



△ **Lucy**
Shown here are the fossilized remains of the apelike Lucy – a member of the genus *Australopithecus* from east Africa from over 3 MYA. The fossil is sufficiently complete to suggest that Lucy walked upright on two legs.

FROM APES TO FARMERS

The history of humankind is rooted in a part of the animal kingdom that includes monkeys, apes, and other primates. It took millions of years of evolution – over countless generations – for apelike ancestors to become modern *Homo sapiens*.

Scientific evidence links all humans to apes. Specifically, chimpanzees are our closest non-human relatives, and DNA – the ultimate bloodline indicator – suggests that we separated from a common ancestor some 6.5 million years ago (MYA). Indeed, humans are apes – albeit in an upright, naked form.

Monkeys, apes, and humans are primates that have a large brain, grasping digits, forward-facing eyes, and nails instead of claws. Fossilized remains of animals that lived in the distant past provide tantalizing evidence of just how apes became modern humans. Skeletons turn into fossils when they become mineralized into rock – a process that usually takes at least 10,000 years. Fossilized remains are usually fragmentary, but an expertise in anatomy helps scientists use the fossil record to reconstruct extinct species. Fossils can also be dated so scientists can build up a chronology of evolutionary change. For example, African fossils of a primate called *Proconsul*, dated to 21–14 MYA, resembled a monkey. But it lacked a tail – a feature more typical of apes – suggesting that *Proconsul* could have been the earliest known member of the ape family.

Hominids and hominins

Modern great apes (gorillas, orang-utans, and chimpanzees), humans, and their prehistoric relatives are united in a biological family called hominids. As well

“We can see the focus, the centre of evolution, for modern humans in Africa.”

CHRIS STRINGER, BRITISH ANTHROPOLOGIST

as lacking a tail, they have bigger brains than their monkey ancestors. This meant that many prehistoric hominids doubtless used tools to forage for food – just as chimpanzees do today. Great apes also became bigger than monkeys and many spent more time on the ground. One group evolved to walk on two legs, which freed grasping hands for other tasks.

This group – called hominins – includes humans and their immediate ancestors, and dates back at least 6.2–6.0 million years to the species *Orrorin tugenensis* – a very early bipedal hominin found in Kenya.

The first humans

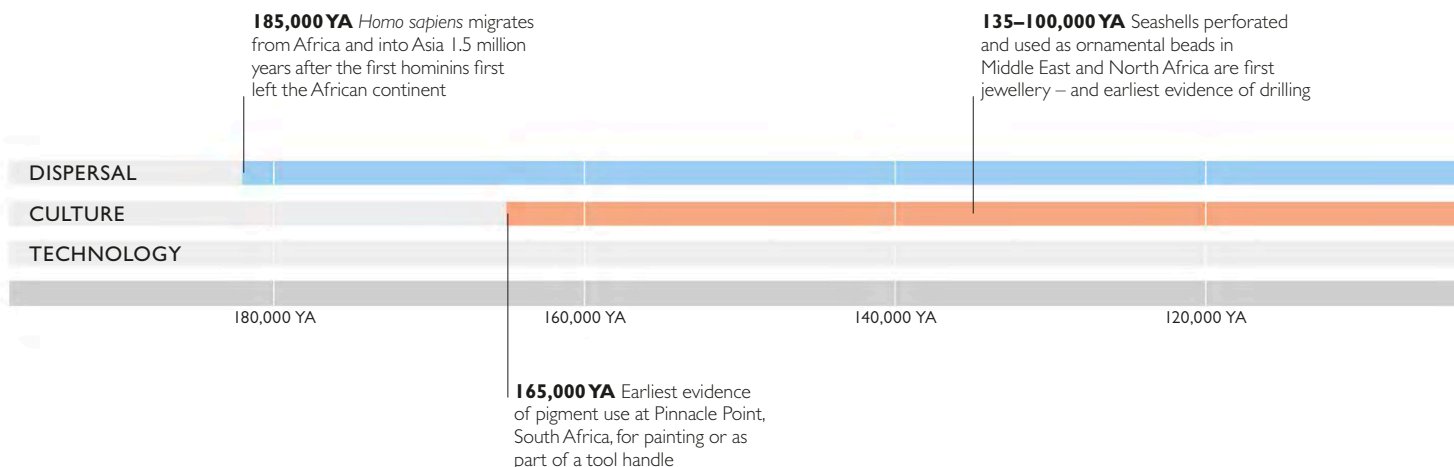
Not all hominins were direct ancestors of living people, but at least one branch of the genus *Australopithecus* might have been. Belonging to the genus *Homo*, the first humans were fully bipedal, with arched feet that no longer had opposable grasping toes and an S-shaped spine centred above a wide pelvis. Such adaptations helped them run quickly on open ground. The earliest species – *Homo habilis*, from 2.4 MYA – may have



△ **Flint and stone**
For nearly 2 million years, human technology was represented by stone flake tools and hand axes. These were made by hitting flint or other workable rock with stone to produce sharp cutting edges.

THE RISE OF MODERN HUMANS

Even before the emergence of modern humans (*Homo sapiens*) almost 300,000 YA, hominins had developed the traits that would make them a dominating force on the planet. From just under 1 MYA, hominins were controlling fire – for cooking, and later to help with manufacturing processes. But with *Homo sapiens* came a more complex culture. Archaeological evidence indicates that these modern humans dispersed widely from their centre of origin in Africa before 200,000 YA.





◁ Close cousins

Neanderthals – the closest extinct human species to modern humans, *Homo sapiens* – had larger skulls with more prominent eyebrows. *Homo sapiens* and Neanderthals were sufficiently similar to interbreed where they coexisted.

remained in Africa, but we know that later other *Homo* species dispersed widely across Eurasia.

The rise of *Homo sapiens*

Only one species of human – *Homo sapiens* – came to dominate the world after emerging from Africa about a quarter of a million years ago. Remarkably, brain capacity doubled between *Homo habilis* and *Homo sapiens*. Bigger brainpower meant that humans could skilfully manipulate the environment and resources around them – ultimately leading to the emergence of complex cultures and technologies.

For much of its time, *Homo sapiens* coexisted with other human species. In Ice-Age Eurasia, chunky-bodied Neanderthals (*Homo neanderthalensis*) successfully lived in a range of environmental conditions, developing their own advanced cultures. But the world's climate became especially unsuitable, and only *Homo sapiens* prevailed. They spread further – reaching Australia by 65,000 YA and South America possibly by 18,500 YA. Evidently, *Homo sapiens* had the social structures to succeed in ways that their competitors could not. The first modern humans were efficient hunter-gatherers, inventing new technologies that helped them



acquire more food and travel further. This meant that they thrived in many different places, from the frozen Arctic to the hot tropics. Then, within the last 20,000 years, all around the world modern humans began to abandon their nomadic ways in favour of fixed settlements, turning their skills to farming the land, supporting bigger societies and – ultimately – setting the seeds of civilization itself.

△ Early artists

These depictions of Ice Age animals on the walls of the Lascaux caves in southern France are about 17,000 years old. Similar paintings nearby show that prehistoric humans had developed a degree of creative expression as early as 30,000 years ago.

92,000 YA Evidence of the earliest known ritual burial of the dead at Qafzeh Cave, Israel

60,000 YA Microliths in Africa – small stone tools, including blades – first used for cutting and scraping, the earliest known processing technology

40,000 YA Oldest securely dated painting includes a handprint in an Indonesian cave

25,000 YA Siberian *Homo sapiens* settles on the continental shelf between Ice Age Russia and Alaska, before dispersing through the Americas

5,000 YA A new wave of colonists – the Austronesians – migrates from Asia, across New Guinea, and reaches islands of the Pacific Ocean

80,000 YA

60,000 YA

40,000 YA

20,000 YA

0

65,000 YA Australia and New Guinea – then connected by land – are colonized by boat

44,000 YA *Homo sapiens* migrate from Asia into Europe, mixing with European Neanderthals and eventually replacing them

30,000 YA Needles used for sewing in Europe and Russia

28,000 YA Spectacular double child burial in eastern Europe shows complex hunter-gatherer cultures living on the steppes

15,000 YA First use of ladders in Lascaux Caves, France

THE FIRST HUMANS

The human story began in Africa 7 or 6 million years ago. Through the fossil record of this vast continent we can draw a complex family tree of human relatives of which our species, *Homo sapiens*, is the last to survive.

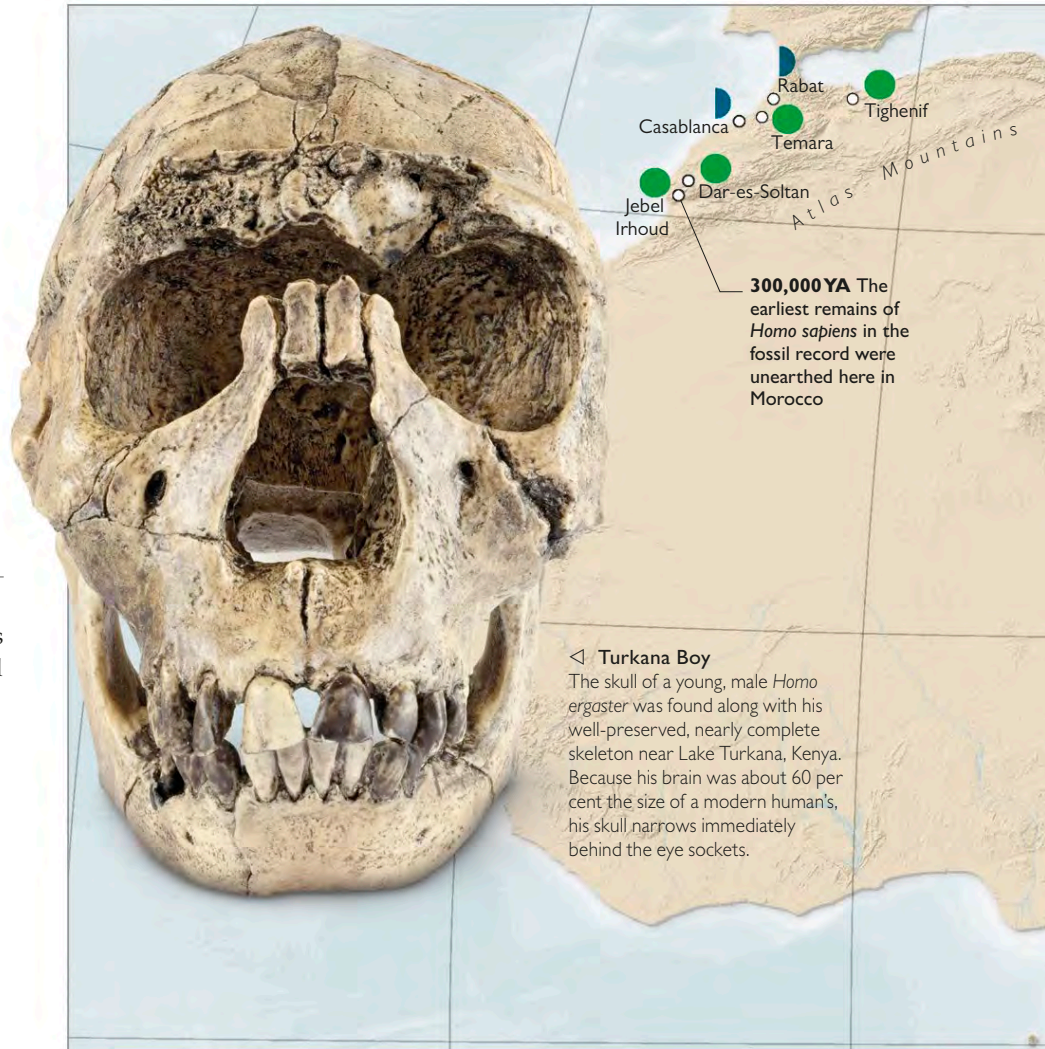
We have fossil evidence for the existence of about 20 different species of African “hominin” – members of the human lineage that diverged from that of chimpanzees 7–10 million years ago. Each has been assigned to a biological group or “genus”, but the relationships between the groups and species are still debated. Only certain hominins were the ancestors of modern humans; others, such as the *Paranthropus* species, may represent evolutionary dead ends.

Human evolution was not an inevitable, linear progression from apes. Some of our ancestors developed adaptations – in different combinations – that would ultimately mark out modern humans. Perhaps most notably, a larger brain enabled complex thought and behaviour, including the development of stone-tool technologies, while walking on two legs became the main form of locomotion.

The earliest fossils assigned to our species – dated to around 300,000 years ago – were found in Morocco, but other early specimens have been found widely dispersed across Africa. This has led scientists to believe that the evolution of modern humans probably happened on a continental scale.

“I think Africa was the cradle, the crucible that created us as Homo sapiens.”

PALEOANTHROPOLOGIST DONALD JOHANSON, 2006



◀ **Turkana Boy**
The skull of a young, male *Homo ergaster* was found along with his well-preserved, nearly complete skeleton near Lake Turkana, Kenya. Because his brain was about 60 per cent the size of a modern human's, his skull narrows immediately behind the eye sockets.

THE FIRST HUMANLIKE APES 7–5.5 MYA

The sparse record of the earliest hominins – *Sahelanthropus* and *Orrorin* – shows that although they had shorter faces and smaller teeth, they had brains no larger than those of chimpanzees. The sole *Sahelanthropus* skull was discovered in Chad, far removed from other hominin sites in eastern and southern Africa. Fossils of both *Orrorin* and *Ardipithecus kadabba* are thought to exhibit features linked to developing two-legged locomotion.



Sahelanthropus skull

▲ Sahelanthropus ▼ Orrorin ■ Ardipithecus

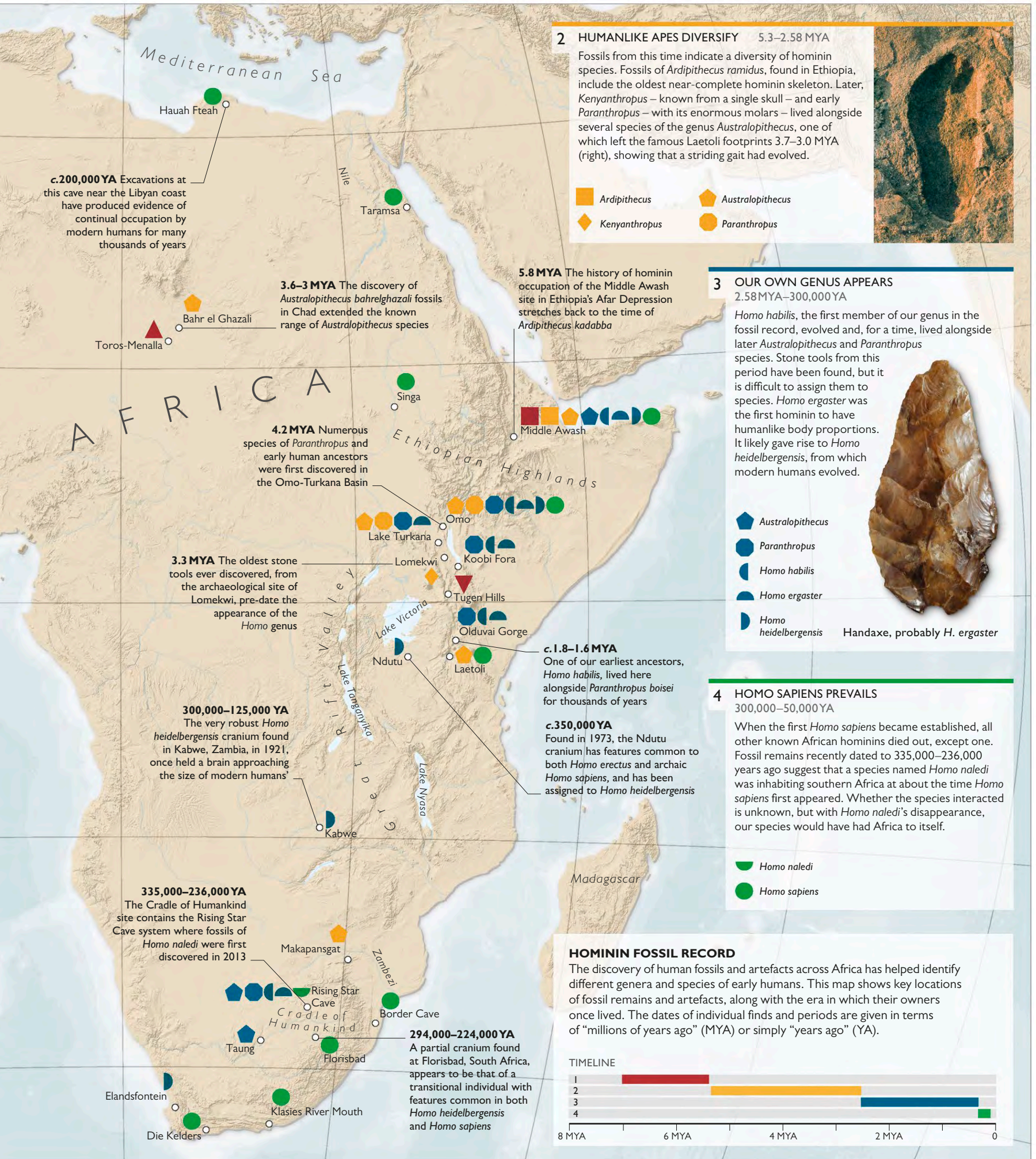
EARLY HOMININ MIGRATION

Archaeological evidence from Asia and Europe suggests that by about 2 million years ago, hominins had begun to leave Africa for the first time – long before *Homo sapiens* began to disperse (see pp.16–17). Experts once assumed that the migration corresponded with the appearance of *Homo ergaster*, but older species might have been the pioneers – a 1.7-million-year-old fossil found in Dmanisi, Georgia, resembles the earlier *Homo habilis*. The earliest known hominin fossils from Southeast Asia are of *Homo erectus* – an Asian variant of *Homo ergaster*, found on the island of Java and dating to 1.8 million years ago. Stone tools from the Nihewan Basin, China, date to 1.6 million years ago. Two sites in Spain's Sierra de Atapuerca show that hominins had reached western Europe by 1.2 million years ago.

KEY
➔ Likely route ○ Sites of fossil finds



ATLANTIC OCEAN



c.200,000 YA Excavations at this cave near the Libyan coast have produced evidence by modern humans for many thousands of years

Hauah Fteah

Taramsa

Bahr el Ghazali

Toros-Menalla

3.6–3 MYA The discovery of *Australopithecus bahrelghazali* fossils in Chad extended the known range of *Australopithecus* species

5.8 MYA The history of hominin occupation of the Middle Awash site in Ethiopia's Afar Depression stretches back to the time of *Ardipithecus kadabba*

- *Ardipithecus*
- ◆ *Kenyanthropus*
- ▭ *Australopithecus*
- *Paranthropus*



A F R I C A

4.2 MYA Numerous species of *Paranthropus* and early human ancestors were first discovered in the Omo-Turkana Basin

Singa

Middle Awash

Ethiopian Highlands

Lake Turkana

Lomekwi

Koobi Fora

Tugen Hills

Olduvai Gorge

Laetoli

c.1.8–1.6 MYA One of our earliest ancestors, *Homo habilis*, lived here alongside *Paranthropus boisei* for thousands of years

c.350,000 YA Found in 1973, the Ndotu cranium has features common to both *Homo erectus* and archaic *Homo sapiens*, and has been assigned to *Homo heidelbergensis*

3.3 MYA The oldest stone tools ever discovered, from the archaeological site of Lomekwi, pre-date the appearance of the *Homo* genus

300,000–125,000 YA The very robust *Homo heidelbergensis* cranium found in Kabwe, Zambia, in 1921, once held a brain approaching the size of modern humans'

Valley of the Rift

Lake Victoria

Lake Tanganyika

Lake Nyasa

Ndotu

Kabwe

3 OUR OWN GENUS APPEARS
2.58 MYA–300,000 YA

Homo habilis, the first member of our genus in the fossil record, evolved and, for a time, lived alongside later *Australopithecus* and *Paranthropus* species. Stone tools from this period have been found, but it is difficult to assign them to species. *Homo ergaster* was the first hominin to have humanlike body proportions. It likely gave rise to *Homo heidelbergensis*, from which modern humans evolved.

- ▭ *Australopithecus*
- *Paranthropus*
- *Homo habilis*
- ◐ *Homo ergaster*
- ◑ *Homo heidelbergensis*



Handaxe, probably *H. ergaster*

4 HOMO SAPIENS PREVAILS
300,000–50,000 YA

When the first *Homo sapiens* became established, all other known African hominins died out, except one. Fossil remains recently dated to 335,000–236,000 years ago suggest that a species named *Homo naledi* was inhabiting southern Africa at about the time *Homo sapiens* first appeared. Whether the species interacted is unknown, but with *Homo naledi*'s disappearance, our species would have had Africa to itself.

- ◐ *Homo naledi*
- *Homo sapiens*

335,000–236,000 YA The Cradle of Humankind site contains the Rising Star Cave system where fossils of *Homo naledi* were first discovered in 2013

Makapansgat

Rising Star Cave

Cradle of Humankind

Taung

Florisbad

294,000–224,000 YA A partial cranium found at Florisbad, South Africa, appears to be that of a transitional individual with features common in both *Homo heidelbergensis* and *Homo sapiens*

Border Cave

Zambezi

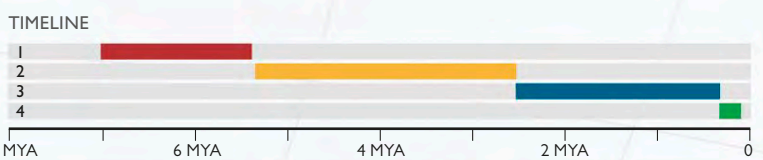
Elandsfontein

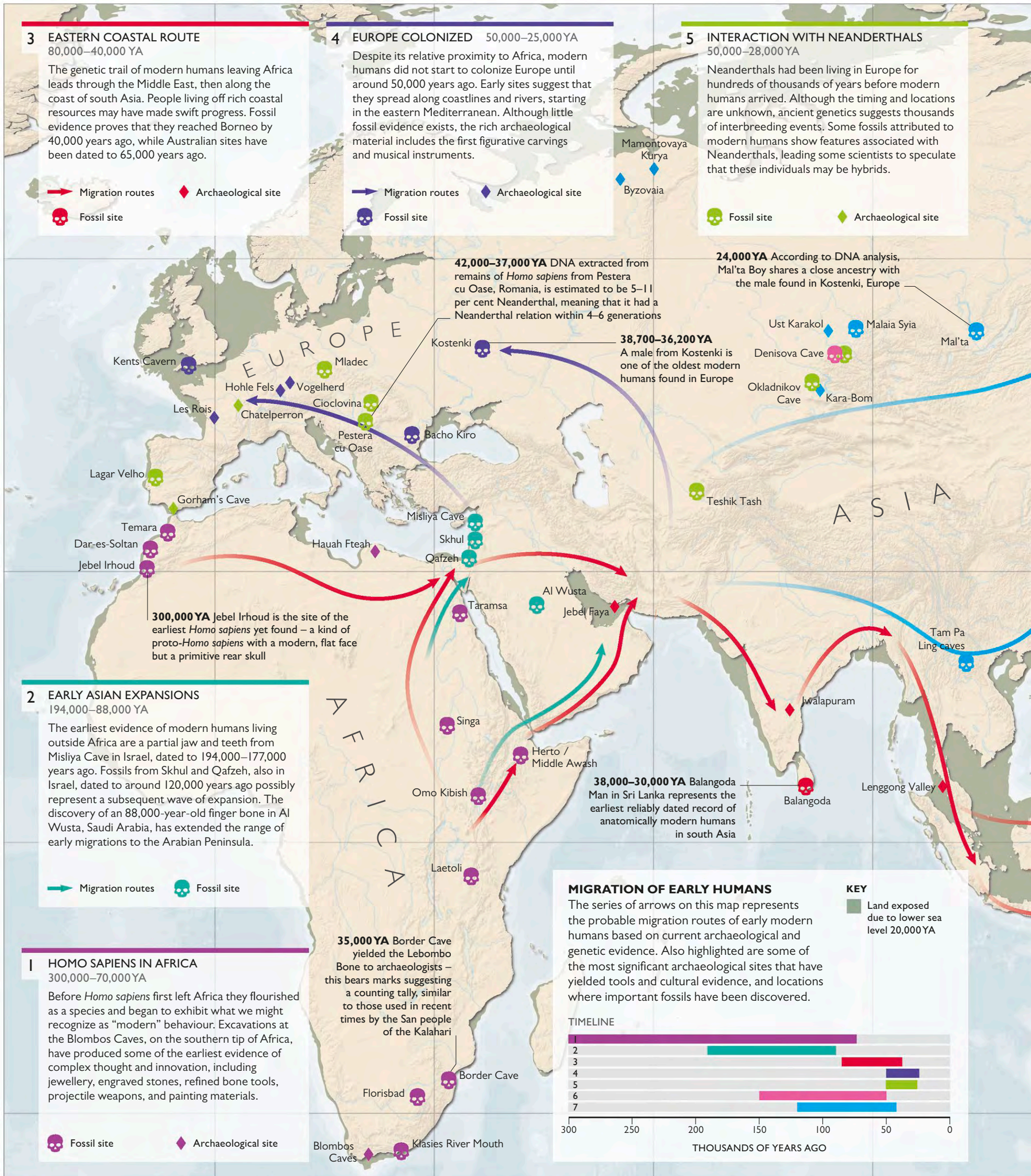
Die Kelders

Klasies River Mouth

HOMININ FOSSIL RECORD

The discovery of human fossils and artefacts across Africa has helped identify different genera and species of early humans. This map shows key locations of fossil remains and artefacts, along with the era in which their owners once lived. The dates of individual finds and periods are given in terms of "millions of years ago" (MYA) or simply "years ago" (YA).







OUT OF AFRICA

The modern human, *Homo sapiens*, is a truly global species, inhabiting every continent. Our colonization of the planet started before 177,000 years ago, when groups began dispersing from their African homeland. By 40,000 years ago, our species lived in northern Europe and central and east Asia, and had crossed the sea to Australia.

Ancient hominins had moved from Africa into Asia and Europe well over a million years before our species first appeared (see p.14). But the details of how *Homo sapiens* relates to these earlier species are still emerging gradually with every fossil and archaeological discovery from the period. Genetic and archaeological evidence now overwhelmingly favours the Recent African Origin model, also known as the “Out-of-Africa” theory, which proposes that *Homo sapiens* evolved in Africa and later spread across the Old World, replacing all other hominin species.

Homo sapiens first left Africa some time after 200,000 years ago, and some groups appear to have reached east Asia by at least 80,000

years ago, and perhaps as early as 120,000 years ago. Either via the Horn of Africa or the Sinai Peninsula, the first migrants travelled east along Asia’s southern coastline, and either north into China or eastwards across Southeast Asia. Subsequent groups headed through central and eastern Asia and finally northwest into Europe.

As they moved into new territories, *Homo sapiens*’ progress may have been hindered, particularly in Europe, by their encounters with other hominins, including Neanderthals and Denisovans. Little is yet known of the Denisovans, but the Neanderthal was the first fossil hominin discovered and is now known from thousands of specimens. Evidence of interaction with both species lives on in our genes.

“I, too, am convinced that our ancestors came from Africa.”

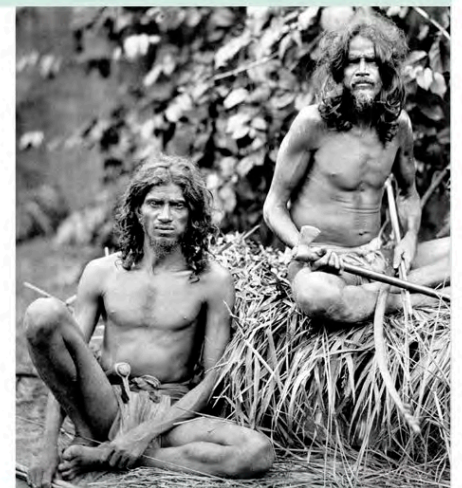
KENYAN PALAEOANTHROPOLOGIST RICHARD LEAKEY, 2005

THE STORY IN OUR GENES

EVIDENCE IN HUMAN DNA

By comparing the genetic make-up of living people from all over the world, scientists are able to analyse the evolutionary relationships between different populations. This has enabled them to confirm our African origins and describe how and when our species spread around the world. Genetic material (DNA) has also been extracted from the fossils of some extinct species. Analysis of the DNA of Neanderthals and Denisovans has revealed that they both interbred with *Homo sapiens* and contributed some of their genes to modern human populations.

The Veddha people of Sri Lanka DNA analysis has been used to show that these are the earliest native inhabitants of Sri Lanka.



THE FIRST AUSTRALIANS

More than 60,000 years ago, hardy, resourceful people arrived in Australia after crossing the seas from Asia. They became Aboriginal Australians and went on to establish a unique way of life with a distinct culture.

During the last ice age, Australia, New Guinea, and Tasmania were joined in a single landmass (see p.17), which was colonized by a seafaring people who crossed the seas from Asia on bamboo vessels. These people were the first Australians. Their journey through the continent followed coastlines and river valleys. Archaeological evidence suggests that by 30,000 years ago, they had spread far and wide, from Tasmania in the south to the Swan River in the west and northwards into New Guinea.



△ **Ancient art**
Discovered in western Australia in 1891, the ancient Bradshaw rock paintings show human figures engaged in display or hunting.

Indigenous Australians

Australia's indigenous peoples were seminomadic; instead of developing agricultural societies, they moved with the seasons. They lived in small family groups but were connected through extensive social networks. Already adept at hunting and gathering, they developed new technologies such as boomerangs, fish traps, and stone axes shaped by

grinding. Over time, the groups became culturally diverse. In the far north, people of the Torres Strait – between Australia and New Guinea – became distinct from the Australian Aborigines. Aboriginal life became centred on relationships between people and the natural world, or “Country”, which included animals, plants, and rocks. These links, which have lasted into modern life, are formalized in the “Dreaming”: oral histories of creation combined with moral codes, some of which are reflected in art.

THE COLONIZATION OF AUSTRALIA

The earliest known archaeological sites in Australia are 65,000 years old – a date that conforms with genetic evidence for the origins of indigenous Australians. Fossils of humans and their animal prey, as well as artefacts from the time, indicate that populations were centred around coastlines and the Murray–Darling river basins.

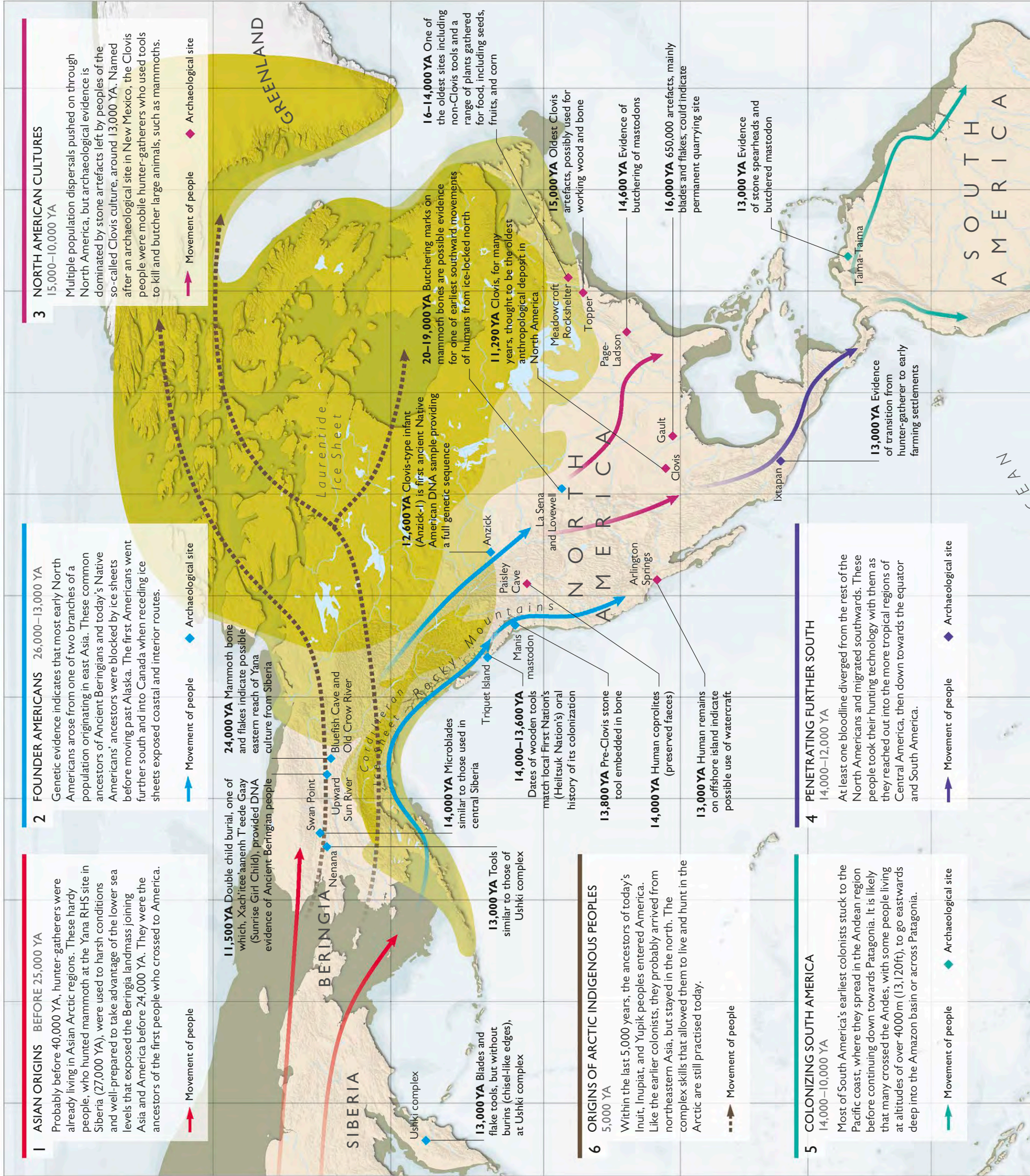
KEY
◆ Archaeological site pre-30,000 YA



Part of the landscape

The Jawoyn people of northern Australia have been producing spectacular rock art for more than 30,000 years. Their paintings often feature marsupials and are predominantly red and white.





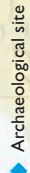
1 ASIAN ORIGINS BEFORE 25,000 YA

Probably before 40,000 YA, hunter-gatherers were already living in Asian Arctic regions. These hardy people, who hunted mammoth at the Yana RHS site in Siberia (27,000 YA), were used to harsh conditions and well-prepared to take advantage of the lower sea levels that exposed the Beringia landmass joining Asia and America before 24,000 YA. They were the ancestors of the first people who crossed to America.

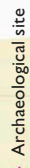
➔ Movement of people



➔ Movement of people



➔ Movement of people



◆ Archaeological site



11,500 YA Double child burial, one of which, Xach'itee'aaneth T'eede Gaay (Sunrise Girl Child), provided DNA evidence of Ancient Beringian people

13,000 YA Blades and flake tools, but without burins (chisel-like edges), at Ushki complex

13,000 YA Tools similar to those of Ushki complex

14,000 YA Microblades similar to those used in central Siberia

14,000–13,600 YA Dates of wooden tools match local First Nation's oral history of its colonization

14,000 YA Human coprolites (preserved faeces)

13,800 YA Pre-Clovis stone tool embedded in bone

13,000 YA Human remains on offshore island indicate possible use of watercraft

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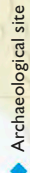
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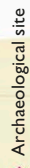
2 FOUNDER AMERICANS 26,000–13,000 YA

Genetic evidence indicates that most early North Americans arose from one of two branches of a population originating in east Asia. These common ancestors of Ancient Beringians and today's Native Americans' ancestors were blocked by ice sheets before moving past Alaska. The first Americans went further south and into Canada when receding ice sheets exposed coastal and interior routes.

➔ Movement of people



➔ Movement of people



◆ Archaeological site



24,000 YA Mammoth bone and flakes indicate possible eastern reach of Yana culture from Siberia

12,600 YA Clovis-type infant (Anzick-1) is first ancient Native American DNA sample providing a full genetic sequence

11,290 YA Clovis, for many years, thought to be the oldest anthropological deposit in North America

15,000 YA Oldest Clovis artefacts, possibly used for working wood and bone

14,600 YA Evidence of butchering of mastodons

16,000 YA 650,000 artefacts, mainly blades and flakes, could indicate permanent quarrying site

13,000 YA Evidence of transition from hunter-gatherer to early farming settlements

13,000 YA Evidence of stone spearheads and butchered mastodon

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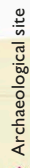
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3 NORTH AMERICAN CULTURES 15,000–10,000 YA

Multiple population dispersals pushed on through North America, but archaeological evidence is dominated by stone artefacts left by peoples of the so-called Clovis culture, around 13,000 YA. Named after an archaeological site in New Mexico, the Clovis people were mobile hunter-gatherers who used tools to kill and butcher large animals, such as mammoths.

➔ Movement of people



◆ Archaeological site



20–19,000 YA Butchering marks on mammoth bones are possible evidence for one of earliest southward movements of humans from ice-locked north

11,290 YA Clovis, for many years, thought to be the oldest anthropological deposit in North America

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6 ORIGINS OF ARCTIC INDIGENOUS PEOPLES

5,000 YA
Within the last 5,000 years, the ancestors of today's Inuit, Inupiat, and Yupik peoples entered America. Like the earlier colonists, they probably arrived from northeastern Asia, but stayed in the north. The complex skills that allowed them to live and hunt in the Arctic are still practised today.

➔ Movement of people



◆ Archaeological site



5 COLONIZING SOUTH AMERICA

14,000–10,000 YA
Most of South America's earliest colonists stuck to the Pacific coast, where they spread in the Andean region before continuing down towards Patagonia. It is likely that many crossed the Andes, with some people living at altitudes of over 4000m (13,120ft), to go eastwards deep into the Amazon basin or across Patagonia.

➔ Movement of people



◆ Archaeological site



4 PENETRATING FURTHER SOUTH

14,000–12,000 YA
At least one bloodline diverged from the rest of the North Americans and migrated southwards. These people took their hunting technology with them as they reached out into the more tropical regions of Central America, then down towards the equator and South America.

➔ Movement of people



◆ Archaeological site





PEOPLING THE AMERICAS

By the time Columbus set foot in the Americas in 1492, the continents had been peopled for thousands of years. The real discoverers of these new worlds had come from Siberia. They conquered ice and snow and trekked enormous distances to colonize a landmass of prairie, desert, rainforest, and mountains.

Some 24,000 years ago the world was locked in an ice age, when an Arctic ice sheet covered much of the northern world. With so much water frozen in glaciers, ocean levels were low enough to expose a connection of land, known as Beringia, between Asia and North America. This meant that people could walk across from one continent to the other, until their way became blocked as ice sheets closed in on them. There, America's founding peoples were isolated for thousands of years, until warmer times melted the ice and opened up corridors to the south, possibly as early as 20,000 YA.

DNA evidence from archaeological sites and the DNA of Native Americans alive today shows that two distinct populations split from the founding group that had entered the new lands across Beringia.

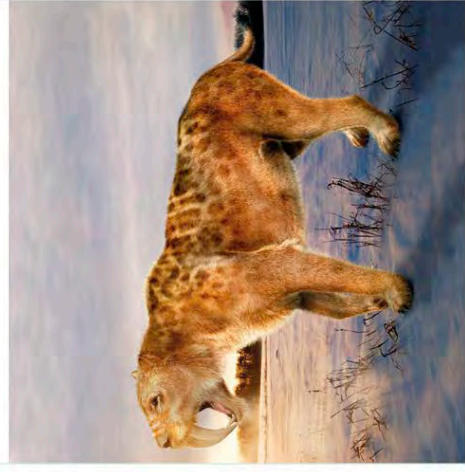
Only one of these went on to settle the Americas – the ancestors of Native Americans. The other population – known as the Ancient Beringians – may have been isolated on or outside Beringia until after the glacial melt, as evidence of their DNA is distinct from that of any past or present Native Americans. Genetics show that between 17,500 and 14,600 YA, the group that had entered America branched again into two new lineages, northern and southern. People who continued further followed routes along the Pacific coast and far into the interior. Some became separated over vast distances, but remained genetically similar, suggesting that they moved rapidly. Within a few thousand years, they had established themselves in Central America, and just centuries after that had entered Patagonia.

"They made prehistory, those latter-day Asians who, by jumping continents became the first Americans. Theirs was a colonization the likes and scale of which... would never be repeated."

DAVID J MELTZER, FIRST PEOPLES IN A NEW WORLD: COLONIZING ICE AGE AMERICA, 2009

THE CLOVIS STONE AGE HUNTERS

The hunter-gatherer Clovis people were once viewed as the first Americans, but archaeological sites pre-dating the Clovis period show this is not the case. However, the Clovis became a widespread influence. They used bifacial stone points and blades to hunt many of North America's large mammals, such as bison, mammoths, and sabre-tooth cats. In addition to the changing climate and habitats of these species, hunters were possibly one of the main factors that led to their extinction.



Extinct sabre-toothed cat



△ **Innovative tools**
Wooden tools called adzes had blades made from stone that were sufficiently strong to fell trees, open up land for pasture, or dig hard ground.

THE FIRST FARMERS

Working the land to grow food was an entirely new way of life for prehistoric humans. It turned them from nomads into farmers – and created settlements with permanent buildings, larger societies, and the potential to develop more elaborate technology and culture.

The earliest humans mostly lived in small nomadic bands and went wherever food was plentiful. They tracked the migrations of large animals as they hunted for meat, just as they followed the seasonal bounties of fruit and seeds. They built – and rebuilt – simple camps, carrying a few lightweight belongings with them.

This hunter-gatherer existence supported humans through the last ice age, but, about 12,000 years ago, a rise in Earth's temperature opened up a world of alternative possibilities. One species of human – *Homo sapiens* – successfully emerged into this warmer world. By this time, these modern humans had spread far beyond their African ancestral home into Asia, Australasia, and America. And independently, all over the world, they had begun creating permanent farming settlements.

Settling down

Permanent camps with stronger houses made sense in places where the land was especially fertile – such as on floodplains of rivers. Settlers could support more hungry mouths by hunting, fishing, and gathering plant food around a local foraging ground that was rich in resources. This was just a small step from farming as

▷ Early farming villages

This settlement at Mehrgarh in modern Pakistan dates from 7000 BCE. It had mud-brick houses and granaries to store surplus cultivated cereal.



it was more convenient to nurture or transplant food plants closer to home, or plant their seeds and tubers (some recent evidence suggests people had started to do this as early as 23,000 years ago) – while the most amenable wild animals were confined to pens. These first farms produced more food to feed more people, so settlements could grow bigger and even produce a surplus to help with leaner times. Valuable food stores – defended from competing camps – became another reason to stay in one place.

Domestication

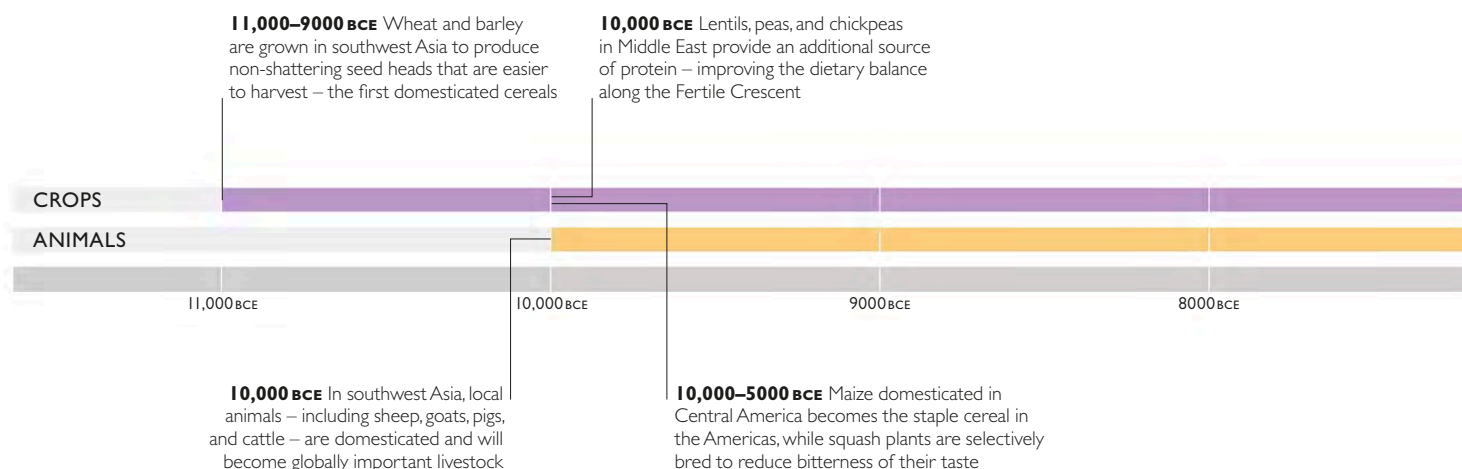
By about 10,000 BCE, agriculture had emerged in Eurasia, New Guinea, and America, with farmers relying on local plants and animals as favoured sources of food. They learned that some species were more useful than others, and so these became staple parts of their diets.

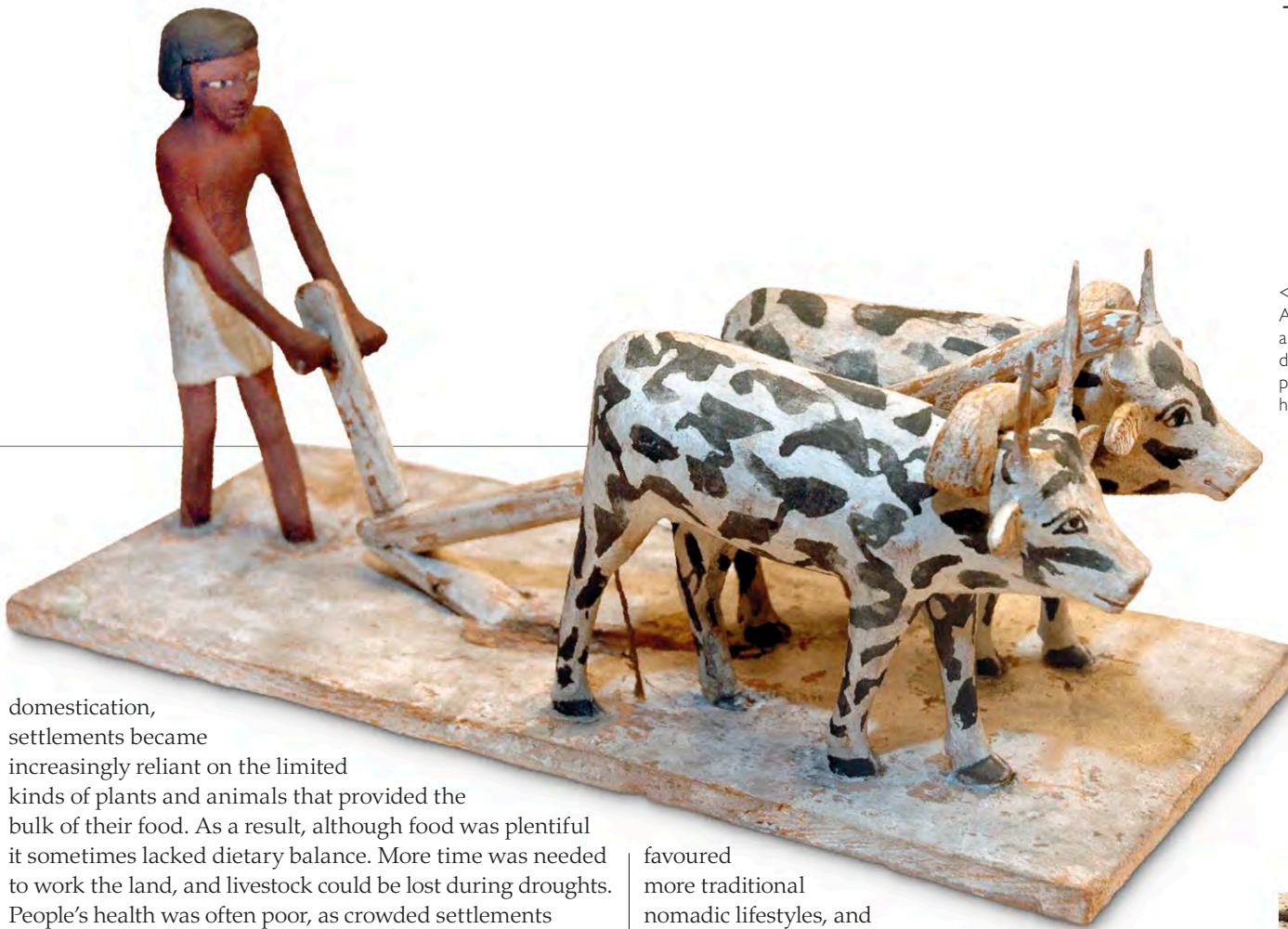
In the fertile floodplains of Mesopotamia (modern Iraq), local wild wheat and barley became the cereals of choice, while goats and sheep provided meat. East Asia's main cereal was rice, and in Central America, farmers cultivated

maize. In all cases, the first farmers selected the most manageable and high-yielding plants and animals. Over time and generations, their choices would change the traits of wild species, as crops and livestock passed on their characteristics to form the domesticated varieties we use today. With

SETTLED LIVING

As modern humans dispersed around the world, they relied on local plants and animals for sustenance. Nomadic societies gave way to settled communities as people planted the first crops or corralled the first livestock. Domestication of wild species began from about 12,000 years ago. The first farmers used the most edible species that were easiest to harvest, growing their food in abundance, providing enough to support larger populations, and ultimately out-competing hunter-gatherers.





◁ **Working the land**
A wooden model, from 2000 BCE, of a man ploughing the land with oxen, depicts the earliest kind of scratch plough, which cut a furrow through hard ground ready for sowing seeds.

domestication, settlements became increasingly reliant on the limited kinds of plants and animals that provided the bulk of their food. As a result, although food was plentiful it sometimes lacked dietary balance. More time was needed to work the land, and livestock could be lost during droughts. People's health was often poor, as crowded settlements encouraged the spread of infectious disease among humans as well as their livestock.

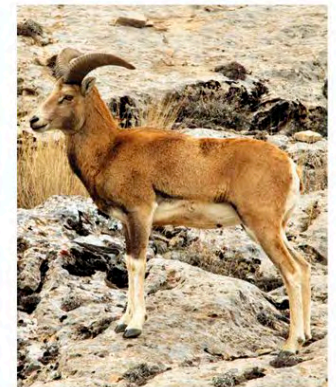
Ultimately, agriculture's success, or otherwise, was a trade-off between these risks and benefits. In some parts of the world – such as the Australian interior – conditions

favoured more traditional nomadic lifestyles, and here humans largely remained hunter-gatherers. As farmers gained a better understanding of the needs of their crops and livestock, they developed ways of overcoming risks and increasing productivity. They learned how to use animal dung as fertilizer or to irrigate the land by diverting rivers – curtailing effects of seasonal drought. In Egypt, for example, the waters of the Nile were used for large-scale irrigation of farmland, helping to lengthen growing seasons.

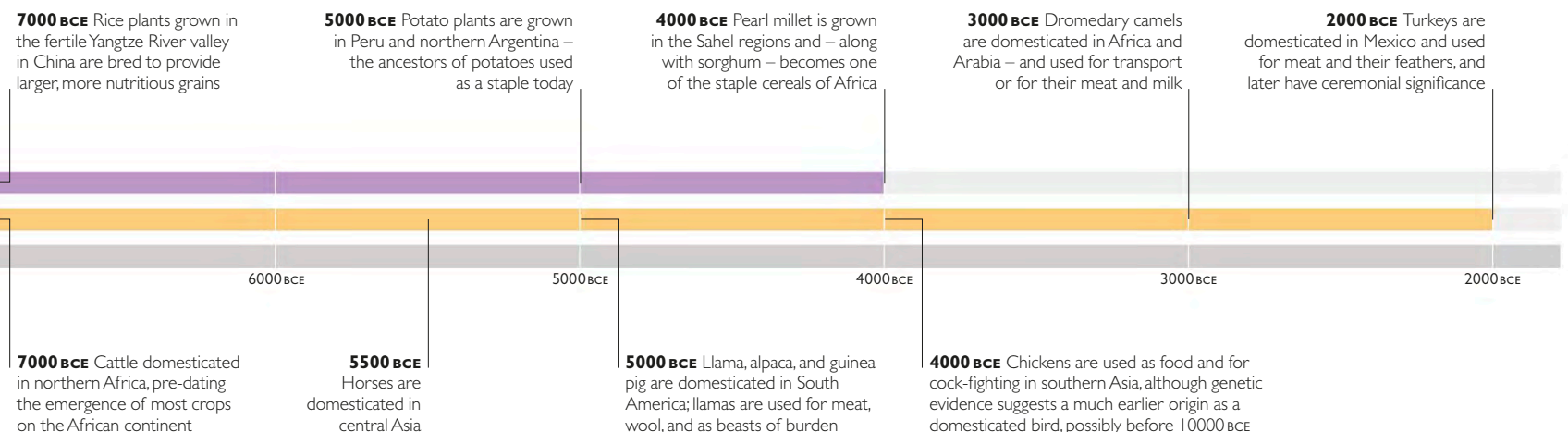
Over time, food productivity became material wealth: more food not only fed more people but facilitated trade, too. At the same time, larger settlements could support people with different skills, such as craftsmen and merchants. It meant that the agricultural revolution would have far-reaching consequences for the history of humankind – including the emergence of industrial towns and cities.

“Farming was the precondition for the development of ... civilizations in Egypt, Mesopotamia, the Indus Valley, China, the Americas, and Africa.”

GRAEME BARKER, BRITISH ARCHAEOLOGIST, FROM *AGRICULTURAL REVOLUTION IN PREHISTORY*, 2006



△ **Feral ancestor**
The Armenian mouflon from south-western Asia is the possible ancestor of the domesticated sheep, which was one of the earliest animal species to be tamed, at around 10,000 BCE.



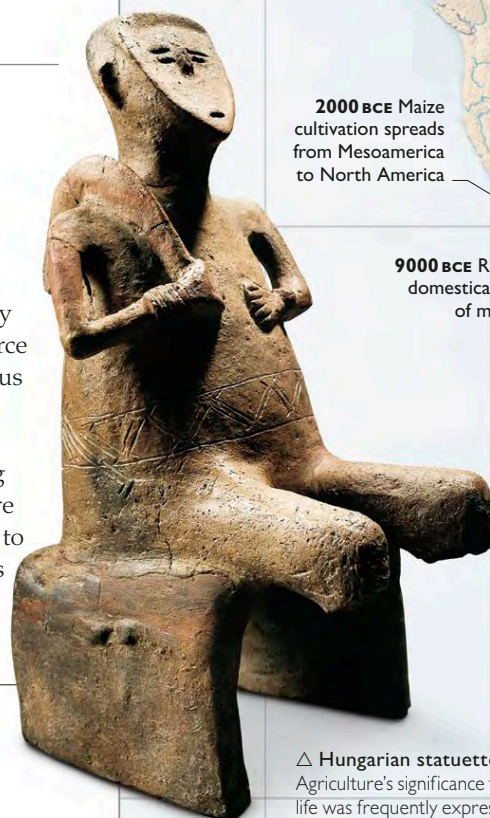
ORIGINS OF AGRICULTURE

When hunter-gatherers abandoned their nomadic life and became the first farmers, they were doing more than feeding their families. They were kick-starting an agricultural revolution that would have enormous implications for the future of humanity.

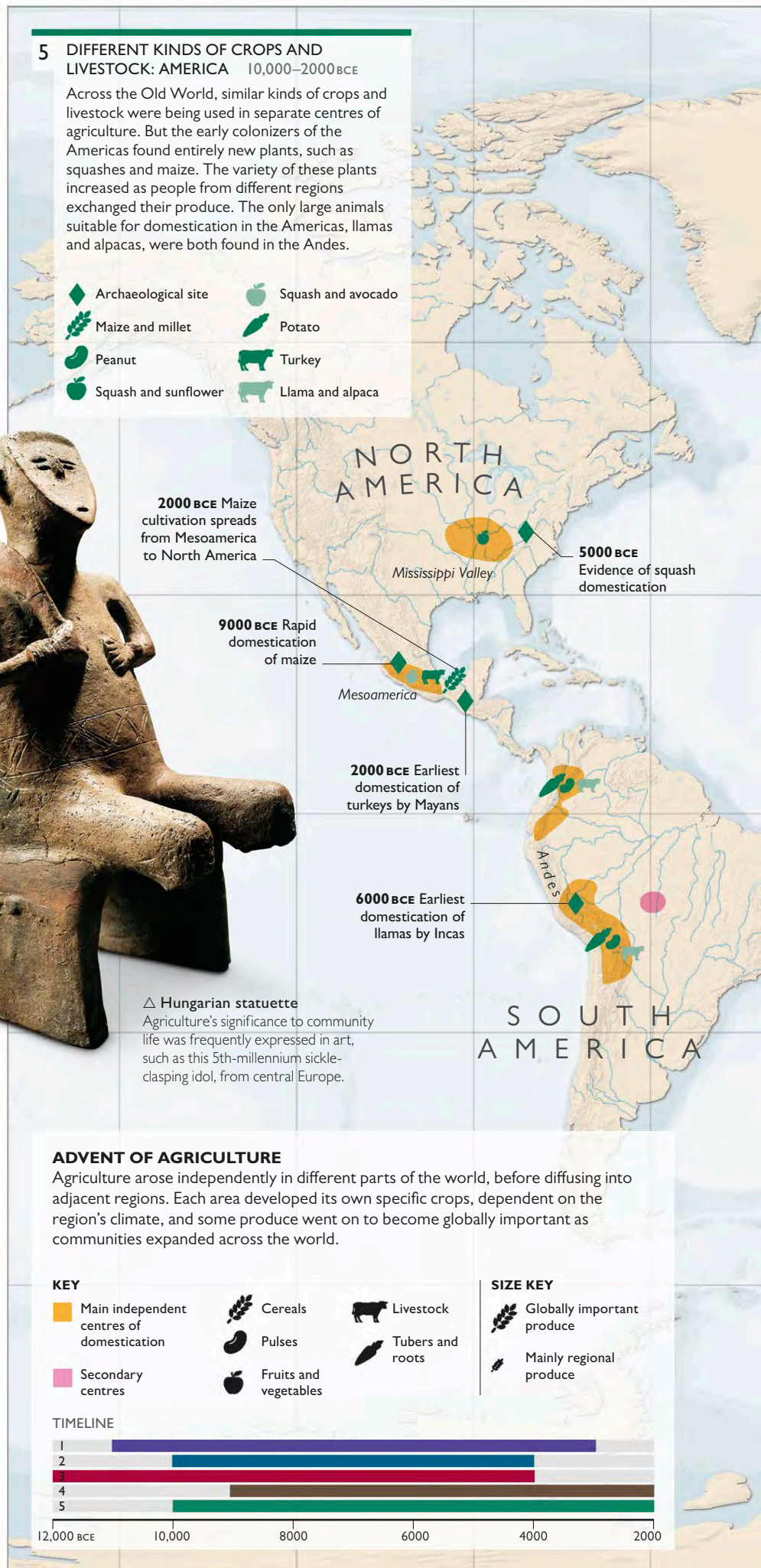
Evidence for agriculture's origins comes from archaeology and from DNA of crops or livestock, and their wild counterparts. No-one knows exactly why people started to work the land. Perhaps they transplanted wild crops closer to home for convenience, or saw the potential of germinating seeds. Whatever happened, as climates warmed in the wake of the Ice Age and populations swelled, people around the world – entirely independently – became tied to farming. It brought a stable source of nourishment and sometimes, when yields were good, a surplus to sustain people through leaner times. Tending crops or corralling livestock demanded that communities stayed in one place long enough to reap the harvest. Other reasons for staying in one location would have been that the new farming tools were too heavy to carry from place to place and any food surplus had to be stored. While agrarian settlements grew to become the seeds of civilization, their communities spread, taking their skills, plants, and livestock with them.

"... Almost all of us are farmers or else are fed by farmers"

JARED DIAMOND, FROM GUNS, GERMS, AND STEEL, 1997

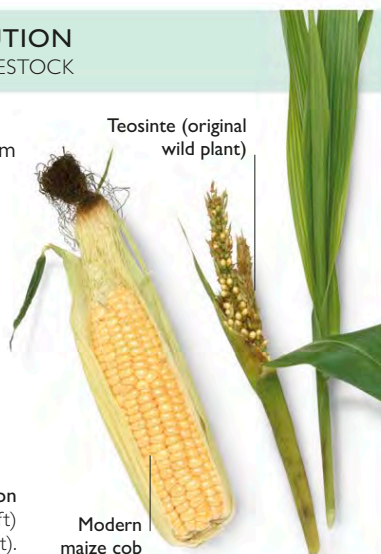


△ Hungarian statuette
Agriculture's significance to community life was frequently expressed in art, such as this 5th-millennium sickle-clasping idol, from central Europe.



DOMESTICATION REVOLUTION WILD SPECIES TO CROPS AND LIVESTOCK

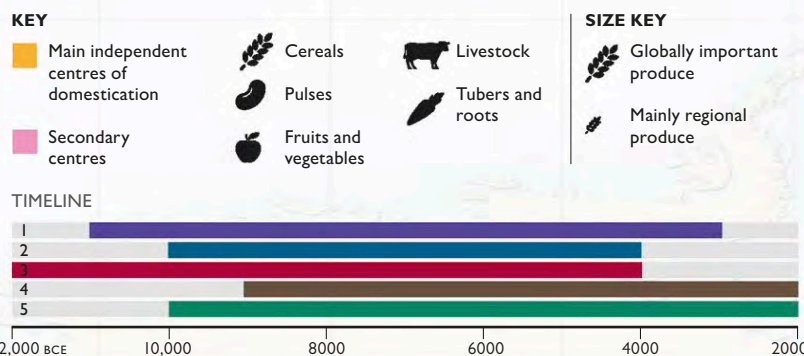
The crops and livestock that humankind uses today descended from wild species that had rather different characteristics. Farmers chose to breed from individuals that served them best, such as by selecting ones that provided better yields or were more easily managed. This so-called artificial selection, applied over many generations and sometimes across centuries, gave rise to domesticated forms of plants and animals.

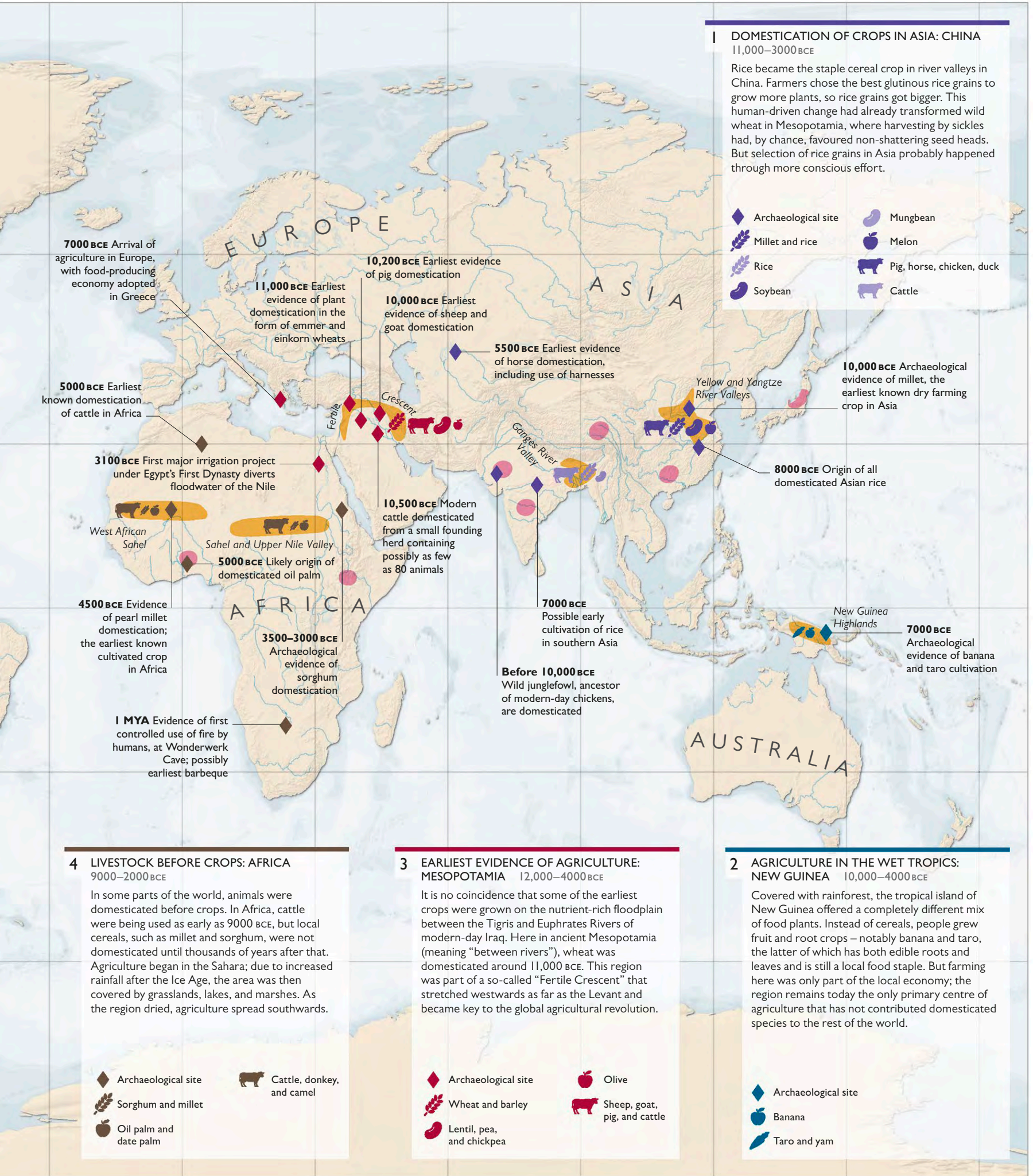


Produce of artificial selection
Bigger cobs of domesticated maize (left) are descended from wild maize (right).

ADVENT OF AGRICULTURE

Agriculture arose independently in different parts of the world, before diffusing into adjacent regions. Each area developed its own specific crops, dependent on the region's climate, and some produce went on to become globally important as communities expanded across the world.





DOMESTICATION OF CROPS IN ASIA: CHINA
11,000–3000 BCE

Rice became the staple cereal crop in river valleys in China. Farmers chose the best glutinous rice grains to grow more plants, so rice grains got bigger. This human-driven change had already transformed wild wheat in Mesopotamia, where harvesting by sickles had, by chance, favoured non-shattering seed heads. But selection of rice grains in Asia probably happened through more conscious effort.

- ◆ Archaeological site
- ◆ Millet and rice
- ◆ Rice
- ◆ Soybean
- ◆ Mungbean
- ◆ Melon
- ◆ Pig, horse, chicken, duck
- ◆ Cattle

7000 BCE Arrival of agriculture in Europe, with food-producing economy adopted in Greece

5000 BCE Earliest known domestication of cattle in Africa

3100 BCE First major irrigation project under Egypt's First Dynasty diverts floodwater of the Nile

4500 BCE Evidence of pearl millet domestication; the earliest known cultivated crop in Africa

1 MYA Evidence of first controlled use of fire by humans, at Wonderwerk Cave; possibly earliest barbeque

11,000 BCE Earliest evidence of plant domestication in the form of emmer and einkorn wheats

10,200 BCE Earliest evidence of pig domestication

10,000 BCE Earliest evidence of sheep and goat domestication

5000 BCE Likely origin of domesticated oil palm

3500–3000 BCE Archaeological evidence of sorghum domestication

10,500 BCE Modern cattle domesticated from a small founding herd containing possibly as few as 80 animals

5500 BCE Earliest evidence of horse domestication, including use of harnesses

7000 BCE Possible early cultivation of rice in southern Asia

Before 10,000 BCE Wild junglefowl, ancestor of modern-day chickens, are domesticated

10,000 BCE Archaeological evidence of millet, the earliest known dry farming crop in Asia

8000 BCE Origin of all domesticated Asian rice

7000 BCE Archaeological evidence of banana and taro cultivation

4 LIVESTOCK BEFORE CROPS: AFRICA
9000–2000 BCE

In some parts of the world, animals were domesticated before crops. In Africa, cattle were being used as early as 9000 BCE, but local cereals, such as millet and sorghum, were not domesticated until thousands of years after that. Agriculture began in the Sahara; due to increased rainfall after the Ice Age, the area was then covered by grasslands, lakes, and marshes. As the region dried, agriculture spread southwards.

- ◆ Archaeological site
- ◆ Sorghum and millet
- ◆ Oil palm and date palm
- ◆ Cattle, donkey, and camel

3 EARLIEST EVIDENCE OF AGRICULTURE: MESOPOTAMIA
12,000–4000 BCE

It is no coincidence that some of the earliest crops were grown on the nutrient-rich floodplain between the Tigris and Euphrates Rivers of modern-day Iraq. Here in ancient Mesopotamia (meaning "between rivers"), wheat was domesticated around 11,000 BCE. This region was part of a so-called "Fertile Crescent" that stretched westwards as far as the Levant and became key to the global agricultural revolution.

- ◆ Archaeological site
- ◆ Wheat and barley
- ◆ Lentil, pea, and chickpea
- ◆ Olive
- ◆ Sheep, goat, pig, and cattle

2 AGRICULTURE IN THE WET TROPICS: NEW GUINEA
10,000–4000 BCE

Covered with rainforest, the tropical island of New Guinea offered a completely different mix of food plants. Instead of cereals, people grew fruit and root crops – notably banana and taro, the latter of which has both edible roots and leaves and is still a local food staple. But farming here was only part of the local economy; the region remains today the only primary centre of agriculture that has not contributed domesticated species to the rest of the world.

- ◆ Archaeological site
- ◆ Banana
- ◆ Taro and yam

VILLAGES TO TOWNS

As nomadic hunter-gatherers began farming, for the first time in history human populations became anchored to fixed points on a map of civilization. Settlements grew in size and complexity; the first villages became the first towns.

Just as agriculture turned humans into a more sedentary species, so the settlements they made drove the attributes of modern human society: material accumulation, industry, and trade. This happened in places around the world, but nowhere is the evidence for it clearer than in southwest Asia. Here the first farmers produced enough food on fertile soils to support denser populations. Although life was labour-intensive, and there was a greater risk of disease from overcrowding and malnutrition, there were benefits of living together in one place over a long period. People could concentrate on producing a surplus and perfect skills to make their lives easier. Clay was baked into bricks for making stronger houses or fashioned into large storage vessels. As towns grew they were sometimes fortified with surrounding walls. Shells from the Mediterranean showed wide trade links developing, while copper gradually supplanted flint for better tools. As society itself divided into craftspeople, merchants, and their leaders, these first local industries brought material wealth that formed the basis of the first exchange economies.

"... it made sense for men to band together... for... management of the environment."

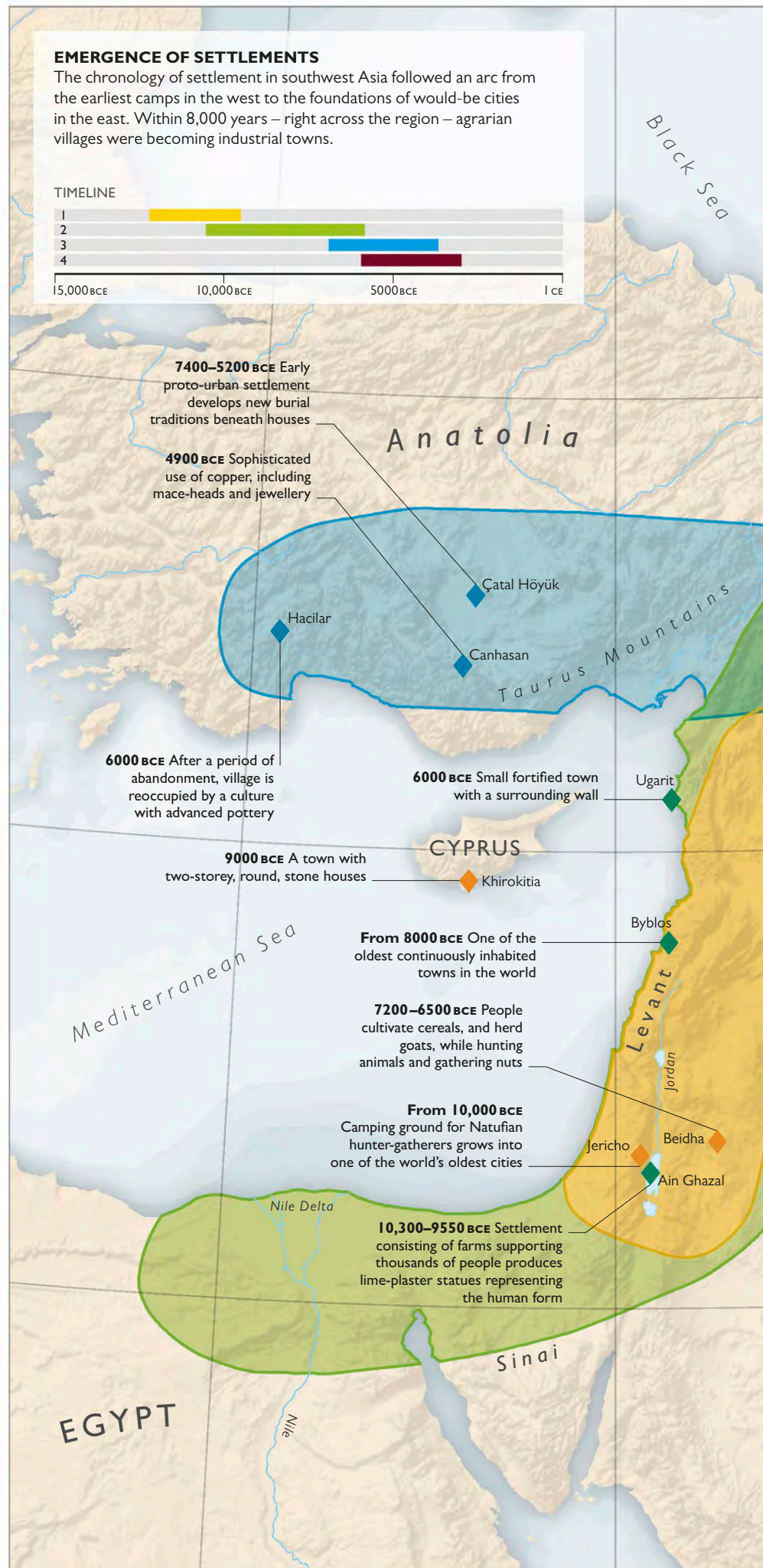
JM ROBERTS, FROM *HISTORY OF THE WORLD*, 1990

POTTERY IN THE STONE AGE HARNESSING THE POTENTIAL OF CLAY

Fired clay had been used to make figurines and pots before 20,000 YA. It later became important in constructing dwellings. Wet clay was used to reinforce brushwood walls. Solid bricks gave protection from the elements and enemies, while creative clay technology was used to fashion more decorative pots.



Halaf vase
Mesopotamian pottery was decorated with geometric designs as early as 6000 BCE.



1 TRANSITION FROM NOMADS TO SETTLEMENTS 12,500–9000 BCE

The Natufian people, descended from nomads of the Levant and Sinai, made the earliest settlements in southwest Asia, from about 12,500 BCE. At first these were probably nothing more than seasonal hunting camps, although evidence for these is scant because nomads had few material possessions. Their descendants stockpiled food that demanded permanent storage.

- Spread of settlements
- ◆ Archaeological site

2 FIRST AGRARIAN SETTLEMENTS 11,000–6000 BCE

Farmers emerged from early settlers who exploited wild cereals, such as rye, which was cultivated as early as 11,050 BCE. At first, settlers rallied together to protect wild food plants from grazing animals, but, over time, plants were moved or seeds sown closer to home. Houses became more permanent, as mud brick replaced perishable brushwood as building material.

- Spread of settlements
- ◆ Archaeological site

3 SPREAD OF MATERIAL CULTURE 7000–4000 BCE

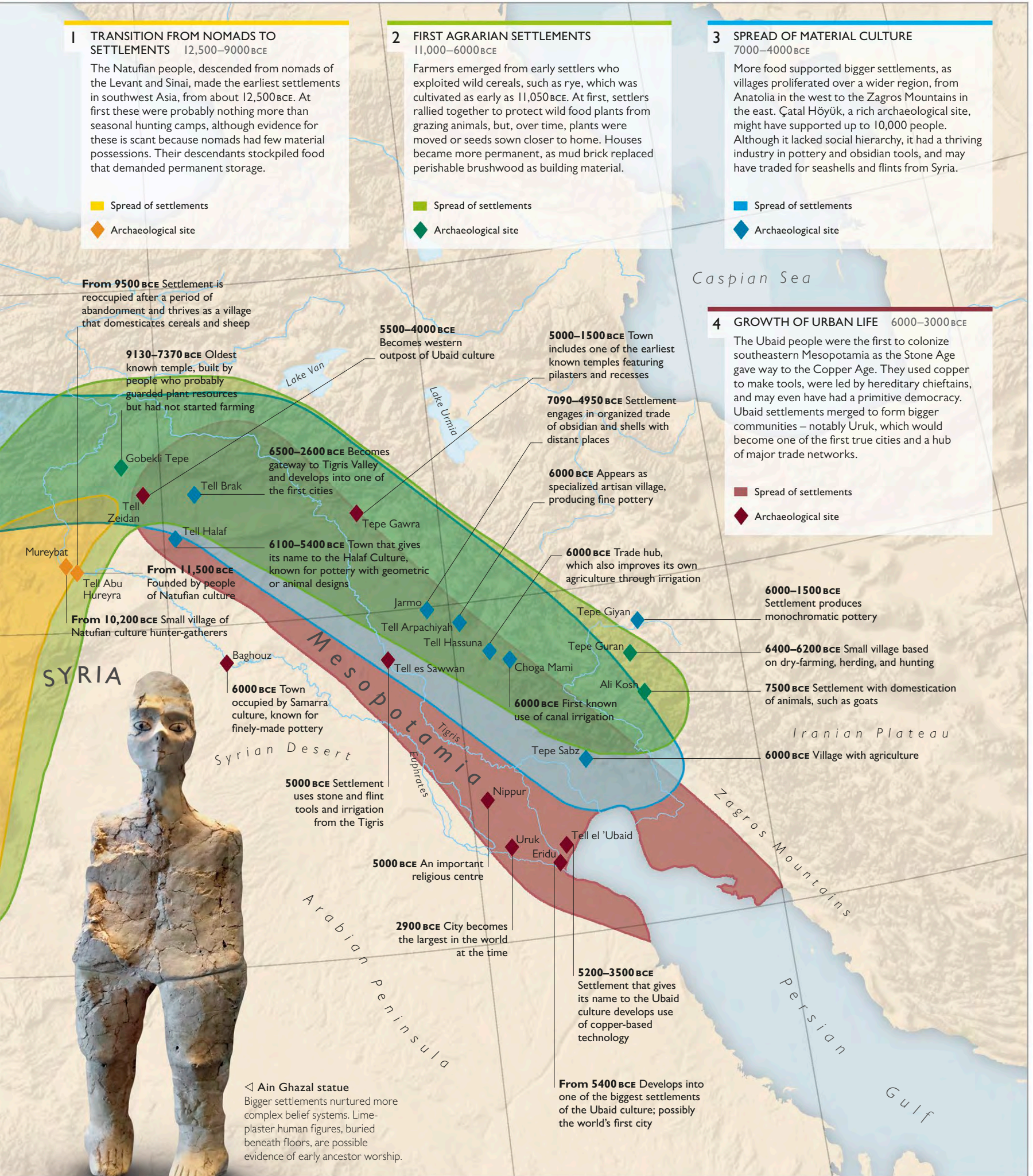
More food supported bigger settlements, as villages proliferated over a wider region, from Anatolia in the west to the Zagros Mountains in the east. Çatal Höyük, a rich archaeological site, might have supported up to 10,000 people. Although it lacked social hierarchy, it had a thriving industry in pottery and obsidian tools, and may have traded for seashells and flints from Syria.

- Spread of settlements
- ◆ Archaeological site

4 GROWTH OF URBAN LIFE 6000–3000 BCE

The Ubaid people were the first to colonize southeastern Mesopotamia as the Stone Age gave way to the Copper Age. They used copper to make tools, were led by hereditary chieftains, and may even have had a primitive democracy. Ubaid settlements merged to form bigger communities – notably Uruk, which would become one of the first true cities and a hub of major trade networks.

- Spread of settlements
- ◆ Archaeological site



From 9500 BCE Settlement is reoccupied after a period of abandonment and thrives as a village that domesticates cereals and sheep

9130–7370 BCE Oldest known temple, built by people who probably guarded plant resources but had not started farming

6500–2600 BCE Becomes gateway to Tigris Valley and develops into one of the first cities

6100–5400 BCE Town that gives its name to the Halaf Culture, known for pottery with geometric or animal designs

From 11,500 BCE Founded by people of Natufian culture

From 10,200 BCE Small village of Natufian culture hunter-gatherers

6000 BCE Town occupied by Samarra culture, known for finely-made pottery

5000 BCE Settlement uses stone and flint tools and irrigation from the Tigris

5000 BCE An important religious centre

2900 BCE City becomes the largest in the world at the time

5200–3500 BCE Settlement that gives its name to the Ubaid culture develops use of copper-based technology

From 5400 BCE Develops into one of the biggest settlements of the Ubaid culture; possibly the world's first city

5500–4000 BCE Becomes western outpost of Ubaid culture

5000–1500 BCE Town includes one of the earliest known temples featuring pilasters and recesses

7090–4950 BCE Settlement engages in organized trade of obsidian and shells with distant places

6000 BCE Appears as specialized artisan village, producing fine pottery

6000 BCE Trade hub, which also improves its own agriculture through irrigation

6000–1500 BCE Settlement produces monochromatic pottery

6400–6200 BCE Small village based on dry-farming, herding, and hunting

7500 BCE Settlement with domestication of animals, such as goats

6000 BCE Village with agriculture

◀ **Ain Ghazal statue**
Bigger settlements nurtured more complex belief systems. Lime-plaster human figures, buried beneath floors, are possible evidence of early ancestor worship.