a major temple to Zeus, and another to the goddess Artemis. The latter complex was accessed up a lengthy staircase that crossed the cardo. The temple's *cella*, or ritual chamber, is bordered by a tall colonnade of massive columns, set in turn in a broad, colonnaded courtyard. Jerash had a *hippodrome* or racetrack,[157] a public fountain called a *nymphaeum*, and a large, heated baths facility.

Roman engineers were adept at seeking out and exploiting the usable resources of a region. Jerash was built of limestone, while Umm Qays (ancient *Gadara*) overlooking the Jordan Valley features large numbers of dark buildings, because extensive basalt flows occur nearby. Bricks and mortar were favoured in many European cities, such as at Lyon (*Lugdunum*) in France. These materials lent great flexibility to the Roman architect for building utilitarian constructions, as well as great monuments. Roman concrete utilised quicklime (highly reactive calcium oxide) which formed at high temperatures, and Roman mixes included lime casts, which added great strength. The Pantheon is the first great architectural masterpiece in concrete. After 1,900 years, its dome of unreinforced concrete (weighing 4,500 tones) is still intact and remains the largest of its kind in the world.[158] In order to retain a viable strength to weight ratio, layers of lighter, porous cement were used in the uppermost layers of the dome.

Evident in the ruins of any Roman city are the channels, shafts, drains, and outlets of a sophisticated water supply system. An example is the Pont du Gard (First Century CE), built over the River Gardon in southern France. Raised fifty metres in the air, it is at once a three-coursed bridge, a road and an aqueduct, It formed a key link in a system which carried water fifty kilometres to the town of *Nemausus* (modern Nîmes). The most astounding accomplishment of Roman hydraulic technology involved the excavation of a series of underground tunnels to form a subterranean water-supply network in the southern Levant. It sourced freshwater springs in southern Syria and brought water to the Roman cities of Gadara and Abila, located over a hundred kilometres away in northern Jordan.[159] It stands as the one of the great engineering feats of the ancient world.

The efficacy of Roman water supply was greatly aided by the adoption of regular street grids in many provincial cities. Traditionally, the invention of the street grid has been accorded to Hippodamus of Miletus (in south-western Türkiye), sometimes referred to as the 'father of town-planning.' Whether or not Hippodamus had anything to do with it, one of the earliest square street grids was developed in his home city by the early fifth century BCE.[160] Using remote sensing, geophysical techniques have brought to light the town plans of buried cities in southern Italy, and show that the regular Roman city was already in place by the early Republic.[161] Two recently investigated cases are *Interamna Lirenas* (founded 312 BCE) and *Falerii Novi* (from 241 BCE). At Falerii Novi, the reconnaissance shows that the water-supply system of drains and pipes was emplaced beneath the street grid before construction commenced.

Compared to the earlier Republic, large, elaborate, buildings of marble and other stone came to embellish late Imperial cities from the second century CE. Architectural facades became decorative in a style known as baroque Roman. Their details included recessed, apsidal niches, engaged pilasters surmounted by non-functional double cornices, in turn topped by hemispherical pediments; and

miniature colonnades placed on high podia, supporting second storeys of even smaller columns. Examples include the Library of Celsus at Ephesos and the stage-front in the South Theatre at Jerash. Despite its late appearance in Rome, Judith McKenzie demonstrated that baroque architectural style appeared over three hundred years earlier in the remote desert city of Petra, in south Jordan. This apparent anomaly is explained by the elements of baroque style having been developed in the great city of Alexandria in Egypt by the third century BCE, whence it was transferred to Petra.[162] Alexander the Great established large numbers of new cities in the Middle East, including Alexandria, before 323 BCE. A renowned intellectual and cultural centre, Alexandria became the greatest of the Hellenistic cities; the New York of its time, surpassing anything else in the Mediterranean. Although ancient Alexandria has since been built over, many of the ornate architectural fragments survive, scattered on monuments, and displayed in museums in Alexandria. Accounts of the city's fabulous architecture survived until Islamic times.[163]

By contrast with many of its subordinate provincial towns, the city of Rome grew up in haphazard fashion. At its height, it was the biggest city that had ever existed on earth. It covered an area of over 40 square kilometres, and is estimated to have held a population of a million.

Medieval Developments, East and West

No city in the West surpassed Rome up to the nineteenth century, since the limits to growth imposed by the agrarian economy were not exceeded until the Industrial Revolution. Architecturally, though, the advent of the Gothic Cathedral in Western Europe between the twelfth and sixteenth centuries CE represents a significant breakthrough in building technology.[164] A common thread running through fringe popular culture is that the pyramids of Egypt are so extraordinary as to require supernatural or extra-terrestrial explanations. However, if one were to devise a television reality show for competing neophyte builders and provide each contestant with 10,000 stone blocks, a pyramid (that is to say, a step pyramid) would inevitably be the result. This is because the step pyramid is simple in concept, easy to build, and inherently stable. By contrast, the Mediaeval cathedral is a kind of architectural miracle. It was not itself exceeded in elevation until the nineteenth century. The Gothic cathedral was styled with pointed arches and broad sheets of stained glass framed in lead, and hung between slender, ribbed stone columns. It was all made possible by the invention of the flying buttress, a sloping pillar of stone that transferred load away from the walls and into the ground. The cathedrals were a western European phenomenon, with leading examples being Notre Dame and Chartres in France, Cologne in Germany, Milan in Italy, and Lincoln, Salisbury and Canterbury in England. In 1,311 CE, Lincoln Cathedral surpassed the height of the Great Pyramid of Giza, a record that had not been bettered for some four thousand years.

As Maya kings reached their peak in Mesoamerica, the Khmer people built an urban civilisation at Angkor in Cambodia that is astounding in its scale and achievements.[165] Angkor was an urban complex at least 25 times bigger than anything else that had ever existed, engineered in the tropical rainforest, to boot. It expanded to become a city of 1,000 square kilometres, traversed by a network of canals and supplied with huge reservoirs, one of which (the West Baray) was longer than the entire Melbourne Central Business District. The centrepiece, Angkor Wat, is a temple complex so vast that one could place the Great Pyramid of Gizeh in a corner of its grounds. It is adorned with carved friezes 800 metres long, into which several Parthenons would fit. At 163 hectares, Angkor Wat is the largest ancient building ever erected. It is enclosed by walls 6.4 kilometres long and surrounded by a moat 200 metres wide. The elaborate structure of Angkor Wat was built to portray the world of Hindu cosmology. The high central tower represents the mythical Mount Meru, the lower towers the other celestial peaks, the outer wall, the borders of heaven, and the surrounding moat, the ocean at the end of the world.

The question is how, in a difficult rainforest environment, an urban civilisation could appear which outshone all others before it in size and magnificence. Part of the solution to the mystery of Angkor is a bountiful environment that enabled the production of huge food surpluses. The Tonle Sap, a tributary of the Mekong River, provided the city with an unsurpassable natural bounty. Not just a large body of water, its seasonal pulsing provides the key to Angkor's prosperity. In the wet season the Mekong River backs up and engorges the Tonle Sap, enabling enormous areas to be irrigated. In the dry season it shrinks drastically, providing convenient wet ground for rice cultivation and rendering large numbers of fish for the harvest.

A Chinese diplomat, Zhao Daguan, left a memoir of his visit to Angkor in 1296-1297. He was admitted to an audience with the king and treated to tremendous

nocturnal firework displays. Zhao described the fecundity of the region, and how Tonle Sap yielded three to four rice crops a year, many vegetables, abundant fish, and also water buffaloes. One of the best surviving temples at Angkor Thom is Ta Prohm. Its foundation inscription gives an insight into the scale of Angkor society. It was administered by 18 high priests aided by 2,740 officials with 2,202 assistants, and retained 615 female dancers. Some 306,372 villagers worked for the temple. Judging by these figures, perhaps a million or more people inhabited the Angkor region.

Lidar mapping has also recently revolutionised our knowledge of Angkor Wat and its surrounds. Formerly it was thought that the temple was surrounded by sparsely occupied fields. A new study shows that Angkor Wat formed the hub of a residential district, marked by roads, houses, ponds and small mounds, and that it was bordered to the south by a massive enigmatic structure [166] Sediment cores sunk in the canals reveal ancient sludge and garbage deposited there, indicating the former existence of riverside stilt houses, just as people build in the region today. The key to Angkor's operation was the maintenance of a huge, low-density population living in close proximity to resources of riverine food resources, cultivated gardens, and unlimited water and transportation.

High and Wide: Powering the Industrial City

Constraints on the growth of both high-density and low-density urban complexes were only breached in the modern era. In Europe, the former type had long been exemplified by ancient Rome, where apartment dwellers, like those who dwelt in the port of Ostia, took their place amongst a citizenry a million strong, distributed over forty square kilometres. At Angkor, the widespread entrenchment of low-density residential systems enabled the city to grow to its outer limits at some 1,000 square kilometres. Globally, the largest compact, preindustrial cities on record are Chang An in China during the T'ang Dynasty (seventh to ninth Centuries CE), and Edo in Japan during the Tokugawa shogunate (seventeenth to twentieth centuries CE), both reaching 80-90 square kilometres.[167]

Roland Fletcher's 'Interaction-Communication' model argues that there bounds to the densities that human beings can tolerate, and that there are limits to the areas of cities, beyond which communication systems cannot operate effectively. A third consideration is a 'Threshold Limit' for urban density, below which settlements may expand almost limitlessly, but which inhibits a return to nucleation or high-density population. Material innovations and technological developments provide the keys to surmounting these constraints. Screen-fences, double-glazing and windowless house-walls presented to the street are all measures able to reduce interaction.

Fletcher regards the 100-square-kilometre urban limit as a maximum beyond which the ancient agrarian economy could not prevail. Industrialization in the nineteenth century provided the power to crash through this barrier. Technology propelled life in virtually every walk of life: the rotary steam press led to thousands of pages being printable in an hour, so that mass circulation of newspapers could inform entire communities on a daily basis. Most significant of all was the incorporation of the railway into urban centres. Workers could now commute to their employment in the inner city and return each evening to their dormitory suburbs, tens of kilometres away. New colonial cities with ample room for expansion coincided with the development of the railway, and as a result, they spread explosively. Melbourne is a case in point. Having risen to prosperity in the 1850s due to the Victorian Gold Rush, rail lines were extended radially to outer suburbs in every direction by the 1870s and 1880s. By 1880, municipalities of the greater Melbourne area linked by rail covered at least 2,000 square kilometres.[168]

Automobile ownership drove the city onwards and outwards to places where the trains couldn't go. Mass-transit freeways were developed to permit effective intra-city interaction over long distances. The world's first modern freeway, opened in 1940, was the Arroyo Seco Parkway (now the Pasadena Freeway), linking Pasadena with Los Angeles.[169] It features the Four Level Interchange, the world's first 'stack interchange' opened in 1949. These are the familiar woven overlays of exit and entry ramps that connect intersecting roadways. As a result, the greater Los Angeles area has become the biggest urban area in the United States, with a population of 18.5 million people spread over nearly 88,000 square kilometres.

Trains, planes, automobiles, and virtually every other kind of industrial contrivance were made possible by the invention of the Bessemer steel process in the mid-nineteenth century. Not only did steel push the city laterally to great size, but it also propelled it into the air. Steel frames were first used in large factories and mills in the north of England, but there had been no impetus to build them particularly high. The first tall building to be constructed

with an all-steel frame was the ten-storey Rand McNally Building, constructed in Chicago in 1889.[170] In a sense, the skyscraper recapitulated the Gothic cathedral. The lightweight steel skeleton was load bearing, which enabled the use of thin cladding walls bound to it. The system resulted in light and manageable buildings.

The year 1889 also saw the completion of another innovative construction in metal: the wrought-iron Eiffel Tower, built by the Seine in Paris. Standing to a height of 300 metres, the view from the top provided a transformative geographical experience. Such was the pace of technological change, the tower did not retain its title because the electric elevator soon enabled the skyscraper to ascend even further. Elisha Otis had introduced the first passenger lifts, or elevators, in 1853, and by the turn of the twentieth century, electric versions were being fitted in American buildings. Once rapidly ascending elevators were installed in skyscrapers, the public accepted the new buildings as safe and pragmatic venues for work and residence. By 1931, the Empire State Building in New York City, built to a height of 381 metres, had eclipsed the Eiffel Tower. High-rise buildings dramatically increased population densities, and by 1925, New York had overtaken London to become the biggest city in the world.[171]

With continuing growth, highly industrialised cities and their intermediary towns and villages converged into a greater entity: the conurbation, or megalopolis. The first examples developed in the Ruhr Valley in Germany, around the great port of Rotterdam in the Netherlands (the Randstad), and along a 700-kilometre stretching from Boston to Washington D.C. in the eastern United States. New giants are now emerging in East Asia, and have been termed 'mega-conurbations'.[172] They spread voraciously, and there is no longer room for outlying zones that one might call 'the suburbs'. These peripheral or 'peri-urban' regions become industrialised and develop mixed functional character, just as do the cores of the super-cities. Generally, these places do not stem from detailed planning schemes that emanate from centralised administrations. They often develop haphazardly according to the interests of real estate entrepreneurs with political connections, looking to make huge sums of money by attracting investment. Examples include Japan's Tokaido region, extending between Tokyo and Osaka, and in China, developments in the Pearl River and Yangtze river deltas. With the development of high-speed internet, the individuals living in such massive establishments now enjoy the flexibility of working from home without having to make gruelling commutes to the office.

It is small wonder that these untrammelled venues have aroused opposition, and stimulated endeavours to imagine different modes of urban life. Much ingenuity has been put into returning big-city life to a local scale, and in conceiving the city as a series of small-scale communities, where local interests and companionship can be generated. Ironically, Baron Haussmann's makeover of Paris in the eighteenth century achieved something like this, even if one of his principal objectives was to create broad avenues like the Champs Elysée, so the troops might enter the city quickly to put down future insurrections. Nevertheless, his building limit of six storeys created a low-rise city of intimate character. In neighbourhoods of the Left Bank (5th arrondissement), the lengthy Rue Mouffetard winds through a succession of small markets, restaurants, and shops, providing a congenial high-density urban experience.

The Future City

Hillier and Hanson have noted a disparity between the sustained attraction that city life has held for people over the ages and the undercurrent of negativity about the city that runs through many urban theoretical texts.[173] They note that the city is often cast as 'socially bad' and is often regarded as poorly planned and a place of alienation. Some commentators call for the reinvigoration of the city[174] or imagine the postmodern city.[175]

An overriding problem for twenty-first century cities is the challenge of climate change. Architects and city planners are now designing environmentally sustainable building projects, and even whole cities. An example is an office building in Amsterdam known as The Edge.[176] The building is oriented to harvest maximum sunlight for its solar panels. Rainwater is collected for irrigation and bathroom use, and an underground thermal aquifer is exploited to heat and cool the building. As a result of these measures, The Edge is a net positive energy generator, while maintaining a negative carbon footprint. Entire cities now strive to be sustainable and net energy producers. Canberra, the national capital of Australia, is considered to be one of the most sustainable cities in the world.[177] As originally designed, Canberra was unusual in that its urban neighbourhoods were positioned between parks and green spaces, so that one often has the impression of being in the countryside while driving through it. Canberra is powered entirely by renewable energy, nearly all of its citizens are

connected to the internet, and it has a high proportion of green public transport vehicles.

Interest groups are now imagining a green and alternative future city, a kind of 'Ecotopia.' In the future, humanity may even leave the earth and colonise the Moon, Mars and other planets. Since the 1970s, urban planners (for example at NASA) have been preparing to build cities on other worlds. These establishments would need to produce everything necessary for life, including water, breathable air and even gravity, while providing protection from harsh solar radiation. Private enterprise, in conjunction with the European Space Agency and the Massachusetts Institute of Technology (MIT) is currently devising a 'Moon Village'.[178] Elsewhere, the 'Mars City Design' competition, conducted recently by MIT, was won by the 'Redwood Forest' city proposal.[179] It envisions a conjectural metropolis mimicking as closely as possible the characteristics of a giant forest, with subterranean roots being nurtured underground, while upper parts emerge into the light, held between beneath protective branching structures.

If such avant-garde enterprises seem fanciful, it is indeed the case that they are now being put into effect on earth. On the Red Sea coast of Saudi Arabia, work is proceeding on a type of bubble-city called 'Neom'.[180] One of its principal establishments is to be a linear housing estate called 'The Line'. It will extend, under a covered, mirrored glass surface, some 170 kilometres in length, with a width of just 200 metres. It is designed to contain a lush, vegetated interior, arranged as repeated sets of modules. Each community will need to walk only a few minutes to access all of its requirements. It is being prepared to house nine million people.

Conclusions

The home-bases of our earliest forebears gathered have left only subtle traces in the archaeological record. Stone arrangements stretching back over a million years survive, but they represent equivocal traces. The harnessing of fire from at least three-quarters of a million years ago has yielded more reliable evidence, since the hearth formed the focus of human residence from earliest times. The record of habitations throughout the long human career demonstrate that settlements have been strongly influenced by the cultural traditions of individual societies. Simultaneously, broad trends typify the settlements of large regions.[181] Human residential strategies have also been subject to a range of external limitations that have ordinarily prevented settlements from exceeding thresholds of physical size and population density. These countervailing influences represent the ultimate question for Big History, for all historical inquiry, and indeed for archaeological theory. As Hesketh (2023) has phrased the issue, "How are the contingent issues of human history incorporated into a narrative governed by deterministic laws of nature?"[182]

Periodically, after long periods of stasis, constraints on various modes of residence have been removed, enabling communities to establish more complex settlement types. The anthropologist Leslie White stressed the importance of harnessing increased sources of energy.[183] At 12,500 BCE, the intensive processing and storage of wild cereals enabled communities in the Natufian period to exploit territory more efficiently and found the first stone-built villages. Around 10,000 BCE, the cultivation of fields of accompanied the appearance of the first large villages. Between 8,000 and 8,500 BCE, herd animals were added to the mix, fuelling another upswing and the establishment of large rectilinear villages across the Middle East. After a period of stasis, the harnessing of hydraulic power to raise irrigated grain on the plains of southern Iraq provided the economic basis for the first cities, around 3,500 BCE. No less important as critical thresholds for urban life were the ordering and direction of civic populations by mitigating their interactions through settlement planning and transport systems, and developing effective communication systems in the forms of writing and accountancy.

At the end of the Ice Age, a pyrotechnological advance transformed mineral rock into a pliable building material, with the discovery of hydrated plaster in the Natufian period and its subsequent adoption in Neolithic settlements. Later, the invention of hydraulic cement delivered great versatility for Roman architecture, and increased the productive capacity of water supply systems, which in turn enabled the Roman city to grow. The development of the Bessemer steel process in the nineteenth century greatly enhanced infrastructure and enabled the city to reach into the sky. The harnessing of steam power and electricity during this period effectively abolished constraints on interaction and communication, leading to the vast modern city, and to interrelated clusters of massive cities. The digital revolution in the late twentieth century has led to the internationalisation of labour, with employees able to participate as virtual citizens in the global city. Physically, we see the current development of the self-contained bubble-city; a type which will foreseeably be embedded extra-terrestrially in the next century, on the Moon or

on Mars. Such is the future of the city, one of humanity's greatest inventions. But we have never managed to get cities entirely right (despite the continual efforts of urban planners and scholars), and over a billion fringe-dwellers around the world still live in poverty at their edges.[184]

Notes

1. Christian, "What is Big History?"; Hesketh, *A History of Big History*; Spier, *The Structure of Big History*.
2. Fletcher, *The Limits of Settlement Growth.*
3. Doxiadis, *Ekistics,* 15.
4. Hillier and Hanson, *The Social logic of Space*, 2.
5. Hillier and Hanson, *The Social logic of Space*, 271.
6. Chomsky, *Syntactic Structures.*
7. Benítez-Burraco and Boeckx, "Universal Grammar and Biological Variation."
8. 'Palaeolithic' is a nineteenth-century term that defined flaked stone tool assemblages before the advent of barbed Mesolithic projectiles and edge-ground Neolithic axes. 'Pleistocene' is the long geological epoch aged from 2.58 million to a little later than 10,000 BCE. In practical terms, both end at the same time.

[9]. 'Hearth' has several overtones in English but for archaeologists it simply connotes a fireplace, with or without constructed frames or borders.

10. Isaac, "Stone Age Visiting Cards."
11. Binford, *In Pursuit of the Past*, 172-176.
12. Goren-Inbar *et al.*, "Hominin Control of Fire."
13. Shahack-Gross *et al*., "Repeated Use of a Central Hearth."
14. Brown *et al.*, "Fire as an Engineering Tool."
15. Certainly, our forebears used caves as they found them. Caves contribute disproportionately towards the record of ancient settlement because they protect deposits as they accrete. However, typically low rates of accumulation over time indicate that caves formed just part of a broader settlement-round for most groups.
16. Moore, *The Prehistory of Home*.
17. Hoffman, *Egypt before the Pharaohs*, 56-57; Barham et al., "Evidence for the earliest structural use of wood."
18. Lumley, *La Grande Histoire des Européens* ; Villa, *Terra Amata and the Middle Pleistocene.*
19. Jaubert *et al*., "Early Neanderthal Constructions"
20. Klein, *Ice-Age Hunters of the Ukraine*, 69.
21. Iakovleva, "Mammoth Bone Circular Dwellings."
22. Nadel, "Ohalo II."
23. Moore, *The Prehistory of Home*.
24. Bar-Yosef and Valla, *The Natufian Culture in the Levant*; Bar-Yosef and Valla, *Natufian Foragers in the Levant*.
25. Edwards, *Wadi Hammeh 27.*
26. Perrot, "Le Gisement de Mallaha" ; Valla, "Sedentism, the "point of no return."
27. Eckmeier *et al*., "14C Dating of the Early Natufian."
28. Delannoy *et al.*, "Engineers of the Arnhem Land Plateau."
29. White, "Don't Touch That Dial."; Makarewicz, "The Younger Dryas in the Near East."
30. Willcox, "The Roots of Cultivation."
31. Kenyon and Holland, *Excavations at Jericho*; Kenyon, *Digging up Jericho*.
32. Bar-Yosef, "The Walls of Jericho."
33. Nigro, "Expedition to Tell Es-Sultan, Ancient Jericho." The PPNA wall has nothing to do with the fabled bastion brought down by Joshua. It dates some 7,000 years earlier than the one brought down by trumpet-blast in the Biblical narrative.
34. Bar-Yosef and Gopher, *An Early Neolithic Village.*
35. Finlayson *et al*., *The Early Prehistory of Wadi Faynan*.
36. Mithen, "Shamanism in Southwest Asia."
37. Schmidt, *Göbekli Tepe*.
38. Özdoğan, "The Sayburç Reliefs."
39. Dietrich *et al.,* "Cereal Processing at Göbekli Tepe."
40. Banning, "So Fair a House."
41. Simmons, *The Neolithic Revolution*, 121 ff.
42. Białowarczuk, "From circle to rectangle"; Flannery, "The Origins of the Village; Saidel, "Round House or Square?"
43. Stordeur, *Le Village de Jerf El Ahmar.*

44. Edwards *et al.*, "The Natural Inspiration for Natufian Art."
45. Fletcher, *The Limits of Settlement Growth,* 29. The shift to rectilinear buildings was probably not done to increase the strength of individual architectural units.
46. Flannery, "The Origins of the Village."
47. Dhavalikar, "Farming to Pastoralism in the Deccan."
48. Nelson, *From Cameroon to Paris*
49. Kingery *et al.*, "The Beginnings of Pyrotechnology."
50. Gebel, *Basta II*.
51. Simmons, *The Neolithic Revolution in the Near East*, 169-174.
52. Watkins, "Ordering Time and Space."
53. Özbaşaran *et al*., *The Early Settlement at Aşıklı Höyük*.
54. Hodder, *The Leopard's Tale*.
55. Mellaart, *Çatal Hüyük.*
56. Vander Linden, "To Tame a Land."
57. Parker Pearson, *Stonehenge*.
58. Clarke, *Skara Brae*
59. Linseele *et al*., "Introduction of Animals into Africa."
60. Eiwanger, "Merimde Beni-Salame."
61. Watkins *et al*., "Qermez Dere."
62. Riehl *et al*., "Emergence of Agriculture in Iran."
63. Jarrige, "Mehrgarh Neolithic"; Jarrige and Jarrige, "Premiers pasteurs et agriculteurs."
64. Costantini, "Agriculture in the Kachi Plain."
65. Liu *et al*., "Harvesting and Processing Wild Cereals."
66. Kuzmin, "Chronology of the Earliest Pottery in East Asia."
67. Liu, *The Chinese Neolithic*; Ma *et al.*, "Multiple Indicators of Rice Remains."
68. Zhao and Wu, "Early Neolithic Hemodu Culture."
69. Sather, *Adaptation, History, and Fate in a Maritime Fishing Society,* 1.
70. Fiskesjö and Chen, *China before China*.
71. Ardelean *et al.*, "Occupation in Mexico."
72. Bennett *et al*., "Evidence of Humans in North America."
73. Flannery, *Guilá Naquitz*.
74. Smith, "Reassessing Coxcatlán Cave."
75. Hammond, "Preclassic Maya Site of Cuello."
76. Dillehay *et al.*, "Early Human Presence at Monte Verde."
77. Iriarte *et al*., "Ice Age Rock Art in the Amazon?"
78. Dillehay *et al.*, "Preceramic Adoption of Peanut,."
79. Gibson, *Poverty Point*.
80. Rollefson and Köhler-Rollefson, "The Collapse of Early Neolithic Settlements."
81. van der Plicht *et al.,* "Tell Sabi Abyad, Syria."
82. Byrd, *Protohistoric Village Organization*.
83. Pascoe, *Dark Emu*.
84. Sutton and Walshe, *Farmers or Hunter-Gatherers?*
85. McDonald *et al.*, "Seeing the Landscape."
86. Memmott, *Gunyah Goondie + Wurley*, 201.
87. Clarke "Romancing the stones"; Frankel, "About Budj Bim."
88. Memmott 2022, *Gunyah Goondie + Wurley*, 184-187.
89. Williams, "An Aboriginal 'village'."
90. Muecke, "A Fragile Civilisation."
91. Haas, "A Brief Consideration of Cultural Evolution."
92. Service, *Primitive Social Organization.*
93. Pauketat, *Chiefdoms and Other Archaeological Delusions*.
94. Watson and Gibson, *Postmodern Cities and Spaces*, 1.
95. Niemalä *et al*., *Urban ecology: Patterns, Processes, and Applications.*
96. Dickens, *Urban Sociology*; Harding and Blokland-Potters, *Urban theory*.
97. Bryson, *At Home. A Short History of Private Life*.
98. Ucko *et al., Man, Settlement and Urbanism*; Renfrew, "The City through Time and Space."
99. Childe, "The Urban Revolution."
100. Johnson, "Organizational Structure and Scalar Stress."
101. Yoffee, *Myths of the Archaic State*.
102. Friedman, "Hierakonpolis, City of the Hawk."
103. The advent of early village agrarian life is often now

described as a slow and gradual process, in reaction to Childe's concept of the 'Neolithic Revolution'. Protracted it may have been, but it developed as a series of sharp jumps rather than as a gradual, even development; *cf.* Fletcher, "Settlement Archaeology."

104. Lloyd, *The Archaeology of Mesopotamia*.

105. Algaze, *Ancient Mesopotamia*; Adams and Nissen, *The Uruk Countryside*. The landmark archaeological survey conducted by Robert McCormack Adams and Hans Nissen neatly delineated the processes of earliest urbanisation. With no hope of getting through centuries of digging to investigate the villages and hamlets of the Uruk countryside, the survey team drove up to sites by four-wheel drive across a huge area of some 500 square kilometres. Their method was to estimate the dates of each site by its characteristic surface pottery. In this way, they tracked the process of demographic change over several centuries, as rural villagers fled the countryside for the 'bright lights' of new city life. It is a process that has occurred ever since, down through the ages, at places such as Mexico City and Rio de Janeiro.

106. Hammer, "Multi-Centric, Marsh-Based Urbanism."

107. Romano and D'Agostino, "The Harbor of Abu Tbeirah."

108. Lloyd and Safar. "Eridu."

109. This term describes a polity like a modern nation, with a capital city that controls and administers a large territory; Bard, "Early State in Egypt."

110. Friedman, "Hierakonpolis, City of the Hawk."

111. Jeffreys, "The Survey of Memphis."

112. Belova, "'The White Walls' of Memphis."

113. Blier, "The African Urban Past."

114. Unforgettably, the historian Hugh Trevor-Roper (1965: 9-11) wrote: "Perhaps, in the future, there will be some African history to teach. But at present there is none, or very little: there is only the history of the Europeans in Africa. The rest is largely darkness…" (*cf.* Fuglestad 1992).

115. Lamentably, the conversation between Presidents Reagan and Nixon (Naftali 2019); a racist diatribe highlighting the *lack* of African culture; e.g., Africans supposedly still uncomfortable wearing shoes; still recently swinging from the trees.

116. And, it seems inevitably, Africa features prominently in Donald Trump's list of 'shithole countries' (Barron 2018).

117. Trevor-Roper (1969) even excluded ancient Egypt where writing was born around 3,000 BCE; Ethiopia and its Kingdom of Aksum which was literate and urban long before the Christian era; and the north African coast of the Mediterranean, with its splendours from the Carthaginian, Roman and Early Islamic periods.

118. McIntosh, *Excavations at Jenné-Jeno.*

119. Auster, *Timbuktu.*

120. Hammer, *The Bad-Ass Librarians of Timbuktu.*

121. Patel, "Stone towns of the Swahili coast."/

122. Chirikure *et al.*, "A Bayesian Chronology for Great Zimbabwe."

123. Graef, *Susa and Elam.*

124. Kenoyer, *Indus Valley Civilization*.

125. Vidale, "Aspects of Palace Life at Mohenjo-Daro."

126. Wheatley, *Origins of the Chinese City*. This underlying concept is also seen in many other ancient Asian cities, and according to different specifics, in ancient American ones too.

127. Li, *et al.*, "Guandimiao."

128. Zhang *et al.*, "The Rise of Erlitou."

129. Liu, *The Chinese Neolithic*.

130. Jaang *et al.*, "When Peripheries Were Centres"; Zhong & Shelach-Lavi. "A Metropolis in the Highlands?"

131. Bevan, "The Neolithic Complex at Niuheliang."

132. Moseley, *The Maritime Foundations of Andean Civilization*.

133. Quilter *et al.*, "Subsistence Economy of El Paraíso."

134. "Pyramid in Peru Torn down by Developers," *UK Guardian*, July 4, 2013.

135. Solis, *et al*., "Dating Caral, a Preceramic Site."

136. Sandweiss *et al*., "Coastal Peru between 5,800 and 3,600 Years Ago."

137. Prümers *et al*., "Low-Density Urbanism in the Bolivian Amazon."

138. Marcus and Flannery, *Zapotec Civilization*.

139. Cowgill, "State and Society at Teotihuacan, Mexico."

140. Gastelum, *The Maya and their relationship with Teotihuacan.*

141. Harrison, *The Lords of Tikal*.

142. Hansen *et al*., "LiDAR Analyses in Guatemala."

143. Inomata *et al*., "Monumental Architecture at Aguada Fénix."

144. Aimers, "What Maya Collapse?"

145. Helmke *et al*., "The Komkom Vase."

146. "These great towns … and buildings rising from the water, all made of stone, seemed like an enchanted vision … Indeed, some of our soldiers asked whether it was not all a dream." Bernal Díaz, *The Conquest of New Spain*, 214.

147. Milner, *The Moundbuilders*.

148. Aswani and Graves, "The Tongan maritime expansion."

149. Boedeker and Raaflaub, *Arts in Fifth-Century Athens*.

150. Hurwit *et al.*, *The Acropolis in the Age of Pericles*.

151. C. Higgins, "Britain Treasures the Parthenon Marbles."

UK Guardian, January 24, 2023.

152. Camp and Mauzy, *The Athenian Agora*.

153. Martin-McAuliffe and Papadopoulos, "Framing Victory."

154. Coarelli *et al.*, *Rome and Environs*.

155. The statue survived for so long because later people mistook it for Constantine, Rome's first Christian emperor.

156. Browning, *Jerash and the Decapolis*.

157. Ostrasz and Kehrberg, *The Hippodrome of Gerasa*.

158. Strickland, "Why Ancient Roman Structures Still Stand."

159. Al-Karaimeh, "The Water Tunnels in the Eastern Hills."

160. Owens, *The City in the Greek and Roman World*, 51-56.

161. Verdonck *et al.*, "Radar Survey at Falerii Novi."

162. "He (Alexander) built the city upon vaults and in tiers, making passages and openings for light… Its walls are built from different kinds of marble, white and coloured, so are the places and buildings; at night the city was bright without lamps because of the great whiteness of the marble...It is said that this was the most magnificent city ever built on earth, having the most wondrous buildings ('Abd al-Mun'im al-Himyari, ninth century CE). Cited in McKenzie, *The Architecture of Petra*, 61.

163. McKenzie, *The Architecture of Alexandria.*

164. Smith, "Gothic Cathedrals."

165. Higham, *The Civilization of Angkor*.

166. Evans *et al*., "Uncovering Landscapes at Angkor."

167. Fletcher, *The Limits of Settlement Growth,* 203 *ff.*

168. Lee, *The Railways of Victoria*.

169. Hise, *Magnetic Los Angeles*.

170. Webster, "The Skyscraper."

171. Chandler, *Four Thousand Years of Urban Growth*.

172. Friedmann and Sorensen, "City Unbound."

173. Hillier and Hanson, *The Social logic of Space*, 1.

174. Landry, *The Creative City*; Richards and Palmer, *Eventful Cities.*

175. Low, *Theorizing the City.*

176. Randall, "The Smartest Building in the World"

177. Brown, "World's Most Sustainable City."

178. "Moon Village."

179. Szondy, "Prize-Winning Mars City Concept."

180. Osiejak, "Saudi Arabia's The Line."

181. As Bruce Trigger noted: "The most important issue confronting the social sciences is the extent to which human behavior is shaped by factors that operate cross-culturally as opposed to factors that are unique to particular cultures." Trigger, *Understanding Early Civilizations*, 3.

182. Hesketh, *A History of Big History*, 34.

183. White, *The Evolution of Culture*.

184. Statista, "Number of People Living in Slums".

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