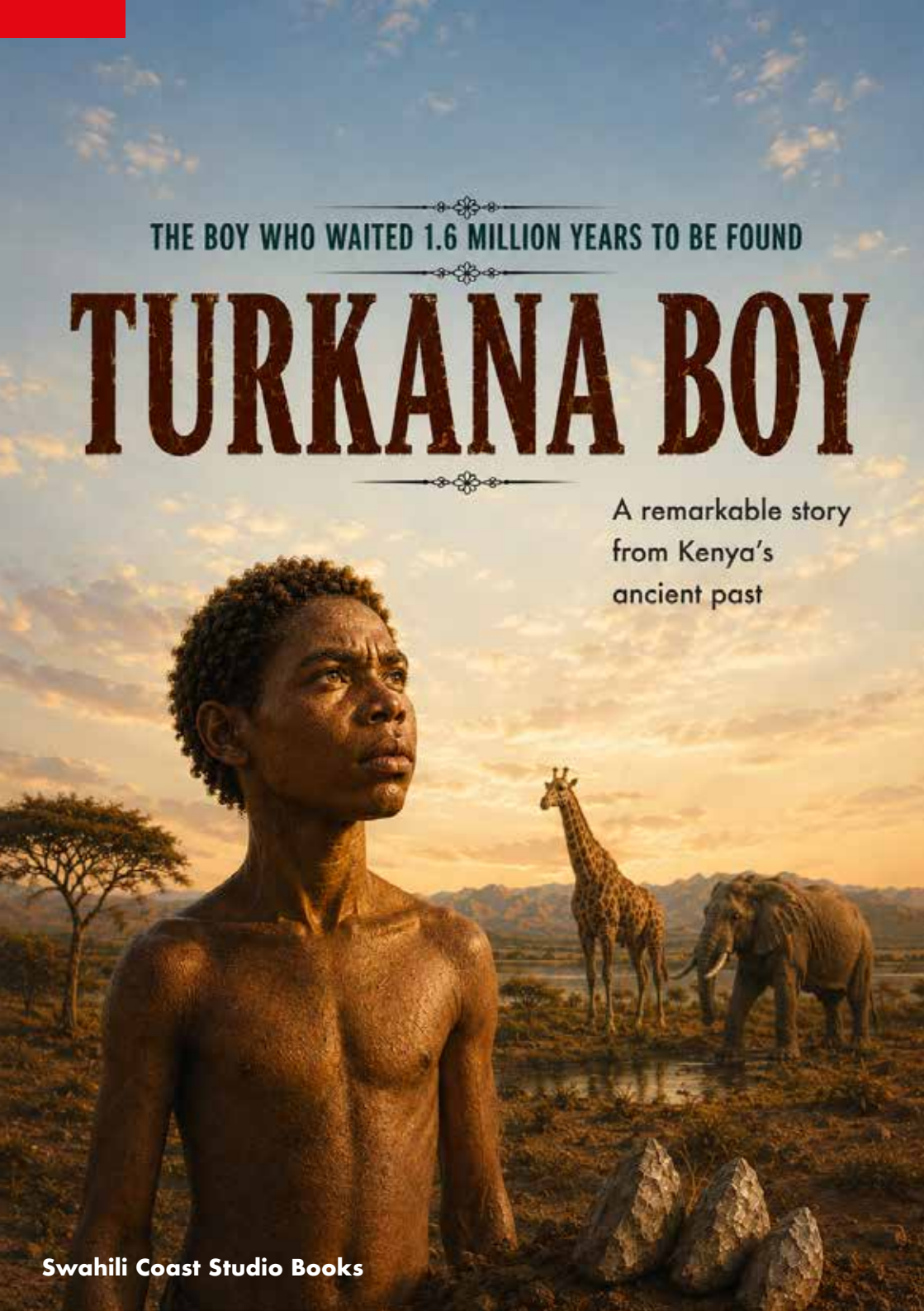
THE BOY WHO WAITED 1.6 MILLION YEARS TO BE FOUND
TURKANA BOY
A remarkable story from Kenya's ancient past
Swahili Coast Studio Books



The boy who waited 1.6 million years to be found

TURKANA BOY

Poul Erik Larsen

Swahili Coast Studio Books

Indholdsfortegnelse

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A Closer Look

Before we begin…

This book can be read in two ways.
Perhaps you want to know what we actually know about Turkana Boy. How old was he? What did he look like? What did he eat? What sort of animals lived around him? Did his people use fire? And how can scientists possibly know anything about a boy who died around 1.6 million years ago?

Then begin with *Part One – Meet Turkana Boy.*
This is where we look at the evidence: bones, teeth, stone tools, footprints, ancient landscapes and the clues scientists have spent decades trying to understand.
Sometimes the evidence gives us a surprisingly good answer.
Sometimes it gives us several answers.
And occasionally it seems to look at us and say:

We really don't know.

That is science too.

But perhaps you would rather begin with the adventure.

Then turn to *Part Two – A few days, 1.6 million years ago, on page 71.*

There we take everything we have learned and use it to imagine a few days in his world, walking alongside Turkana Boy and his people.

The events in that part are imagined. The world around them is not simply invented. We have built it as carefully as we can from archaeology, fossils and scientific research.

You do not have to read Part One first.

But if something happens in the story and you suddenly think:

Hang on. How do they know that?

Good.

Come back here.

That is exactly what this part of the book is for.

PART ONE

What the bones can tell us

The man who noticed a piece of bone

Nariokotome, Kenya · 1984

In 1984, Kamoya Kimeu was walking through the dry country near Nariokotome, west of Lake Turkana in northern Kenya, looking at ground that to most of us would probably have appeared to contain very little worth looking at. There was dust, there were stones, there were fragments of other stones, and beyond them more dust and more stones, stretching through a landscape where the sensible thing for an ordinary visitor might have been to look up occasionally and admire the view.[1]

Kimeu was not an ordinary visitor.



He had spent years searching for fossils and developed the eye that comes only from experience: the ability to look at thousands of perfectly uninteresting pieces of rock and notice the one small object that does not quite belong among them. It is a skill that sounds rather unimpressive until you try it yourself.

On that particular day, something on the ground caught his attention.

It was a small piece of skull.

There was nothing spectacular about it. No complete face stared dramatically out of the earth, no skeleton lay conveniently arranged in the sand waiting to be discovered, and there was certainly no label *saying Important early human – please dig here*. It was simply a fragment, small enough that countless people might have walked straight past it.

Kimeu stopped.

And because he stopped, researchers came back.

A boy begins to appear

Once excavation began, that insignificant fragment became considerably more interesting, because beneath and around the place where it had been found were more bones belonging to the same individual. Careful work gradually revealed parts of the skull, ribs and spine, pieces of the pelvis, arms and legs, until the researchers realised that they were not dealing with another isolated fragment from the distant human past, but with a remarkably substantial part of one young body.[1]

That matters enormously.

Human fossils from this far back in time are usually incomplete, and a single tooth, a jaw fragment or part of a skull may become scientifically important because that is all that survived. Here, however, enough of one individual had remained together for researchers to begin asking questions that isolated bones could never answer nearly as well.

How tall was he?

How was his body built?

How old was he when he died?

How did he grow?

How did he move?

And perhaps the most irresistible question of all: *what sort of human was he?*

The skeleton is commonly described as about 40 percent complete when cor-

responding bones from the two sides of the body are counted only once, which may not sound terribly impressive until we remember what had happened to it in the meantime. The boy had died, his body had decomposed, some bones had disappeared, the remainder had been buried, geological processes had worked on the landscape for roughly 1.6 million years, and eventually erosion had to expose the right piece of him at exactly the right time for someone capable of recognising it to walk past.[1]

Forty percent begins to sound rather generous.

Science gave the skeleton a catalogue number: *KNM-WT 15000*.
It is an excellent name if you are responsible for keeping track of thousands of fossils in a scientific collection, but rather less successful if you are trying to remember that the bones once belonged to a living child.

Fortunately, he acquired another name.
Turkana Boy.

One discovery — and one man who should not disappear from it

There is a small danger in telling stories about great scientific discoveries, because famous researchers, universities and museums have a tendency to grow larger as the story is repeated, while the person who actually noticed something unusual lying in the dust can slowly shrink into a footnote.

Kamoya Kimeu deserves better than that.

He became one of East Africa's most accomplished fossil finders, working for decades with research teams investigating human origins in Kenya, and his ability to recognise fossil material in difficult terrain contributed to several important discoveries. Turkana Boy therefore begins not only with a child who died in East Africa around 1.6 million years ago, but also with a Kenyan fossil hunter who, on one particular day in 1984, looked at a tiny piece of bone and understood that it was worth stopping for.

Had he walked past, the skeleton might eventually have been found by somebody else.

Or perhaps erosion would have destroyed it.

We cannot know.

What we do know is that he didn't walk past.

And because of that, 1.6 million years after the boy disappeared from the landscape, *we can begin to meet him*.

Meet KNM-WT 15000

A skeleton that shouldn't really have survived

Finding a fossil from 1.6 million years ago requires a certain amount of luck. Finding enough bones from the same individual to begin reconstructing an entire body requires considerably more.

This is what makes Turkana Boy so unusual.

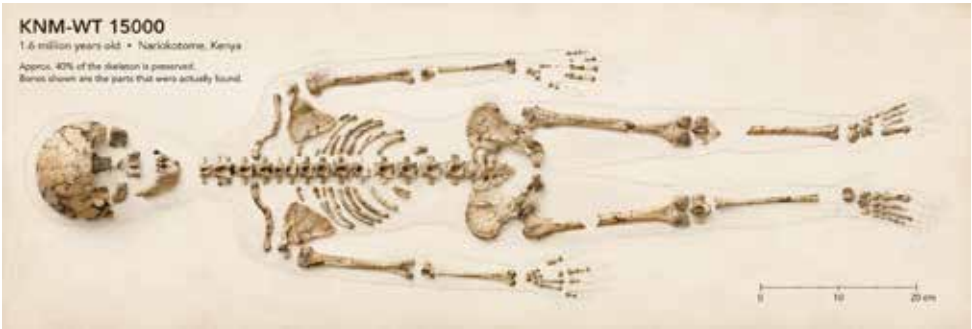
As the excavation at Nariokotome continued, researchers recovered parts of his skull, spine and ribs together with pieces of the pelvis and bones from his arms and legs, leaving them with something palaeoanthropologists rarely receive from so distant a period: not merely a skull, a tooth or an isolated fragment, but enough of one young individual to begin looking at the relationships between different parts of his body.[2]

For most of us, a skeleton is simply a collection of bones, perhaps made slightly more interesting by the knowledge that they belonged to somebody who lived an unimaginably long time ago. To a scientist, however, those bones are closer to a biography written in a language that has taken generations of research to learn how to read.

The length of the leg bones can help estimate stature, while the proportions between arms and legs tell us something about the shape of the body they once supported. The pelvis contributes information about sex and locomotion, joints preserve clues about movement and development, and teeth contain an extraordinary record of growth that began while their owner was still alive.

One bone can tell us something.

Enough bones from the same person can begin to tell us about *him*.



What emerged from the ground at Nariokotome was a body that in some respects already looked surprisingly familiar. Turkana Boy had relatively long legs and shorter arms, and the proportions of his body were much closer to ours than those of several earlier members of the human family.[2]

That does not mean that putting modern clothes on him would have allowed him to walk unnoticed through Mombasa.

It does mean that if we had seen him moving across the landscape from a distance, there would have been something unmistakably human about the way that body was built.

And then the scientists looked at his teeth.

That complicated everything.

How old was he?

When Turkana Boy was first studied, researchers commonly estimated that he had died at around eleven or twelve years of age, an interpretation influenced partly by comparisons between his skeleton and the development of modern human children.

There was an obvious difficulty with that comparison.

Turkana Boy was not a modern human child.

Our own species has an unusually prolonged childhood, and the timing of growth, tooth development and maturation cannot simply be projected backwards onto another human species that lived more than a million years before *Homo sapiens* existed.

Teeth provided another way of approaching the problem, because they do something rather useful for scientists: while they are developing, they preserve microscopic growth patterns. By studying these patterns and the stage reached by different teeth, researchers can reconstruct aspects of development with a precision that the rest of the skeleton cannot always provide.

When Turkana Boy's dental development was examined in greater detail, the picture changed.

Instead of eleven or twelve, the evidence from his teeth suggested that he was probably much younger, somewhere around eight or nine years old when he died.[3] Modern reviews of his development commonly place him in roughly that range, although the precise relationship between his dental age, skeletal devel-

opment and the growth pattern of Homo erectus remains a subject of scientific discussion.

That made his body considerably more interesting.

He was already around 1.6 metres tall.

An eight- or nine-year-old child standing approximately 160 centimetres tall sounds enormous to us, and the obvious temptation is to imagine a modern eight-year-old, stretch him vertically until he reaches Turkana Boy's height and conclude that *Homo erectus* children must have been giants.

Unfortunately, evolution rarely makes things quite that convenient.

Turkana Boy was not simply a modern child enlarged to unusual proportions, because the timing and pattern of his growth were probably different from ours. His teeth appear to have developed more quickly than those of modern humans, and researchers continue to debate exactly how his skeletal and dental development fitted together.[3]

So we know approximately how tall the boy was when he died.

Trying to work out how tall the man would have become is another matter entirely.

The adult who never existed

For many years, one of the most familiar reconstructions of Turkana Boy suggested that, had he survived into adulthood, he might eventually have reached around 185 centimetres.

It is an impressive number.

It is also a very good demonstration of what happens when scientists change the assumptions behind a calculation.

The early estimates depended partly on applying something resembling a modern human growth pattern to the young skeleton. If Turkana Boy still had the sort of adolescent growth spurt experienced by modern humans ahead of him, there was obviously quite a lot of growing left to do.

But what if he didn't?
As researchers reconsidered his age and the way *Homo erectus* may have matured, different growth models produced very different adults from exactly the same dead boy.

One study, published in 2010, explored growth patterns intermediate between those of modern humans and chimpanzees and arrived at a preferred adult-height estimate of only about *163 centimetres.*[4]
Five years later, another analysis challenged some of those assumptions and concluded that considerably more growth may still have remained, producing estimates of roughly 176–180 centimetres.[4]

That is a substantial disagreement.

And it is tempting to ask which group got it wrong.

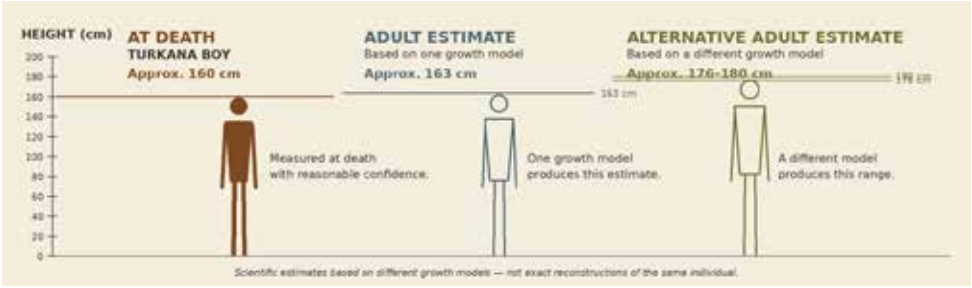
Perhaps neither did.

Both were trying to answer a question for which an important piece of evidence is permanently missing: *Turkana Boy never became an adult.*

We cannot measure the man he would have become, because that man never existed. Researchers therefore have to construct models from the evidence that did survive and make assumptions about how individuals like him grew, and when those assumptions change, the answer can change with them.

That is not science failing to make up its mind.

That is science showing its working.



Perhaps one day new fossils or better methods will narrow the range. Perhaps they will produce yet another answer.

For now, we know considerably more about the boy who died than about the man he might have become.

And perhaps that is appropriate.

Because it is the boy we actually found.

So what exactly was he?

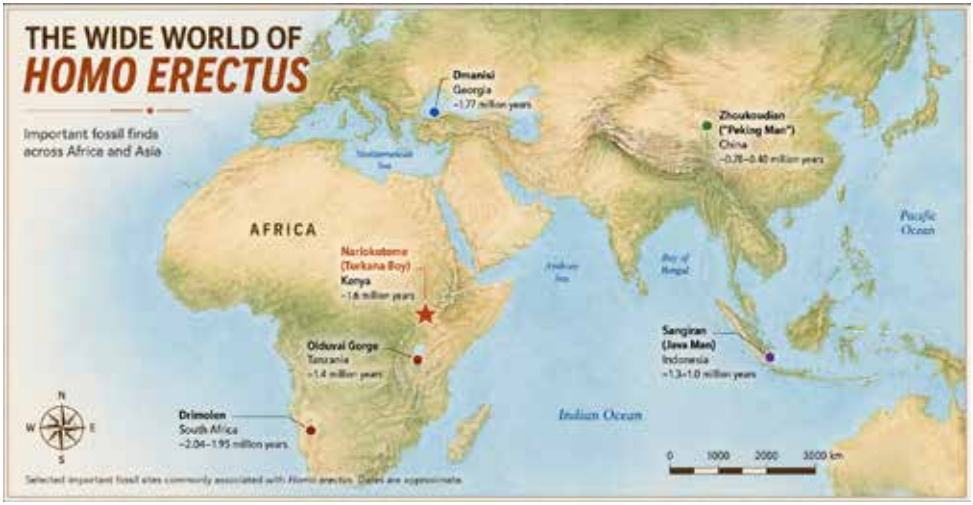
A name for someone who didn't need one

Once researchers had established that the bones from Nariokotome belonged to a young member of the human family, another question appeared almost immediately: *what should they call him?*

Not Turkana Boy. That part was easy.

The difficult part was deciding where he belonged in the increasingly complicated family tree of human evolution.

Today, the skeleton is most commonly placed within *Homo erectus,* a remarkably successful human species that appeared in Africa roughly two million years ago and, in one form or another, spread far beyond the continent. Fossils generally assigned to *Homo erectus* have been found across large parts of Africa and Asia, making it one of the most geographically widespread and long-lived members of our evolutionary family.[5]



That sounds reassuringly straightforward.

It isn't.

Some researchers prefer to use the name *Homo ergaster* for the earlier African fossils, including Turkana Boy, while reserving *Homo erectus* primarily for re-

lated populations found later in Asia. Others regard those differences as variations within a single, geographically widespread species and therefore use *Homo erectus* for both the African and Asian material.

The argument is not simply about names. Behind it lies a much more interesting question: *how different do two groups have to become before we decide that they represent different species?*

That is difficult enough when the animals are alive.

It becomes considerably harder when everyone involved has been dead for more than a million years.

Nature did not make the boxes

We humans are extremely fond of classification.

We give living things names, arrange them into groups and subgroups, draw lines between species and construct family trees showing how we think they are related. This is enormously useful, because without classification biology would quickly become a conversation in which everybody was talking about that rather large animal over there and hoping everyone else knew which one they meant.

The problem is that evolution did not happen in boxes.

There was never a morning on which a group of earlier humans woke up, looked at one another and discovered that they had become *Homo erectus*. Populations changed gradually over enormous stretches of time, while groups moved, became separated, met others, adapted to different environments and accumulated differences that we can now see only through the incomplete fossil record they left behind.

The labels came much later.

We invented them because they help us describe what we find.

And occasionally scientists disagree about where one label should end and another begin.
Turkana Boy sits directly inside one of those disagreements.

Many researchers see enough similarities between the African fossils and the classic Asian *Homo erectus* material to treat them as members of the same broadly defined species. Others place greater emphasis on differences in skull shape and other anatomical features and find it useful to distinguish the African form as *Homo ergaster.*[5]

Neither choice changes the bones.

It changes the box in which we put them.

That distinction is worth remembering, because scientific names can sometimes make uncertainty look more settled than it really is. A Latin name printed beneath a fossil has a reassuring air of authority, but the fossil itself does not know which label is sitting underneath it.

Turkana Boy certainly didn't.

Human — but not us

Whichever name we choose, there is much less disagreement about something more important for our story.

Turkana Boy was not *Homo sapiens*.

He was not a strangely proportioned modern child living in prehistoric Kenya, and we should resist the temptation to reconstruct him simply by taking a boy from today, removing his clothes and placing him on an African plain.

His skull was different from ours, with a lower and more elongated braincase, a more pronounced brow region and a brain substantially smaller than the average modern human brain. His face and jaws differed from ours as well, and the details of his growth suggest that childhood itself may have proceeded differently from the unusually long developmental period characteristic of modern humans.[6]

Yet below the neck, some things become surprisingly familiar.

His body was tall and relatively slender, with long legs and arm-to-leg proportions much closer to modern humans than to earlier hominins such as the australopithecines. Those proportions suited an animal that spent its life moving efficiently on two legs across the ground, and they belong to a body plan that, in broad terms, we would recognise.[6]

If we could somehow stand at a safe distance and watch Turkana Boy walking with his group, therefore, the experience might be rather strange.

The head would tell us immediately that we were not looking at a modern human. The body might make us look twice.

This mixture of familiar and unfamiliar is one of the reasons the skeleton matters so much. Earlier members of the human family already walked on two legs, of course, but by Turkana Boy's time we see a body that had become much more

recognisably adapted to sustained terrestrial movement, with long lower limbs and proportions approaching those of later humans.

The human story had not reached us.

But it had reached something that, from a distance, might already have looked remarkably close.

So what shall we call him?

For this book, we do not need to solve a taxonomic argument that professional palaeoanthropologists have not completely settled themselves.

Where classification matters, we will generally follow the broad usage and refer to Turkana Boy as *Homo erectus,* while acknowledging that *Homo ergaster* is also widely used for the African material to which he belongs.[5]

That tells us where we are placing him scientifically.

For almost everything else, however, we have a considerably better name.

Turkana Boy.

Because our real question is not whether the correct word on a label should be *erectus* or *ergaster.*

We want to know what sort of world could support a boy like this.

What did the land around him look like? What moved through it? Where was the water, what happened when the seasons changed, and what did a body with those long legs actually have to do all day?

For those questions, we need to stop looking at the museum label.

We need to go outside.

The world outside

Not the Turkana we know today

If we could leave the bones behind, step out through the museum door and somehow continue walking for another 1.6 million years into the past, one of the first mistakes we might make would be to imagine that Turkana Boy's world looked much like the country around Lake Turkana today.

It didn't.

The modern Turkana Basin is strikingly beautiful, but much of it is dry, hot and sparsely vegetated, with broad areas of exposed earth and rock surrounding a lake whose waters seem almost improbable in such an arid landscape. Stand there today and it is easy to imagine that the same sun has been beating down on essentially the same country forever.

The rocks tell us otherwise.

During the period in which Turkana Boy lived, the basin was still warm and strongly seasonal, but the environment around Nariokotome included considerably more grassland, woodland and vegetation associated with rivers and watercourses than much of the surrounding region supports today. Fossil soils, sediments, pollen and plant remains, together with the animals preserved in the same geological record, allow researchers to reconstruct a landscape that was neither dense tropical forest nor the almost bare semi-desert a visitor might encounter in parts of Turkana now.[7]

It was a mosaic.



Open grassland gave way to patches of woodland, while trees and denser vegetation followed rivers and other places where water persisted. Some areas would have offered shade and plant foods, others long views across more open country, and all of them would have changed as rain came and went.

For a boy living there, those differences were not scenery.

They were information.

A landscape that moved with the seasons

The East African landscape has never been particularly interested in remaining the same throughout the year, and Turkana Boy would have lived with seasonal change in a much more immediate way than most of us do today.

When rain came, dry ground could become wet remarkably quickly, vegetation responded, temporary pools and channels filled, and animals changed where they moved and gathered. When the rains disappeared again, water became harder to find, grasses dried, some plants stopped producing useful food and the movements of animals changed once more.

We should be careful here, because the sediments beneath our feet can tell us that water once flowed through a particular place and fossil pollen can tell us something about the vegetation that grew in a region, but neither can provide a weather forecast for the Tuesday on which Turkana Boy happened to be hungry.

What they give us instead is the larger pattern.

His world changed.

And anyone who intended to survive in it had to notice.

A place that provided water at one time of year might offer little later. A channel that appeared harmless when dry could carry moving water after heavy rain, while vegetation that provided shade, fruit, roots or other resources would not necessarily do so forever.

This means that knowing the landscape was not simply a matter of remembering where something was.

It also meant knowing *when it was likely to be there*.

That distinction would have mattered enormously to people whose survival depended on finding what the landscape provided rather than buying what they needed from somewhere else.

A modern traveller can arrive in Turkana with bottled water, food, maps, weather forecasts and a vehicle capable of carrying all of them.

Turkana Boy's group had the landscape.

Fortunately, they had probably spent their entire lives learning how to read it.

Water changes everything

Of all the things that shaped this world, water may have been among the most important.

Rivers and channels created greener corridors through otherwise more open country, supporting vegetation and attracting animals that needed to drink.

Wet areas could provide food and shade, but they also attracted predators and other animals that made approaching water something considerably more complicated than simply walking to the edge and bending down.

Water was therefore both resource and risk.

A child growing up in such an environment would not need a scientific understanding of hydrology to know this. Long before he could explain why water appeared in one place and disappeared from another, he could have learned which routes led towards it, which parts of the bank were safe to approach and which signs suggested that something else had reached the water first.

We cannot recover Turkana Boy's personal knowledge from his skeleton.

But we can recover enough of his environment to understand why such knowledge would have mattered.

And the landscape around water contained something else that helps us reconstruct his world.

Animals.

A remarkable number of them.

He was not alone out there

The fossil record of the Turkana Basin reveals a landscape inhabited by a rich community of large mammals, reptiles, birds and smaller animals, many of which would have looked at least partly familiar to somebody visiting East Africa today, while others belonged to branches of the animal family tree that have since disappeared.[8]

There were grazing and browsing animals, pigs and antelopes, hippopotamuses associated with water, crocodilians waiting where animals came to drink, members of the elephant family moving through the landscape and giraffids feeding at heights unavailable to most other herbivores.

Some would have been potential food.

Some would have competed for resources.

Some could kill him.

Many probably required nothing more dramatic than knowing where they were. This is where it becomes easy for us to make another mistake.

We look at reconstructed prehistoric animals and think of them as wildlife, because that is how most of us encounter large African animals today. We visit a reserve, climb into a vehicle, take photographs and become excited when somebody points towards something moving between the trees.

Turkana Boy did not live in a wildlife reserve.

There was no boundary between the human world and the animal world.
It was the same place.



An animal moving between distant trees might therefore deserve no more attention from him than a familiar bird outside our window deserves from us, while another sound from vegetation beside the water could make everybody stop immediately.

He would not have known the names we use for those animals today, and certainly not the scientific names by which palaeontologists classify their fossil remains. Yet a name is not required in order to know an animal.

A boy can recognise the shape of something he has seen many times before, the prints it leaves in soft ground, the sound it makes when disturbed, the places where it usually feeds and the distance at which it is sensible to stop approaching.

In his world, that knowledge was considerably more useful than taxonomy.

This is also why, when we later try to imagine a few days in Turkana Boy's life, the animals should not all arrive on cue as though somebody had organised a prehistoric safari for him.

Some may be seen.

Others may be heard.

A few may leave nothing more than tracks in the mud.

And some of the most important animals in his day may be the ones he knows are nearby and therefore chooses never to see at all.

Reading a world without writing

None of this required Turkana Boy to be a scientist, and it certainly did not require him to understand his environment in the terms we use today.

He did not need words such as *ecosystem, seasonality, predator* or *Giraffidae*.

He needed the knowledge those words describe.

A footprint in damp ground could reveal that an animal had passed; broken vegetation might suggest its direction, while birds gathering somewhere ahead could indicate food, danger or simply something worth investigating. A smell carried by the wind might be meaningless to us and immediately familiar to somebody who had encountered it hundreds of times before.
Much of that knowledge leaves no fossil.

There is no archaeological layer containing *the things Turkana Boy noticed on the way to water.*

So we cannot claim that he personally recognised a particular bird call, understood every track or knew exactly how a crocodilian hunted.

What we can say is that he lived in an environment where recognising such information could have obvious survival value, and that the people around him had generations of experience from which a child could learn.

This is an important boundary in our reconstruction.

The fossils can give us the animals.

Geology can give us the landscape.

Other evidence can help us reconstruct climate and vegetation.

What Turkana Boy himself knew about all of it has to remain an inference.

A very reasonable inference in many cases.

But an inference nonetheless.

That distinction will become important later, when we allow the bones to become a boy again.

For now, however, there is another clue lying all over this landscape, and unlike knowledge, it has an annoying habit of surviving.
Stone.

Stones that became tools

A stone is not a tool

Stone has one enormous advantage for anyone attempting to reconstruct human behaviour after more than a million years.

It survives.

Wood rots, skin disappears, plant fibres decay and the hands that once made and used things eventually vanish with the rest of the body, but a piece of stone can remain in the ground for an astonishing length of time, still carrying marks made when somebody struck it deliberately.

That is why some of our clearest evidence for what early humans could *do* comes not from their skeletons, but from stones.

By Turkana Boy's time, stone-tool technology was already ancient. Early members of the human family had been deliberately producing sharp-edged stone tools for well over a million years before he was born, and archaeological sites in East Africa show that tool-making traditions continued and changed through the period in which *Homo erectus* lived.[9]

The basic idea can sound almost absurdly simple.

Take one stone.

Hit it with another.

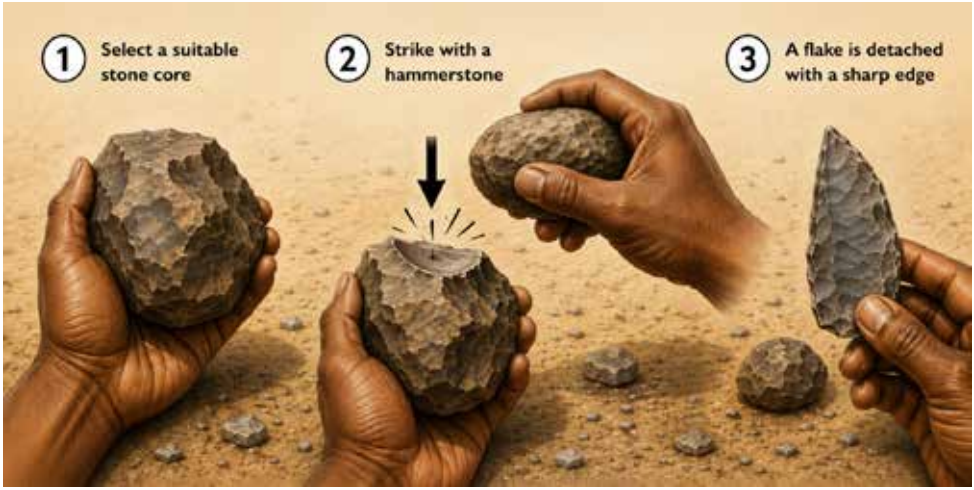
Get a sharp piece.

If that were really all there was to it, archaeology would be considerably easier.

The important part is not merely striking the stone, but understanding – whether through experience, observation or learned practice – which material will fracture usefully, how the stone should be held, where the blow should land and how much force it requires. A badly placed strike may produce nothing useful at all, while a well-directed one can detach a flake with an edge sharp enough to cut flesh, hide, plant material or other things encountered during daily life.

The difference between a stone and a tool therefore lies partly in something that does not fossilise.

Knowing what to do with it.



The sharp piece may be the important piece

To modern eyes, there is a temptation to look for the object that most resembles a finished tool.

A beautifully shaped handaxe immediately looks intentional. We recognise symmetry, edges and form, and it satisfies our expectation that a tool ought to look like somebody made it.

A simple flake is easier to overlook.

It may look like nothing more than a broken piece of stone.

But that broken piece can be extraordinarily useful.

When a suitable stone is struck correctly, the detached flake may have an edge sharp enough for cutting almost immediately, without requiring hours of additional shaping. The remaining core can sometimes be struck again to produce further flakes, which means that a skilled toolmaker is not simply smashing stones and hoping something useful happens.

There is structure in the process.

Archaeologists can often recognise this structure from the scars left where flakes were removed, from the shape of the flakes themselves and from the characteristic fracture patterns produced when suitable stone is deliberately struck. By reconstructing the sequence of blows, experimenting with the same raw materials and comparing archaeological assemblages, researchers can begin to un-

derstand how tools were made even though the person who made them disappeared more than a million years ago.[9]

This does not mean that every broken stone found near an ancient human site is a tool.

Nature is perfectly capable of breaking rocks without human assistance.
The archaeological problem is therefore not simply to find something sharp, but to identify repeated patterns showing deliberate production.

One suspicious stone proves very little.

Hundreds or thousands of pieces displaying the same kinds of controlled fracture are considerably harder to blame on bad weather.

Oldowan, Acheulean — and a world that refuses to change neatly

The names archaeologists give stone-tool traditions make the story sound rather orderly.

One of the earliest widespread technologies is known as the *Oldowan,* characterised broadly by cores and deliberately produced sharp flakes. Later, another tradition appears in the archaeological record: the *Acheulean,* famous particularly for larger cutting tools, including handaxes and other deliberately shaped implements.[10]

It would be wonderfully convenient if one technology had simply stopped on Friday and the new one had begun on Monday.

That is not what the evidence shows.

Technologies overlap, older methods continue to be useful, different tasks require different tools, and archaeological sites preserve only part of what people were doing. By Turkana Boy's time, Acheulean technology already existed in East Africa, but simpler flake-and-core technologies certainly had not become useless merely because somebody had learned how to make something more elaborate.[10]



A sharp flake still cuts.

Evolution may be complicated, but meat remains surprisingly practical about these things.

This is important when we try to imagine Turkana Boy's world, because we should not equip every member of his group with a beautifully symmetrical handaxe simply because handaxes existed during his period.

Archaeology tells us that people were making stone tools.

It tells us what kinds of technologies existed.

It can sometimes tell us what particular edges were used for.

What it cannot do is reach across 1.6 million years and place a particular tool into Turkana Boy's hand.

Did Turkana Boy make tools?
We don't know.

There is no stone flake with his fingerprints preserved on it, no tool kit buried beside his skeleton and no archaeological evidence allowing us to say that KNM-WT 15000 personally sat down one morning and made anything at all.

But that is not quite the same as saying we know nothing.

Turkana Boy belonged to a population living in East Africa at a time when stone-tool manufacture was well established, and he lived in a world in which such technology had existed for an immense span of time.

The archaeological record therefore gives us very good reason to regard stone tools as part of the technological environment inhabited by people like him.[10]

Whether a boy of his age could already make useful flakes is a different question.

Modern humans often learn complicated practical skills long before adulthood, particularly when those skills are visible in everyday life, and there is no obvious reason to imagine that learning in an early human group began only when childhood ended. Yet the fossil record cannot tell us when Turkana Boy first watched someone strike stone, when he first tried it himself or how competent he might have become.

This is precisely where evidence ends and reconstruction begins.

In the factual part of this book we can say that stone-tool technology existed, that people in his broader world produced sharp flakes and more complex implements, and that making them required controlled actions rather than random stone breaking.

Later, when we allow ourselves to imagine a few days in his life, we may let the boy watch somebody who is better at it than he is, try a blow himself, get it wrong and learn by watching what the more experienced person does differently.

We cannot prove that scene happened.

But we can explain exactly why we think it c*ould* have happened.
And that is the bargain this book makes with the reader.

A small flash of something else

There is one more interesting thing about striking stone.

Sometimes it produces a spark.

Certain rocks, depending on their mineral composition and what they are struck against, can generate visible sparks, and that immediately raises an irresistible thought when we are dealing with early humans.

Fire.

We need to be careful.

A spark is not evidence that Turkana Boy or the people around him deliberately made fire, and producing an occasional spark while working stone is a very long way from knowing how to turn one into a flame.

Fuel must be suitable, conditions must be right, and a person must understand enough of the process to make it happen deliberately and repeatedly.

So if a spark ever jumped from stones being struck in Turkana Boy's world, it may have done nothing more impressive than disappear.

Perhaps nobody noticed.

Perhaps somebody did.

The stones cannot tell us.

What they can tell us is that early humans were manipulating materials with considerable skill, producing edges capable of changing what their hands alone could do.

A stone could open skin. Cut meat. Scrape material. Help break down a carcass. And perhaps perform tasks for which the evidence has disappeared completely

because the material being worked was wood, bark or plants rather than bone.

For Turkana Boy's world, this was technology.

Not primitive technology.

Not a failed attempt at the technology we have today.

The technology that solved problems in his world.

And once we begin asking what those tools might have been used on, we arrive at something every living human eventually has to solve, regardless of species, century or technology.

What was for dinner?

Fire

The evidence becomes difficult

Fire is one of those things that seems so completely human that it is difficult to imagine human life without it.

We cook with it, warm ourselves with it, use it for light, shape materials with heat and have spent thousands of years becoming steadily better at producing, controlling and containing it. Even today, when most of us no longer need a fire to survive the night, we still seem remarkably fond of sitting around one.

The problem begins when we ask a very simple question.

When did this start?

Unfortunately, fire is not nearly as cooperative with archaeologists as stone.

A stone struck deliberately can preserve the scars of that action for more than a million years. Fire leaves ash, charcoal, burned bone, heated stone and altered sediment, but many of those things can also be produced by natural fires, moved after burning or destroyed long before an archaeologist arrives.

Finding evidence that something burned is therefore only the beginning.

The much harder question is whether *someone deliberately controlled the fire*.

And by the time of Turkana Boy, that question becomes extremely interesting.[11]

Africa was already burning

Natural fire was certainly part of the world in which early humans evolved.

Dry vegetation, seasonal conditions and lightning provide all that is required for bushfires to occur without human assistance, and early humans living in open and wooded East African environments would almost certainly have encountered burned landscapes during their lives.

They did not have to invent fire in order to see it.
The landscape could provide it perfectly well on its own.

This matters because encountering fire and *making fire* are two completely different achievements, and between them lies another possibility that may have been enormously important: using naturally occurring fire without knowing how to create it.

Imagine a lightning strike igniting dry vegetation. Once the dangerous front of the fire had passed, the landscape could contain glowing branches, smouldering wood, burned plants and animals caught by the flames. Any early human approaching afterwards would have been confronted with something simultaneously dangerous and potentially useful.

Whether Turkana Boy's people regarded such fire as useful is something his skeleton cannot tell us.

But the opportunity was certainly there.



Burned does not necessarily mean cooked

Archaeologists searching for early fire face an awkward problem: nature is perfectly capable of producing much of the evidence they are looking for.

Burned bone beside early stone tools sounds exciting.

Until we remember that a bushfire can burn bone.

Charcoal sounds promising.

Until we remember that trees burn without human permission.

Heated sediment may indicate a fire burned repeatedly in one place, but even then researchers must establish that the material has remained where it was heated and that later geological processes did not move or alter it.

The strongest evidence for controlled fire therefore usually comes not from one burned object but from context: where the burning occurred, how intensely material was heated, whether the evidence is concentrated in a particular place, what

else was found with it and whether natural processes provide a convincing alternative explanation.

In other words, archaeology would very much like the fire to leave a note saying: *Made here deliberately by early humans.*

Fire has so far declined to cooperate.

There is evidence — but what does it mean?

Several African sites have produced evidence suggesting that early humans interacted with fire hundreds of thousands of years before the widespread hearths associated with much later humans, and some proposed examples extend back towards the period in which Turkana Boy lived.[11]

One particularly important site for our story lies in Kenya itself.

At *FxJj20 AB at Koobi Fora,* researchers identified patches of reddened sediment that experimental work suggested had been heated to temperatures consistent with burning. The deposits are very old — around 1.5 million years — placing them remarkably close in time and region to the broader world of Turkana Boy.[12]

That sounds almost like the answer we wanted.

Almost.

The evidence demonstrates that heating occurred.

It does not provide a photograph of *Homo erectus* sitting around a campfire.

Researchers have therefore debated whether such early traces represent deliberate fire use, repeated occupation around fire, naturally occurring burning or processes that are more difficult to reconstruct after such an enormous interval. Other early African sites have added further pieces to the discussion, and newer analytical methods have become increasingly good at detecting heating that cannot be recognised simply by looking for obvious charcoal or blackened earth.[12]

The picture is becoming more interesting.

It is not becoming simple.

And that is exactly why we should resist the attractive illustration of Turkana Boy sitting comfortably beside a neat little campfire roasting dinner.

We do not have the evidence to give him that.

Using fire is not the same as making it

There is another distinction that is easily lost when we ask whether early humans "had fire".

That phrase can mean several different things.

A group might recognise that recently burned meat was edible without controlling fire at all. They might approach a landscape after a natural fire and exploit resources exposed or altered by burning.
They might learn to take a naturally burning branch and keep it alive for some time. Eventually, people might become capable of maintaining fire, transporting embers and using them repeatedly.

Only later still does another ability become necessary if fire is to become completely independent of nature:
making it from nothing whenever you need it.

These behaviours do not have to appear at the same moment.

Indeed, it would be rather surprising if they did.

The first human interaction with fire may therefore have been less like an invention and more like a very long relationship in which generations gradually discovered that this dangerous natural phenomenon occasionally did useful things.

Unfortunately, behaviours such as carrying a glowing branch leave very little archaeological evidence.

An ember transported for an afternoon does not fossilise particularly well.

So when we imagine possible stages between avoiding natural fires and routinely controlling them, we must recognise that we are constructing reasonable possibilities rather than reading a sequence directly from the ground.

The distinction matters.

It also leaves us with a wonderfully large space labelled:
We don't know yet.

What about the sparks?

Stone-tool manufacture introduces an irresistible possibility.

Striking certain minerals can produce sparks, and people who repeatedly worked stone may therefore have seen brief flashes produced by their own actions.

A spark, however, is not a fire-making technology.

For that, the spark must be capable of igniting suitable material, the material must be prepared correctly, and the person doing it must understand the process well enough to reproduce the result deliberately. The archaeological evidence from Turkana Boy's period does not allow us to say that his people possessed that knowledge.

So our spark must remain exactly what it is.

A spark.

It may have vanished before anyone noticed it.

Someone may have watched it disappear.

Under the right conditions, perhaps a spark occasionally caught something capable of smouldering.

We cannot turn any of those possibilities into an event in Turkana Boy's life simply because they make a good story.

What we *can* do is acknowledge that early humans were repeatedly striking stones together in a world containing dry vegetation, natural fires and materials capable of burning.

After that, the evidence falls silent.

And silence is not permission to make it say whatever we like.

Could Turkana Boy have tasted cooked meat?
Here the question becomes particularly tempting.

If animals were occasionally killed or injured by natural fires, then early humans living in fire-prone landscapes could have encountered flesh altered by heat without having controlled the fire themselves.

Would they have eaten it?

We don't know.

Could they have?

Certainly.

Heating changes meat. It alters texture and flavour, and sufficiently cooked flesh can become easier to chew and digest. The much larger evolutionary question of when cooking became a regular part of human diet remains controversial, particularly because biological arguments for early cooking do not by themselves tell us when people actually began controlling fire for that purpose.[13]

For Turkana Boy, therefore, we should keep two questions separate.

Could he have encountered naturally cooked meat?

Yes. There is nothing extraordinary about that possibility in a landscape where natural fires occurred.

Can we say that his people routinely cooked their food?

No.

Those two answers give us more than enough room for the story later.

We can allow an imagined boy to find an animal scorched by a natural bushfire, notice that the meat beneath the burned surface smells and tastes different and decide that he likes it.

We do not need to give him a barbecue.

Humanity has plenty of time for that.



So — did they have fire?
The most accurate answer is also the least satisfying.

Maybe, in some sense.

Evidence from sites broadly approaching Turkana Boy's period makes it reasonable to take early interaction with fire seriously, and research continues to improve our ability to detect ancient heating. There is also no reason to doubt that early humans repeatedly encountered natural fire.

What remains uncertain is the behaviour behind the evidence.

Did people merely exploit landscapes after they burned?

Did some groups preserve naturally obtained fire?

Were fires deliberately maintained at particular sites?

Had anybody learned to create fire reliably?

Were any of these behaviours widespread, or did they appear locally and disappear again?

We cannot answer all of those questions from the evidence currently available.

And perhaps this is one of the nicest examples in our entire story of how science actually works.

A hundred years ago, researchers had fewer methods with which to investigate microscopic traces of heating.
Today they can examine changes in sediments, minerals and bones that earlier archaeologists could not detect. Tomorrow, another technique may change the picture again.

So this book does not need to pretend that the question has been settled.

We can simply say what the evidence allows us to say *now*.

Turkana Boy lived in a world where fire occurred naturally.

People living broadly around his time may already have interacted with fire in ways that went beyond simply running away from it.

Exactly how far that relationship had developed remains uncertain.

And somewhere between the flames, the stones and the bones lies another question that is almost impossible to avoid.

Because whether his meat was raw, accidentally roasted or something in between, Turkana Boy still had to eat.

So what was on the menu?

What was for dinner?

Eating before there were recipes

Whether Turkana Boy ever tasted meat changed by fire is uncertain, but there is one part of his diet about which we can be considerably more confident.

He had to eat.

Quite a lot, probably.

He was young, his body was growing, and simply moving through the landscape required energy. At around 1.6 metres tall already, he was not a small child, and whatever pattern of growth *Homo erectus* followed, building and maintaining a body like his required a steady supply of calories.

The difficulty, of course, was that none of those calories came in packets.

There were no fields planted specifically for human consumption, no domesticated animals waiting to become dinner and no reliable store of food that could simply be opened when somebody became hungry.
Food had to be found in a landscape where almost everything else was also trying either to eat, avoid being eaten or protect whatever food it had found for itself.

Turkana Boy's menu was therefore determined less by preference than by opportunity.

And fortunately for us, some of those opportunities have left traces.

Meat leaves marks

One of the strongest lines of evidence for meat eating among early humans comes from animal bones.

When stone tools are used to remove flesh from a carcass, they can leave characteristic cut marks on the surface of bone, while breaking bones to reach the marrow inside can produce another set of recognisable fractures. Archaeologists have found both kinds of evidence at Early Pleistocene sites in East Africa, demonstrating that hominins were processing animal carcasses with stone tools long before Turkana Boy lived.[14]

This tells us something important.

Meat was part of the diet. It does not tell us how the animal became meat.

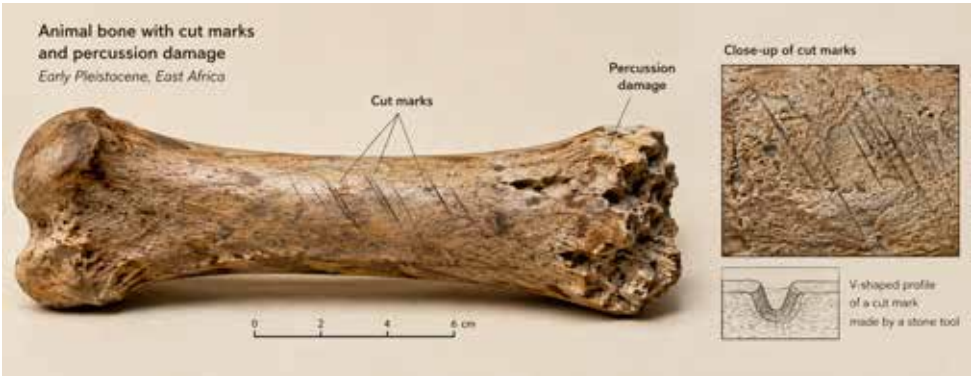
For many years, discussions of early human subsistence were often framed as a choice between two rather dramatic possibilities: hunters went out and killed animals themselves, or scavengers waited until more capable predators had finished and then collected whatever remained.

The real world was probably less interested in choosing sides.

Early humans could have obtained animal foods in different ways depending on circumstances. A small animal might be caught directly, an injured animal might provide an opportunity, while a carcass left by a large predator could still contain useful flesh, organs, marrow and other tissues. Even bones that looked thoroughly unpromising from the outside might contain a valuable package of fat and energy inside.

A hyena might regard the same package with considerable enthusiasm.

This occasionally created a problem of ownership.



The important point is not whether every piece of meat came from hunting or scavenging.

It is that early humans had tools capable of processing carcasses and knew how to use them.

Again, the stone tells us something about the hand.

The useful part inside the bone

Marrow deserves special attention because it is easy for a modern reader to look at a stripped animal bone and conclude that dinner is over.
For an early human carrying a suitable hammerstone, it might not have been.
The long bones of large mammals contain fatty marrow, and archaeological evi-

dence of deliberate bone breakage shows that early hominins sometimes opened bones to reach it.[14] A carcass that had already been visited by predators could therefore still contain food inaccessible to an animal unable to break the remaining bones efficiently.

This may have made stone technology useful in a rather satisfying way.
A predator has the teeth.

The human has a rock.

Evolution does not award points for elegance.

The result is what matters.

This does not mean that Turkana Boy personally wandered around smashing every bone he encountered, but it gives us a behaviour firmly enough grounded in the archaeological record to include in the world around him. A child watching experienced members of a group open bones would have had ample opportunity to see that something apparently empty could still contain food.

Whether he was already good at doing it himself is another matter.

As anyone who has ever watched a child learn to use a hammer will appreciate, understanding the general principle and consistently hitting the right place are not necessarily the same skill.

Dinner was not necessarily meat

Bones preserve beautifully compared with most foods, and this creates an important distortion in our picture of ancient diets.

If Turkana Boy ate meat and somebody left the bones behind, those bones might survive.

If he ate fruit, leaves, roots, seeds or other plant foods, lunch usually disappeared completely.

Plants are inconsiderate like that.

As a result, the archaeological record can make meat appear more dominant simply because bones and stone tools preserve far better than most plant material. Evidence from tooth wear, dental calculus, stable isotopes and comparisons with environments inhabited by early *Homo* all contribute to a broader picture in which plant foods almost certainly remained important.[15]
Exactly which plants Turkana Boy ate is much harder to reconstruct.

The vegetation available would have varied with habitat and season, and different underground storage organs, fruits, seeds, leaves and other edible resources may have been used when available. We should therefore resist the temptation to invent a prehistoric shopping list for which the evidence does not exist.

What we can reasonably imagine is variety.

Some foods required searching.

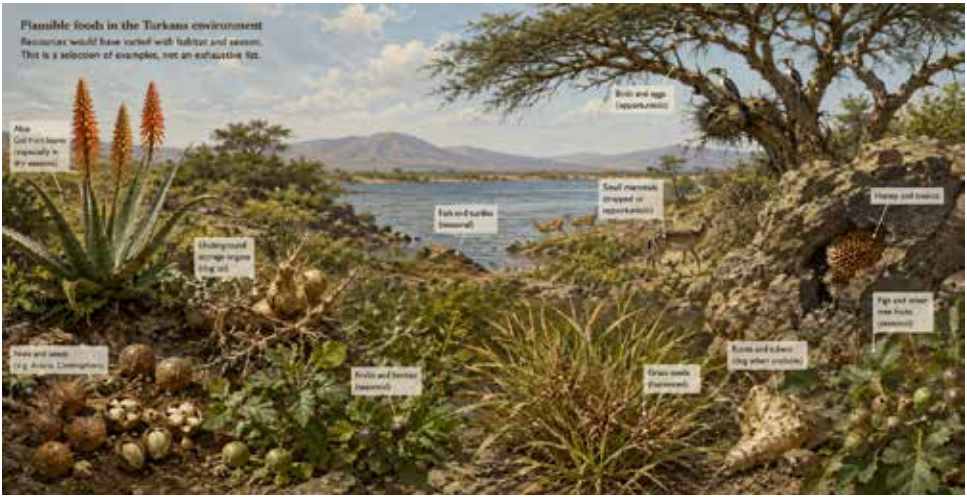
Some required digging.

Some appeared only at certain times.

Some probably tasted better than others.

And some things were almost certainly eaten because they were available rather than because anyone considered them particularly delicious.

That last part of human nutrition has survived remarkably well.



Finding food was knowledge

The interesting thing about diet is therefore not merely what entered Turkana Boy's mouth.

It is everything that had to happen first.
Someone had to know where edible plants grew and when they were likely to be available. Somebody had to recognise which parts could be eaten and which were useless or dangerous. Carcasses had to be found, assessed and sometimes

approached in a landscape containing other animals with equally strong opinions about who should eat them.

Tracks could matter. Birds could matter. Smell could matter. Memory certainly mattered.

A child growing up in this world would therefore be learning food long before anyone deliberately sat down to teach him about it. Every journey with older and more experienced members of the group provided opportunities to watch where they looked, what they picked up, what they ignored and, perhaps most importantly, what they absolutely refused to put in their mouths.

We cannot reconstruct those lessons individually.

But we should not mistake the absence of a classroom for the absence of education.

Knowing how to find food was knowledge.

Knowing how to open it was technology.

Knowing when not to approach it could be survival.

And all three had to be learned somewhere.

Who ate first?

This is where the evidence becomes quiet again.

We know early humans ate animal foods and used stone tools to process carcasses. We have good reason to think plant foods contributed significantly to their diet. We can reconstruct parts of the environment from which those foods came.

What we cannot reconstruct from Turkana Boy's bones is dinner etiquette.

Did food get shared?

Did adults routinely give food to children?

Did individuals keep what they found?

Were particular foods divided differently from others?

How much cooperation surrounded the acquisition and processing of a carcass?

There are fascinating arguments about food sharing, cooperation and social behaviour in human evolution, but moving from those broader arguments to a detailed description of Turkana Boy's group would take us beyond what the evidence can support.

So we will leave the seating plan for dinner unwritten.

There probably wasn't a seating plan anyway.

What matters is that obtaining enough energy to survive in this landscape was not merely a matter of being hungry and looking around until something edible appeared. It required accumulated knowledge of animals, plants, seasons, places and tools.

And Turkana Boy had been alive long enough to have learned at least some of it.

How much?

Again, the bones refuse to say.

But those bones contain another clue about the body all this food had to support, because Turkana Boy was built for something humans like him probably did extremely well.

Moving.

Built to move

Those legs are trying to tell us something

When researchers reconstructed Turkana Boy's body, one feature was particularly difficult to overlook.

His legs were long.

Not merely because he was already tall, but because the proportions of his limbs were different from those of several earlier members of the human family. Compared with australopithecines, early African *Homo erectus* had moved towards a body in which the legs were considerably longer relative to the trunk and the arms played a much smaller role in locomotion.[16]

To us, this begins to look familiar.

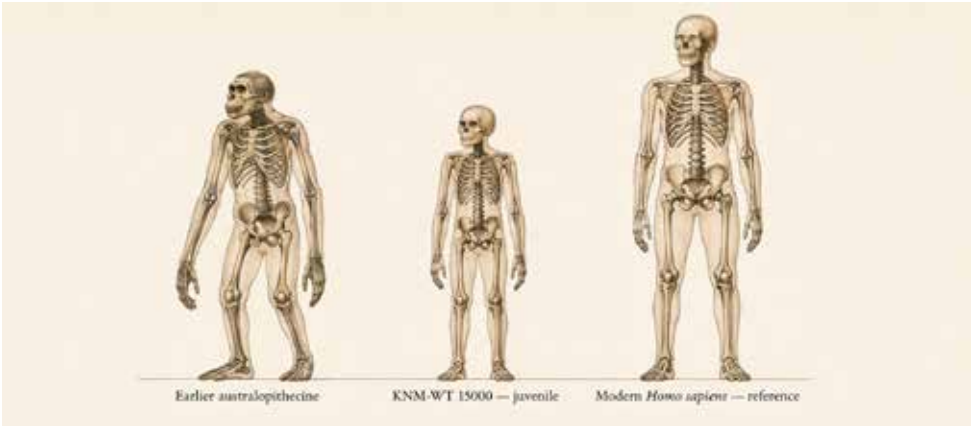
We are long-legged animals ourselves, although this is easy to forget because most of us spend a remarkable proportion of our lives finding increasingly comfortable ways not to use them.

For Turkana Boy, legs mattered.

His body belonged to an animal committed to moving on the ground, upright on two feet, through a landscape in which water, food, stone and other resources were not necessarily located conveniently beside one another.

The question is therefore not simply why Turkana Boy had long legs.

The more interesting question is what those legs allowed a human like him to do.



Walking is expensive if you are badly designed for it

Moving a body requires energy, and if an animal spends a significant part of its life travelling across the ground, even relatively small improvements in the efficiency of that movement can become important.

Longer legs allow longer steps, while the combination of limb proportions, joints, muscles and an upright body determines how much energy must be spent moving a particular distance. Biomechanical modelling of the Nariokotome skeleton suggests that its proportions were well suited to efficient bipedal walking, particularly over longer distances or at greater speed.[17]

This does not mean that Turkana Boy spent his childhood training for a marathon. He had nowhere to register.

It means that the body represented by his skeleton was well suited to a life in which travelling on foot mattered.

Another intriguing study has suggested that these proportions may also have made carrying relatively light loads surprisingly efficient. A model based on KNM-WT 15000 indicated that carrying something equivalent to around 10–15 percent of body mass could have been mechanically economical compared with the proportions reconstructed for much earlier hominins.[17]

That possibility matters because early humans did not necessarily move through the landscape empty-handed.

Stone could be carried from places where useful raw material was available. Food could be moved. A useful tool might be worth keeping rather than manufacturing another one every time it was needed, and whatever other materials people carried in wood, bark, hide or plant fibres have largely disappeared from the archaeological record.

Once again, the skeleton cannot tell us what Turkana Boy personally carried.

But it can tell us that his body was increasingly well suited to going somewhere with it.

Walking farther changes the size of your world

There is another consequence of efficient movement that is easy to miss.
If travelling becomes less costly, *the usable landscape becomes larger.*

A water source farther away can still be reached. Stone from another part of the landscape can be brought back. Animals can be followed over greater distances,

and a group can move between places that would be much more expensive to connect if every kilometre demanded considerably more energy.

This does not mean that long legs alone caused *Homo erectus* to spread across Africa and eventually far beyond it. Human dispersal is far too complicated to reduce to one anatomical feature.

But *Homo erectus* is the first human species known to have dispersed very widely, with fossils appearing across large parts of Africa and Asia, and that geographical expansion occurred in a body increasingly suited to efficient terrestrial travel.[18]

The two facts belong in the same conversation.

We should simply resist making one explain everything about the other.

Evolution is rarely so obliging.

Walking — or running?

This is where the legs become even more interesting.

Some researchers have proposed that the changing proportions seen in early *Homo* were useful not only for walking efficiently, but also for *endurance running*. Later anatomical changes within the genus Homo have been discussed in connection with running over longer distances, and aspects of KNM-WT 15000's lower limb are consistent with fully terrestrial bipedal locomotion and have been interpreted as possibly supporting endurance-running capabilities.[19]
The word *possibly* matters.

We cannot examine Turkana Boy's skeleton and determine how many kilometres he could run, how fast he could cover them or whether running played an important part in obtaining food. Nor does evidence that his anatomy was capable of efficient running demonstrate that people like him routinely pursued animals over enormous distances.

There is a difference between a body being *capable of something* and knowing how often its owner actually did it.

A modern human skeleton is capable of running a marathon.

This tells us remarkably little about whether its owner ever intended to. So we should keep the evidence where it belongs.

Turkana Boy had a body well adapted to upright terrestrial movement. His long legs would have supported efficient travel, and researchers have good reason

to investigate whether bodies like his were also increasingly suited to endurance running.

Whether Turkana Boy himself enjoyed running is, fortunately, beyond the reach of palaeoanthropology.

A body for the heat

Long legs were only part of the shape researchers reconstructed.

Turkana Boy was also relatively narrow-bodied, producing the tall, slender form that distinguishes him from more compact earlier hominins. In a hot environment, such proportions can be advantageous because a body with relatively more surface area can lose heat more effectively than a shorter, broader one.[20] The Smithsonian similarly describes his long-legged, narrow-shouldered form as typical of humans adapted to hot, dry climates.

That does not mean evolution had designed him according to an engineering drawing marked *East Africa – hot version*.

Natural selection does not work like that.

But over generations, body proportions that performed well under particular environmental and behavioural pressures could become increasingly common, and by Turkana Boy's time the human body had acquired a form remarkably well suited to spending substantial time moving upright through warm, open environments.

That combination matters.

Long legs help move the body efficiently.

A slender form helps deal with heat.

Free hands can carry things.

And suddenly the landscape we described in the previous chapters begins to look different.

Distances that appeared large on our imaginary map were distances a body like this was equipped to cross.

The Kenyan runner we should probably leave alone

There is an irresistible modern comparison here. Kenya is famous for producing

some of the world's finest distance runners, and anyone looking at Turkana Boy's long, slender legs might be tempted to draw a line from a boy at Nariokotome 1.6 million years ago directly to the athletes racing today.

It is a lovely thought.

It is also much too simple.

Modern Kenyan running success involves training, culture, geography, physiology, individual variation and many other factors, and there is no scientific basis for turning Turkana Boy into the distant grandfather of Kenyan athletics simply because both happen to involve long legs. Studies of modern Kenyan runners do find associations between lower-leg morphology and running economy, but that is a very different question from demonstrating evolutionary continuity from KNM-WT 15000.[21]

So we shall behave ourselves. Mostly.

We can at least observe that long before Kenya began collecting Olympic medals, there was already a very long-legged young human walking around beside Lake Turkana.

After that, we will leave the comparison where it belongs.

With a smile rather than a footnote pretending to prove it.

But where was he going?

The skeleton has now given us another piece of the world we are trying to reconstruct.

Turkana Boy was not simply capable of standing upright.

His body belonged to a form of human for whom travelling efficiently across the ground had become central enough to be written into the proportions of the skeleton itself. Studies of KNM-WT 15000 and other early African *Homo erectus* material reinforce the picture of fully terrestrial bipedal locomotion and increasingly human-like limb proportions.

But efficient legs only solve part of the problem.

A boy can walk a very long way and still arrive somewhere useless.

To move successfully through Turkana Boy's world, someone had to remember where water could be found, recognise places where food was likely to appear,

understand the movements of animals and know when a familiar route had become dangerous.

That kind of information is much harder to excavate.

There are no fossilised memories.

There are no footprints labelled *I knew where I was going*.

Yet inside Turkana Boy's skull there was a brain, and although its size can be measured far more easily than its thoughts, that brain had one job above all others.

It had to solve the problems of his world.

Brain for his world

Smaller than ours — but that is not the same as stupid
Turkana Boy had a smaller brain than the average modern human.

That much is relatively straightforward.

The inside of his skull allows researchers to estimate the volume once occupied by his brain, and KNM-WT 15000 had a cranial capacity of roughly *880 cubic centimetres*. A typical modern adult human brain occupies considerably more, averaging somewhere around 1,300–1,400 cubic centimetres, although there is substantial variation between individuals.[22]

Put those numbers beside one another and a very tempting conclusion appears.

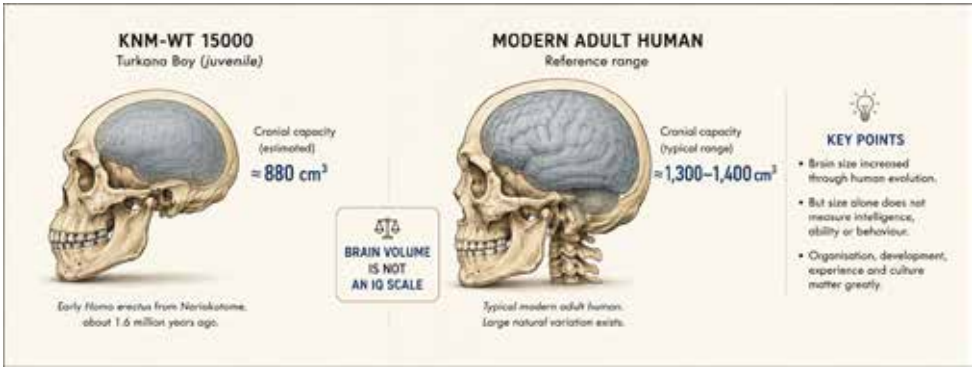
Smaller brain.
Less intelligent.

Unfortunately, brains are not buckets, and intelligence is not simply the amount we can pour into them.

Brain size matters in human evolution, and the general increase in brain size through parts of our evolutionary history is real and scientifically important. But brain volume alone does not provide an IQ score, nor does it tell us exactly what an extinct human could understand, remember or learn. Organisation matters, body size matters, development matters, and — most frustratingly for anyone hoping for a simple number — behaviour does not fossilise inside the skull.

We can measure the container.

The contents are considerably more difficult.



He had already survived for years

There is another way of approaching the question.

Instead of asking whether Turkana Boy could have solved the problems we give children today, we can ask what sort of problems his own life presented.

The list becomes impressive rather quickly.

He lived in a landscape where water and food changed with place and season, where some animals were useful and others dangerous, where routes had to be remembered and where recognising a track, a smell, a sound or a change in vegetation could matter. People around him belonged to a technological tradition in which stone was deliberately selected, struck and transformed into useful cutting edges, while food had to be located, recognised, processed and sometimes defended from other animals.

None of this required algebra.

Algebra would have been remarkably useless.

What it required was a brain capable of learning about *his world*.

And by the time he died, Turkana Boy had already been doing that for years.

We do not know what he personally knew, of course. His skeleton cannot tell us whether he was unusually observant, hopeless at making stone flakes or the child everybody wanted nearby when looking for water. Those would be stories, not evidence.

But he belonged to a population that survived.

Generation after generation, people like him found enough food, avoided enough danger, raised enough children and passed on enough useful behaviour for their descendants to continue.

That is not proof of modern intelligence.

It is evidence of competence.

And competence is perhaps the more useful word.

Intelligence depends rather heavily on the examination

If we could somehow bring Turkana Boy into a modern classroom, the result would probably be disastrous.

He could not read. He could not write. He knew nothing about numbers as we use them, maps, electricity, computers, traffic lights or why an adult would become upset if he picked up a telephone and hit it with a stone.

We might conclude rather quickly that he knew almost nothing.

Then we could reverse the experiment.

Take one of us and place us beside Lake Turkana 1.6 million years ago without clothes, water, food, tools, telephone, GPS or somebody conveniently explaining which direction to walk.

The examination would now contain different questions.

Where is the nearest reliable water?

Which tracks are fresh?

Which animal made that sound?

Is that plant edible?

Is something watching us from the vegetation?

Where can suitable stone be found?

Which direction leads back to the group?

And perhaps most importantly:
Why did everyone else suddenly start running?

Our educational advantages might begin to feel slightly less impressive.

This does not mean Turkana Boy was secretly as cognitively sophisticated as a modern human. We have no evidence for that, and the differences between his brain and ours were real.

It means only that calling him stupid tells us very little.

His brain was not failing to understand our world.

His brain had to solve the problems of his world.

And apparently brains like his solved enough of them.

Knowledge does not need a book

This raises another problem for us, because most of the knowledge Turkana Boy required was exactly the kind least likely to leave archaeological evidence.

Suppose somebody in his group knew that a particular plant could be eaten only at a certain stage of growth.

That knowledge leaves no fossil.

Suppose another person could distinguish the track of a dangerous animal from one that could safely be followed.

No fossil.

Suppose someone knew where water could usually be found after several dry days, how to choose a useful piece of stone or which bird calls meant that something interesting was happening nearby.

Still no fossil.

Yet knowledge of this kind can be extraordinarily sophisticated.

Even among modern humans, literacy and practical intelligence are not the same thing. A person can struggle to read a page and nevertheless possess an extraordinary understanding of animals, weather, machinery, plants, construction or a landscape in which another person would be completely lost.

Turkana Boy lived long before writing existed.

That does not mean he lived before knowledge.

The important question is therefore not whether his group had education.

It is *how knowledge moved from one person to another.*

Learning without school

Children learn an astonishing amount simply by being near other people.

They watch. They imitate. They try things. They fail. They try again.

Eventually they become the person whom a younger child watches.

There is no reason to imagine that this basic process began with *Homo sapiens*. Indeed, the existence of persistent stone-tool traditions strongly suggests that

practical behaviours could be maintained across generations, although exactly how much depended on imitation, deliberate teaching or other forms of social learning remains debated.[23]

A child growing up among toolmakers did not need a scheduled lesson entitled *Introduction to Flake Production*.

He could watch somebody choose a stone.

See where it was struck.

Hear the sound of a successful blow.

Try it himself.

And discover that knowing what someone else did is not always the same as being able to do it.

That particular educational principle remains fully operational today.



Over years, thousands of small observations could accumulate into practical knowledge.

Not all of it needed to be taught deliberately.

Not all of it required words.

And that brings us to one of the most fascinating questions of all.

Did Turkana Boy talk?
We don't know.

Soft tissues associated with speech do not fossilise conveniently, and although bones can provide clues about anatomy relevant to breathing and vocalisation, they cannot preserve a conversation.

Researchers have long debated the vocal abilities of *Homo erectus,* including what the Nariokotome skeleton might tell us about breathing control, the spinal cord and the anatomy involved in producing speech. Earlier interpretations of the skeleton suggested limitations that might have restricted sophisticated speech, but later work showed that some of those anatomical features could be explained in other ways and should not be treated as straightforward evidence that Homo erectus lacked spoken communication.[24]

So once again we reach an answer that is less dramatic but more accurate. We cannot reconstruct Turkana Boy's language.

We do not know whether people like him possessed anything approaching the complex spoken languages used by modern humans.

But communication does not begin with grammar.

Modern primates communicate through calls, facial expressions, posture and gesture, while humans themselves continue to communicate enormous amounts without saying anything at all. Social learning, cooperation and group life can therefore exist across a wide range of communicative abilities.

Turkana Boy's group may have used vocal sounds.

They may have used gestures.

They almost certainly reacted to one another's behaviour.

Exactly how rich that system was is beyond our evidence.

If Turkana Boy could speak to us, therefore, the most interesting thing about the conversation might be that we would probably understand none of it.

Assuming, of course, that he was having a conversation at all.

A brain we can measure, a mind we cannot
This is perhaps the most important distinction in the chapter. Turkana Boy left us a skull. The skull gives us measurements.

From those measurements, comparisons with other fossils and the archaeological world around people like him, we can investigate the evolution of the human brain and make cautious inferences about behaviour.

But Turkana Boy did not leave us his thoughts.

We cannot know whether he was curious. Whether he was stubborn.
Whether he frightened easily. Whether he enjoyed making tools.

Whether he noticed things before the adults did. Whether he had a favourite person in the group.

Those belong to the boy we will later create in our story, not the boy preserved by science.

And when we reach that story, we must remember the difference.

We are allowed to imagine a boy who watches closely, learns from mistakes, recognises familiar animals and gradually understands his surroundings, because none of those behaviours requires us to give him abilities that contradict the world documented around him.

But we must never pretend that his bones told us he did those things.

The skull gives us a brain of about 880 cubic centimetres.

The archaeology gives us a world containing tools, movement, food gathering and social learning.

Everything else requires caution.

Which leaves us with an intriguing human problem.

A group can contain several individuals who know different things.

One may be particularly good at finding animals, another at working stone, while someone else may remember where water remains during the dry season.

Knowledge becomes much more powerful if it can be shared.

And once people begin living, learning and surviving together, the next question is no longer about the individual boy.

Who were the people around him?

The people around him

One skeleton does not make a society
Turkana Boy was found alone.

At least, that is how the fossil record presents him to us.

We have his bones, but not the skeleton of a mother lying beside him, a father a few metres away or a neat circle of relatives waiting patiently for archaeologists to reconstruct the family photograph.

The circumstances in which his body was preserved tell us almost nothing directly about the people with whom he lived.

That can create a misleading picture.

Because although KNM-WT 15000 entered science as one individual, there is every reason to understand him as a member of a social species. Humans and our closest primate relatives do not normally survive as solitary animals, and the technological and behavioural world associated with early *Homo* makes considerably more sense when knowledge, resources and experience can exist across more than one individual.[25]

Precisely what those groups looked like is much harder to say.

We do not know whether Turkana Boy lived primarily among close relatives, how many individuals usually stayed together, whether groups regularly divided and rejoined, or whether particular people held positions we would recognise as leaders.

Even the apparently harmless word *family* can smuggle modern assumptions into a world where we do not know the social arrangements.

So perhaps the safest word is also the simplest.
Group.

There were other people around him.

After that, the evidence becomes less talkative.

Nobody needs to know everything
Living in a group has an obvious advantage that has nothing to do with friendship.

Knowledge can be distributed. One individual does not need to be equally good at recognising tracks, finding water, selecting stone, processing food, remembering distant places and noticing danger if several individuals travel together and their experience can somehow benefit the others.

This does not mean that Turkana Boy's group contained an official toolmaker, tracker and water specialist, each reporting for duty in the morning.

We have no evidence for anything so organised.

But variation between individuals is ordinary biology. Some people notice things faster than others. Some acquire particular practical skills more easily. Older individuals have had longer to accumulate experience, while younger ones can observe what they do and gradually acquire parts of that knowledge themselves.

A group therefore contains something an individual never can.

More than one lifetime of experience.

An older member may remember a place a younger one has never visited. Someone who has repeatedly worked stone may recognise useful material more quickly. Another individual may notice animal signs that somebody else walks straight past.

None of these people needs a job title.

They simply need to be different.



The advantage of being young

Turkana Boy's age becomes interesting again here.

If he was around eight or nine years old when he died, he had lived long enough to acquire a considerable amount of experience, but he was still growing. His teeth and skeleton tell us that much.

They do not tell us what he had learned.

Yet childhood, whatever its precise duration in *Homo erectus,* creates an opportunity for learning before an individual has reached full physical maturity. A young member of a social group can watch more experienced individuals, imitate their behaviour and discover through repeated success and failure which actions work.

This need not involve formal teaching.

Imagine a child watching someone strike a stone.

The first time, he sees a blow.

After many occasions, he may begin noticing that the experienced person does not strike everywhere. A particular stone is chosen. It is turned. The angle changes. Some pieces are discarded while others are kept.

Eventually the child may try.

Perhaps nothing happens.

Perhaps entirely the wrong piece breaks off.

Perhaps the stone lands on his finger.

The archaeological record is regrettably unable to distinguish between these educational outcomes.

But repeated technological traditions demonstrate that somehow, across generations, early humans succeeded in transmitting enough practical behaviour for stone-working knowledge not to disappear every time an experienced individual died.[26]

Somebody learned from somebody.

We simply cannot introduce them by name.

Children are useful before they are adults

There is another modern assumption worth leaving behind.

Being a child does not necessarily mean spending the day waiting for adults to do everything.

In many human societies, children gradually participate in everyday subsistence activities long before adulthood, learning while also contributing in ways appropriate to their size, experience and ability. We cannot simply transfer the behaviour of any modern hunter-gatherer society directly onto *Homo erectus,* but the broader principle reminds us that childhood and usefulness are not opposites.

Turkana Boy had eyes. He had ears. He could walk. He could carry something. And he had already spent years in the same world as the adults around him.

Exactly what he did with those abilities is unknown, but it would be equally speculative to imagine him as a passive passenger through childhood, protected from every practical task until some prehistoric birthday announced that he was finally ready to participate.

Learning probably happened because life was happening around him.
A journey to water was also an opportunity to learn the route.

Finding a carcass was also an opportunity to watch it being processed.

Seeing someone reject a plant could be information worth remembering.

Hearing everybody react instantly to a particular animal sound could teach a lesson without anyone needing to explain it.

Sometimes education consists simply of noticing that everyone older than you has suddenly become extremely interested in moving in the opposite direction.

Experience has value

This also gives older members of a group a potentially important role.

Physical strength matters in a demanding environment, but strength is not the only useful resource an individual can possess. A person who has lived through many seasonal cycles may remember where water remained during an unusually dry period, where useful stone could be found or how animal movements changed when conditions altered.

Whether *Homo erectus* commonly survived to advanced ages, and what social roles older individuals played, are questions that cannot be answered neatly

from Turkana Boy's skeleton. We should therefore avoid creating the wise grandmother, respected elder or tribal chief simply because such characters make a story convenient.

But experience itself requires no speculation.

The longer someone successfully lives in an environment, the more opportunities that individual has had to encounter it under different conditions.

Memory can therefore become a resource.

And unlike a stone tool, it weighs nothing when the group moves.
The difficulty is getting the information from one brain into another.
Which brings us back to communication.

They did not need our language to cooperate

We have already admitted that we do not know whether Turkana Boy spoke anything we would recognise as language.

Fortunately, cooperation does not require Shakespeare.

A gesture can direct attention.

A call can signal danger.

A facial expression can stop a child reaching towards something.

An individual can follow another without receiving a spoken explanation of the destination, and a young person can imitate an action without anyone supplying a verb for it.

Modern primates demonstrate that surprisingly complex social interactions can occur through combinations of vocalisation, gesture, posture, facial expression and learned expectations. That does not tell us exactly how *Homo erectus* communicated, but it warns us against treating the alternatives as either modern language or complete silence.[27]

There was an enormous range of possibilities between the two. For our purposes, that is enough.

We can reasonably reconstruct people responding to one another, directing attention, learning by observation and coordinating simple actions without deciding whether Turkana Boy possessed words for *water, stone, elephant* or *come over here immediately because something unpleasant is behind you*.

The behaviour can sometimes be supported more confidently than the vocabulary.

Safety in numbers — usually
A group also changes the relationship between a relatively vulnerable human and the other animals sharing the landscape.

Turkana Boy was tall for his age and belonged to a species capable of using tools, but he had no claws, no enormous canine teeth and no particular ability to outrun every predator interested in him.

One human alone is limited.

Several humans watching different directions are less so.

More eyes can notice danger. Several individuals can react together. Young members can remain near more experienced ones, and food or useful material can potentially be carried or processed by more than one pair of hands.

This does not make the group safe.

Early Pleistocene Africa contained predators considerably better equipped for direct arguments than *Homo erectus* was.

The sensible solution to many encounters was probably not victory.
It was avoiding the argument.

And that requires noticing the danger early enough.



Here our imagined Turkana Boy can eventually become particularly useful. Not because his skeleton tells us he was an exceptional tracker. It doesn't.

But because, when we later enter the fictional part of this book, we are allowed to give our boy an individual personality and abilities consistent with his world. We can let him notice a track before someone else, recognise an animal sound or see a motionless snake that an adult has missed.

The scientific evidence cannot tell us that *this boy* did those things.

It can tell us that noticing such things would have been useful.

That is exactly the boundary we promised not to cross without telling the reader.

Perhaps there was no ordinary day

When we put all of this together, Turkana Boy's social world begins to emerge – not as a reconstructed tribe with names, ranks and customs, but as something much simpler and probably more realistic.

People moved together. They learned from one another. Different individuals had different amounts of experience.

Children were surrounded by opportunities to observe.

Knowledge could survive the individual who first discovered it because somebody else could learn the behaviour.

And the group itself became part of the technology of survival.

There is something important hidden in that last point.

We often tell the story of human evolution through objects: this species made this tool, that species used this technology, later humans invented something else.

But a stone tool is useful only while somebody knows how to make and use it.

A route exists only while somebody remembers it.

Knowledge of an animal matters only if it can influence behaviour.

The most important thing early humans carried from one generation to the next may therefore have been something archaeology can never dig out of the ground.

What other people had learned.

And now we are approaching the limit of what the bones, stones and sediments can safely tell us.

We know quite a lot about the body. We can reconstruct parts of the landscape. We know stone tools existed.

We have evidence about food, movement and the animals sharing the environment.

We can make cautious arguments about learning and social life.

But eventually every scientific reconstruction reaches a point where the evidence stops.

For Turkana Boy, that point leaves us with one final question.

What do we actually know – and what are we about to imagine?

What we know — and what we don't

Where the evidence ends

We have come a surprisingly long way from the small piece of bone Kamoya Kimeu noticed on the ground at Nariokotome in 1984.

From the skeleton, researchers have reconstructed much of the body of a young *Homo erectus* who lived around 1.6 million years ago. We know that he was already tall, with long legs and a relatively slender body, and that his proportions belonged to a form of human well adapted to moving efficiently across the ground.

His teeth have helped researchers estimate his age.

His skull gives us an estimate of his brain size.

The rocks and sediments around Lake Turkana help reconstruct the landscape in which humans like him lived, while fossil animals tell us something about the other creatures sharing it.

Stone tools show that early humans possessed technologies capable of cutting and processing materials.

Animal bones bearing cut marks and percussion damage tell us that meat and marrow were being processed.

And traces of ancient burning raise the fascinating possibility that humans broadly around this period were beginning to interact with fire in ways we still do not completely understand.

None of this is fantasy.

These are pieces of evidence left behind by a world that disappeared more than a million years ago.

But there is an equally important list of things the evidence does *not* tell us.

The boy is still missing

We do not know what Turkana Boy called himself.

We do not know what the people around him called him either.

We do not know who his mother was, whether he knew his father, how many people travelled with him or what relationships existed between them.

We do not know whether he was good at making stone tools.

We do not know whether he recognised animal tracks particularly well.

We do not know whether he was brave, cautious, curious, stubborn or easily distracted.

We do not know whether he had something resembling spoken language, whether he had ever seen somebody deliberately maintain a fire or whether he had tasted meat changed by heat.

We do not even know what he was doing on the last morning of his life.

Science has given us the skeleton.

It has not given us the boy.

And there is a difference.

There is another kind of question
This does not mean we have to stop.

It means we have to change the question.

Until now we have been asking:
What do we know?

From this point onward we can ask:
What could have happened?

That is a very different question, and it gives us considerably more freedom – but not unlimited freedom.

We cannot give Turkana Boy a bow and arrow, because those belong to a vastly later technological world.

We cannot put cattle beside his camp, because domesticated cattle did not belong to his time.

We cannot give him a modern language simply because dialogue would make the story easier to write.

And we cannot casually place modern animals, plants or landscapes around him when the fossil and geological evidence tells us something different.

The imagination is free to move.

But it has to stay inside the world the evidence has built.

That is the rule for what follows.

A possible boy

The Turkana Boy you are about to meet is therefore not a scientific reconstruction of the personality of KNM-WT 15000.

Nobody can reconstruct that.

He is *one possible boy.*

We will allow him to be curious because children can be curious.

We may let him make mistakes because learning requires them.

He can recognise animals he has encountered before, remember routes through a familiar landscape and learn practical skills by watching people who are better at them.

Perhaps he will notice something an adult misses.

Perhaps an adult will notice something that saves him.

He may encounter fire.

He may taste something new.

He may become frustrated when something does not work and try again later. None of those events is preserved in his bones.

But each time we allow something to happen, it must be compatible with what we know about his body, his environment, the animals around him and the technological world in which people like him lived. Where the evidence is strong, we will follow it. Where the evidence is uncertain, we will remain within what seems reasonably possible. And where we simply do not know, we will say so.

That is the agreement between the science and the story.

A few days, 1.6 million years ago
So now we can finally put the measurements away.

We can leave KNM-WT 15000 lying carefully in the scientific literature, where he has been measured, compared, classified and discussed for decades.

And we can return to Nariokotome. Not in 1984. Much earlier. The lake is different. The landscape is greener.

There are animals moving beyond the trees whose descendants would still look familiar to us today, while others belong to branches of life that will eventually disappear.

Somewhere nearby, people are beginning another day.

Among them is a boy with long legs, a growing body and a brain that has spent years learning the problems of this particular world.

We do not know his name.

So we will use the one history has given him.

Turkana Boy.

From here, the evidence can only take us so far.

The rest is a story.

A FEW DAYS, 1.6 MILLION YEARS AGO

Let the boy live

The first thing the boy noticed when he opened his eyes was hunger, which was hardly unusual, because his stomach had a habit of waking before the rest of him and seemed to have very clear ideas about what the coming day ought to contain.

Food, preferably, and quite a lot of it.

For a while he remained where he was, listening as the people around him slowly began to move. Someone coughed nearby, a younger child made a small unhappy sound and received an equally unhappy response from the woman beside it, while somewhere beyond the place where they had spent the night the birds had already begun their morning argument in the trees. The boy closed his eyes again, perhaps hoping that morning might reconsider, but morning had been doing this for several billion years and was unlikely to change its habits for him.

Eventually he sat up and looked across a landscape slowly emerging from the darkness. The air was still cool enough to feel pleasant against his skin, although experience told him that this would not last, and beyond the scattered trees and lower vegetation the first pale light was beginning to catch the water in the distance. He knew this place, not because anyone had drawn it for him or marked paths through it, but because he had walked across it often enough for the shape of the land to exist somewhere inside his head. He knew where the ground became soft near the water and where animals sometimes crossed, he remembered the direction from which they had come, and he knew where shade was likely to remain after the sun had climbed higher. Somewhere out there, he also hoped, was breakfast, and at the moment this was the part of his geographical knowledge that interested him most.



The people who knew things

By the time the light had strengthened, most of the others were awake and preparing to move, although nobody announced where they were going and nobody appeared to require an explanation. People simply gathered what mattered and began moving in a direction that, for reasons the boy did not always understand, had apparently become the direction in which everyone was going.

To him, these were simply the people around him. He did not think of them as a tribe, and he certainly did not think of them as *Homo erectus,* because nobody had yet informed them that they belonged to a species and they appeared to be managing perfectly well without knowing it.

What mattered was that different people knew different things, and the boy had lived among them long enough to know whom it was worth watching. One of the older women could find food where he saw little more than leaves, roots and dirt, while another seemed able to look at marks on the ground and understand that an animal had passed, which way it had gone and sometimes whether following it was worth the trouble. A broad-shouldered man had a remarkable ability to make heavy bones reveal the food hidden inside them, while another could pick up an ordinary-looking stone, turn it once or twice in his hand and somehow know where it ought to be struck.

The boy particularly liked watching him.

There was something irritatingly simple about the way the man worked. He would examine a stone for a moment, turn it in his hand, strike it with another, and a thin flake with a sharp edge would break away almost exactly where he seemed to expect it. The boy had watched this often enough to reach a conclusion children have probably been reaching since there were children.

He could do that.

He found a stone of his own, turned it carefully in his hand in what he was quite certain was exactly the same way, chose another stone and struck. A useless piece broke from the wrong place, leaving him with something that was neither the shape he wanted nor particularly sharp. He adjusted the stone and tried again, this time with greater determination and no greater success, which was beginning to suggest that the man had somehow made the whole business look considerably easier than it actually was.

The man glanced across while the boy struck again and achieved nothing worth keeping. Eventually he reached over, took the stone from him and turned it only slightly before handing it back. There was no explanation and apparently no need for one; the boy looked at the changed angle, then at the man, raised the

other stone and struck again.

Crack. This time a thin piece came away.

It was not as good as the flakes the man produced, and perhaps not even particularly impressive by the standards of anyone who knew what he was doing, but it had an edge, and the boy turned it in his hand with considerably more satisfaction than the object probably deserved. Then, because there was one obvious property still requiring investigation, he ran a finger along the edge.

A tiny line of blood appeared almost immediately.

He pulled his finger away and stared first at the blood and then at the flake, which had answered his question rather more efficiently than he had expected. There are several ways of discovering that a tool works. This was one of them. The boy kept it.

He carried it with him when the group moved away, holding it for a while before finding a place where he could keep it without discovering the sharpness of the edge a second time. Soon his attention moved elsewhere, as it usually did, and the stone ceased to be the most interesting thing in his world.

But he did not throw it away.

The next morning

By the following morning the stone was still with him.

This was not necessarily evidence of careful planning. The boy had simply kept something that appeared useful, and when he woke hungry again – his stomach having successfully survived another night and resumed its usual responsibilities – the flake was where he had left it.

The group had moved some distance the previous day before settling again, and the country around them was slightly different here, with thicker vegetation in places and more signs of animals having passed during the night. The boy was already awake when the older woman began searching among plants not far away, and this time he watched her hands as much as the plants themselves.

She pulled something from the ground. The boy moved closer. She removed part of it, put another part into her mouth and continued searching.
He looked at the place where she had been.

Then he began searching too.

For some time he found nothing except dirt, leaves and several objects that appeared extremely unlikely to improve breakfast, but eventually his fingers closed around something beneath the surface. He pulled.

It resisted. He pulled harder and nearly fell backwards when it came free. The woman looked towards him. The boy held up what he had found. She did not knock it from his hand.

That seemed promising.

He examined it, then looked at what she was eating and attempted to remove the same part in roughly the same way. It was more difficult than she had made it appear. He pulled at it with his fingers, bit at one end, changed his grip and finally remembered the stone.

The flake came out.
Its edge was not beautiful. Nobody was likely to admire the workmanship, and the man who had helped him make it might have had several professional criticisms if professional criticism had yet been invented. But it cut. Not perfectly, and not where the boy intended on the first attempt, but well enough. He worked at the plant until the part he wanted came free, inspected the result and ate. The woman had already moved farther away. She had not congratulated him. She had not needed to. The boy followed, still chewing.

The country around them
For the next few days nothing happened that the boy would have considered particularly unusual, which is not the same as saying that nothing happened.

They walked. Sometimes they moved for long stretches before stopping, while at other times the day seemed to consist of shorter movements between places where there was something worth finding, eating or investigating. The boy did not know where they were going every time the group set off, and it is doubtful that the question would even have occurred to him in quite the way it occurs to us. People moved, so he moved with them, carrying very little except the stone flake he had made and whatever else seemed worth keeping until it ceased to be useful.

Each evening they stopped somewhere different, and each morning the landscape had changed a little. Sometimes water was close enough to be seen through the trees, while on other mornings there was none in sight. The ground beneath their feet could be hard and pale for much of a day before becoming softer where vegetation grew more thickly, and occasionally the boy saw places where new green growth appeared between older, dry stems. Animals noticed such differences too. Their tracks became more numerous in some places and al-

most disappeared in others, while birds gathered noisily wherever food or water gave them a reason to do so.

The people around the boy noticed these things as well.

Nobody appeared to wander simply for the pleasure of discovering what might be over the next hill. Directions changed. Places that looked perfectly acceptable to the boy were passed without stopping, while at other times someone turned towards a patch of vegetation or a distant line of trees for reasons that became obvious only much later.

One afternoon an older member of the group changed direction towards higher ground.

The boy followed with the others.

For some time there was nothing ahead to explain the decision. The sun was still high, the country increasingly dry, and the boy's earlier breakfast had become sufficiently distant for his stomach to have resumed negotiations. He searched the ground and vegetation as they walked, occasionally finding something worth examining and more often finding nothing worth eating.

They continued over the rise.

Then the boy saw a shape in the distance. A broad tree stood slightly apart from the vegetation around it, its crown uneven and one heavy branch extending almost sideways before turning upwards again.

He knew that tree.

The recognition came before he understood why it mattered. He had approached it from another direction before, perhaps more than once, and as the group continued downhill, other pieces of the landscape began falling into familiar positions. A darker patch of trees lay farther to one side. The ground dipped beyond them. Somewhere below, hidden from where they were walking, there should be water.

The boy looked towards the older person leading them and then back at the country ahead.

He knew where they were going now.

When they eventually reached the lower ground, water appeared between the trees almost where he had expected it.

Nobody congratulated him. Nobody even knew that there was anything to congratulate.

The boy went to drink.

Smoke

It was perhaps two mornings later when the boy smelled smoke.

He noticed it before he saw anything unusual, a faint dry bitterness carried towards him and then away again by the breeze. The smell itself was familiar. Fire moved through this country from time to time, particularly when vegetation was dry enough to burn, and the boy had seen the distant smoke before.

This time the fire was no longer burning where they were going.

The group reached the edge of the burned country later that morning, and the difference was impossible to miss. Pale grass had become blackened stems, leaves had vanished from bushes, and grey ash lifted around their feet as they walked. Here and there a tree had survived with damage only on one side, while smaller plants had been reduced to dark shapes against the ground. Farther ahead, thin smoke still rose from something that had not completely finished burning.



The boy watched where he stepped. Then another smell reached him. He stopped. This was not wood. It was meat.

That immediately made the burned landscape considerably more interesting.

Others had noticed it too, and the group moved towards the smell until they found the animal lying near a patch where the fire had burned particularly hard.

Whatever chance it once had of escaping was no longer relevant. Part of the body was blackened and badly burned, and by modern standards it presented a breakfast that would probably have resulted in several telephone calls to the appropriate authorities.

The boy had no appropriate authorities. He did, however, have considerable interest in breakfast.

One of the adults approached the carcass and opened part of it with a stone flake. Beneath the burned outer surface the flesh looked different from meat the boy usually encountered, and when a piece eventually reached him, the first thing he noticed was that it was still warm.

He bit into it. The texture surprised him. It came apart more easily between his teeth, and the taste was richer than the scraps of raw meat he knew from other carcasses. He chewed for a moment, looking at what remained in his hand, then took another bite.

There was no revelation.

No sudden understanding of what heat had done, no moment in which humanity's future relationship with cooking appeared before him, and certainly no reason to imagine that this particular boy was the first member of his species ever to taste meat changed by fire.

It simply tasted good. So he ate it.

And then he looked for more.

Something still burning

The boy might have forgotten the fire once there was no more meat to occupy him, but something nearby continued to smoke.

A fallen branch lay partly buried in ash. Most of it looked dead and grey, although when the breeze moved across one end a narrow crack beneath the surface glowed red for a moment before fading again.

The boy crouched beside it. He watched. The red appeared again. He reached towards it and touched the wood. His hand came back considerably faster.
For a moment he stared at his fingers and then at the branch with the expression of someone who had been deliberately deceived. The surface had looked grey. Grey things were not supposed to bite.
He put his fingers into his mouth and continued watching from a more sensible distance.

When the breeze returned, the glow strengthened again.

The boy found a stick and pushed at the branch. The grey surface cracked, revealing brighter red beneath, and for a while he experimented with moving it, scraping at the ash and watching what happened when air reached the hotter material underneath. Eventually he blew towards it himself.

Ash flew directly into his face.

He recoiled, coughing and blinking, but when he looked again the red had become brighter.

That was interesting.

When the others eventually began moving away, the boy remained beside the branch for a moment longer. Then he picked it up by the cooler end and followed them.

Nobody had asked him to bring it, and nobody had told him what he might do with it. He simply had something interesting that had not yet stopped being interesting.

For a while the movement seemed to help. Air passed across the glowing end and occasionally the red brightened, but as they travelled it gradually weakened. The boy blew on it again and saw the colour return briefly. Later he scraped away some of the grey surface with a stick and tried again, but whatever remained inside the branch was slowly disappearing.

Eventually there was no red at all. He blew once more. Nothing happened. He waited a little, tried again and finally dropped the branch beside the path.

Then he hurried after the others.

A place worth remembering

Several days passed before the boy thought about the burned branch again, and even then it was not the branch that first occupied his attention.

It was food.

The group had been moving since early morning through country the boy had seen before, although not recently enough for every part of it to be familiar. The vegetation had changed as they travelled, becoming thicker in some places and opening again in others, and the ground occasionally showed signs that water had passed through since the last time he had been there. New growth appeared

among older stems, insects gathered around flowering plants, and tracks crossed the softer ground wherever animals had found something worth stopping for.

The boy did not know that they were travelling north, south, east or west, and there is no reason to imagine that such directions would have meant anything to him. He knew something considerably more useful. There was food ahead.

At least, there had been the last time.

He remembered a place where several trees grew near lower ground and where, at the right time, something edible could be found among the branches. He did not know how far away it was in kilometres, because kilometres were still waiting for someone to invent them, and he could not have given anyone an estimated time of arrival.

He simply knew the place.

As the group moved, small pieces of the landscape began to confirm that they were approaching it. A rise appeared where he expected one, although from this direction its shape looked slightly different. Beyond it the ground descended, and somewhere farther ahead should be a stand of trees he remembered particularly well.

When the trees finally appeared, the boy increased his pace. The older woman noticed.

She knew why.

By the time they reached them, the boy was already searching the branches.

There were fruits there.

Not as many as he remembered, and several were beyond his reach, but enough remained to make the journey worthwhile. The woman reached one before he did and ate it while he watched, which seemed unnecessary considering that she had probably known where they were going all along.

The boy found another.

Then another.

For a while navigation ceased to matter.

He had arrived.

We might describe the journey using compass directions, calculate the distance, plot the route on a map and place a small marker at the destination. The boy had managed without any of these things. He remembered where breakfast grew. For the purposes of navigation, that was quite sufficient.



The tall ones

They remained in the area for some time, partly because there was food and partly because other resources nearby made moving immediately unnecessary. The boy explored farther from the others as the day became warmer, although never so far that the group disappeared completely from sight.

It was while he was searching beneath another tree that movement beyond the vegetation caught his attention.

Several tall animals were feeding farther away.

He stopped and watched them.

Their bodies were familiar enough, but it was their height that always made them difficult to ignore. Long legs carried them between the scattered trees, while necks reached upwards into branches far above the boy's head. One pulled leaves towards its mouth and chewed slowly, apparently unconcerned by the humans in the distance.

The boy knew these animals.

He did not know what we would call them, and the animals themselves appeared equally unconcerned by this gap in taxonomy.

One moved into more open ground, followed by a smaller animal whose legs seemed even less reasonably proportioned to its body. For a moment the younger one increased its pace, its long limbs moving with the peculiar combination of elegance and awkwardness that very young, very tall animals have probably been managing for a considerable part of evolutionary history.

The boy watched. Then he returned to the tree.

We might have travelled thousands of kilometres, paid for a guide, raised an expensive camera and considered the encounter one of the highlights of the journey.

The boy was looking for fruit.



The woman stopped

Later that day they moved through an area where the ground was partly hidden beneath dry leaves and low vegetation.

The older woman was ahead of the boy. She stopped. It was not a dramatic movement. She did not jump backwards or call to the others; one moment she was walking and the next she simply was not. The boy almost continued past her.

Then he noticed where she was looking.

At first there was nothing there. Dry leaves lay across pale earth, thin stems crossed one another, and patches of shadow broke up the ground beneath the vegetation. He followed her gaze and still saw nothing.

Then something moved. A head. Only after seeing the movement could the boy separate the rest of the animal from the ground around it.

The snake had been there the whole time.

The woman stepped around it, giving it enough room to remain where it was, and the boy followed, although his route described a considerably wider curve. As he passed, he kept his eyes on the animal until vegetation hid it again.

He looked at the woman. She continued walking. That was irritating.

The boy looked back at the place where the snake had disappeared and then at the ground ahead. She had seen something that had been directly in front of him, and now that he knew what had been there he could not understand how he had missed it.

For the rest of the afternoon he watched the ground more carefully.
Mostly he found leaves.

This was perhaps disappointing, but it was also preferable to finding snakes.

What the birds knew

For several days the boy saw no more snakes.

He looked for them.

At first he looked quite carefully, particularly when the ground was covered with dry leaves or when vegetation grew thick enough to hide what lay beneath it, but there were limits to how long even a useful new interest could compete with everything else in the world. Gradually he stopped inspecting every suspicious shadow, although now and then something in the grass would make him look twice.

The group continued moving.

The country changed again, becoming more open in places, and by then the boy had lost any clear sense of how far they had travelled since the morning beside the fruit trees. Such a measurement would have been of little use to him anyway. The places themselves mattered more: water behind them, other water somewhere ahead, trees where food had been found, stretches of open ground where animals could be seen at a distance, and patches of thicker vegetation where it was sensible to pay more attention.

One morning the birds told them something.

They were circling ahead, dropping towards the ground and rising again, while others had already gathered in a noisy group around something hidden by the grass. The boy noticed them almost as soon as the adults did, and this time he needed no help understanding why they were interesting.

Something was dead.

The group changed direction. The boy changed direction with them.

We have since developed road signs, maps, satellite navigation and electronic devices capable of telling us exactly where we are on the planet.

For much of human existence, a collection of excited birds was also useful information.

And unlike a telephone, they did not require charging.

Someone had been there first

The carcass lay partly hidden in the grass.

By the time the group reached it, there was no question that other animals had arrived before them. Much of the flesh was gone, the body had been opened, and the ground around it had been trampled into a confused mixture of tracks, flattened vegetation and disturbed earth.

The boy approached with the others but did not rush.

He knew enough about dead animals to understand that finding meat did not necessarily mean owning it. Whatever had killed the animal was no longer visible, but visibility and absence were not the same thing, and several of the adults spent more time looking at the surrounding country than at the food in front of them.

The boy watched too. Nothing moved. The birds complained from a safer distance. Eventually one of the adults went closer, and the others followed.

There was still food to be had, although much of what modern diners might have considered the better part of the meal had already disappeared. The boy was less particular. Scraps of flesh remained in places where teeth had not removed them completely, and stone flakes made it possible to cut away pieces that fingers alone would have struggled to free.

He still had his flake.

It was no longer quite the object he had admired on the morning he made it. One edge had been damaged, dirt had worked into the surface, and anyone hoping to place it in a museum would probably have preferred that the boy stop using it immediately.

The boy had no museum. He cut meat with it.

The part inside

The broad-shouldered man had found one of the long bones. The boy noticed immediately. He moved closer.

This was not new to him. He had seen bones opened before and knew perfectly well why the man was interested in something that appeared, from the outside, to have very little food left on it.

The man placed the bone against firmer ground and struck it with a heavy stone. The first blow left a mark. The next opened a crack, and after another strike the shaft split far enough for the soft material inside to become visible.

Now the boy was very interested indeed.

There are foods that have acquired elaborate recipes, carefully selected ingredients and instructions extending over several pages.

Marrow has the considerable advantage of already being inside the bone. The principal difficulty is persuading the bone to surrender it. The man was good at this.

The boy waited until part of the broken bone reached him, then used a finger to remove what he could reach. It was soft and rich, required almost no chewing and disappeared much faster than he considered reasonable. He scraped deeper, turned the bone, inspected the other end and eventually looked through the hollow centre as though a different viewing angle might reveal a quantity of marrow overlooked by everyone else.

It did not. He checked once more. Still nothing. The bone had become useless. He put it down.



Not quite the same thing

Later, when most of what could easily be taken from the carcass had been removed, the boy found another long bone lying a short distance away.

He picked it up.

It was lighter than the one the man had opened and damaged at one end, but there was enough of it left to make the possibility interesting. The boy carried it back, found a heavy stone and placed the bone on the ground.

The first blow moved it rather than breaking it. He adjusted the position and tried again. The stone struck badly, glanced away and jarred his wrist hard enough to make him stop and shake his hand.

The broad-shouldered man looked over. The boy ignored him. He repositioned the bone. This time, before striking, he looked at the places where it had already been damaged. He turned it slightly, raised the stone and brought it down near one of the existing fractures.
A crack opened. The boy struck again. The bone split. He dropped the stone, pulled the broken pieces apart and looked inside.

Nothing. Someone had already removed the marrow.

For a moment he simply stared into the empty bone, apparently unwilling to accept that the world could allow a successful piece of work to produce such an unsatisfactory result.

The broad-shouldered man made a sound behind him. The boy turned.

We cannot know whether the sound was amusement, approval or something entirely unrelated to what the boy had just done.

The boy appeared to have an opinion on the matter. He threw the empty bone aside. The man made the sound again.

Time to leave

They did not remain there much longer.

The birds had been waiting impatiently throughout the meal, moving closer whenever the humans moved away and retreating again when someone approached. But the birds were not the reason the adults eventually became restless.

A sound came from somewhere beyond the grass. The boy stopped what he was doing and looked towards it.

The sound came again. He knew it. Several of the adults were already moving away from the carcass, and that was all the information he required. Whatever animal was out there could have the remains.

The boy followed.

He did not know the animal's scientific name. He did not need to know whether a future palaeontologist would place it in one genus or another, and he certainly had no interest in the arguments future researchers might have about precisely which large carnivores shared this landscape with him. He knew something considerably more useful.

It ate meat.

They were standing beside meat. The group left. The birds waited a little longer before returning. Whatever had made the sound remained unseen.

And perhaps that was best for everyone.

Five days we do not need to see

Five days passed without anything happening that requires us to follow the boy.

This does not mean that nothing happened. He woke hungry, found food when there was food to find, walked when the others walked and slept wherever they stopped for the night. He probably annoyed somebody. Somebody almost certainly annoyed him. He may have fallen, laughed, been frightened, become bored or spent a considerable amount of time doing something that would appear completely pointless to an adult of any period. We simply do not know. More importantly, we do not need to.

When we find him again, the country around him has changed.

The group had travelled far enough for the dry, pale landscape of several days earlier to have given way to ground where rain had already passed. Green shoots pushed between older grasses, leaves had returned more densely to some of the lower vegetation, and in softer patches of earth the tracks of animals crossed and recrossed one another until following a single set became difficult.

There was more to eat here. The animals appeared to have noticed. So had the people.

The boy had no idea how many kilometres separated this place from the burned country behind them. He could not have pointed towards it on a map, and if we had asked him whether they had travelled north or east, the question itself might have been considerably more confusing than the journey.

He knew where he was in another way. There was water not far ahead. He had been here before.

Before he could see it

The boy recognised the place gradually. A low ridge came first, followed by a patch of darker vegetation on one side and a group of trees whose shapes were familiar without being particularly remarkable. None would have deserved a monument, and future cartographers would never know that they had once helped a boy find his way across East Africa. To him, however, they meant something.

Beyond the ridge the ground would fall away. Farther down, if his memory was right, there would be water. The older people continued in the same direction. The boy walked a little faster. When he reached the top, he looked down.

The water was there. He smiled and continued walking as though nothing unusual had happened.

We carry maps capable of showing almost every road on Earth in our pockets, connected to machines orbiting thousands of kilometres above us, and can still miss the correct turning because we were looking at the screen.

The boy had remembered a hill. It worked.

Rain somewhere else

They did not remain near the water for long, and by later in the day the group was moving again.

The sun was still bright where they walked, although clouds had been building beyond the higher ground for some time. The boy noticed them occasionally without giving them much attention. Clouds sometimes brought rain. Sometimes they did not. Sometimes rain could be seen falling so far away that it seemed to belong to another landscape entirely. One of the older women was paying considerably more attention.

The boy noticed her looking towards the darkening sky, then towards the ground ahead. A little later she did it again. He looked too.

There was rain in the distance now, visible beneath the darkest clouds as a grey curtain that blurred the land beyond it. Here, the sun was still shining. The woman changed direction slightly. The others followed. So did the boy.

For a while nothing happened that explained why. They continued across ground that remained dry, and the distant rain disappeared occasionally behind higher

land before becoming visible again. The boy watched it for a time, then became interested in something moving through the grass and forgot about the clouds.

The woman did not.

An empty river

Later they came to a broad channel cut into the ground.

The boy knew places like this. Water sometimes moved through them, but now the bottom was mostly exposed: sand, stones, dried mud and scattered debris left by water that was no longer there. Crossing should have been easy.

The woman stopped.

The others stopped with her. The boy looked down into the channel and could see no reason for any of this. There was no water. He looked at the woman. She was listening. That was unusual enough to make him listen too.

At first he heard nothing except the ordinary sounds around them, but after a while something else emerged beneath them, so faint and continuous that he could not decide whether it came from the wind or somewhere farther away.

The woman moved back from the channel. Now everyone did. The boy followed, although he still did not understand why. The sound grew. He looked upstream. Nothing. Then something appeared around a bend.

At first it was only movement, a dark line where moments earlier there had been dry ground. Then the line became brown water, carrying grass and branches before it, spreading across the channel and rising around stones the boy had been able to see only moments before. He stepped backwards.



The water kept coming. Within a remarkably short time, the easy crossing in front of them had disappeared beneath a fast-moving brown torrent.

The rain that never touched him

The boy looked towards the distant clouds. Then he looked at the water. The rain was still over there. The water was here.

He watched branches tumble past in the current and tried to fit the two things together. The woman had apparently done so before the water arrived. That was irritating. Again.

She had seen the snake before him. Now she had looked at rain falling somewhere else and somehow understood that an empty channel in front of them was about to stop being empty.

The boy looked at her. She was watching the water. He looked back towards the distant rain.

For once, the narrator can safely leave him alone for a moment. There is no need to explain catchment areas, runoff or the hydrology of seasonal channels to a child who has just watched the demonstration.

He had seen dry ground. Now there was a river. And it had arrived without a single drop of rain falling on his head.

Nothing to do

They waited.

At first the boy was perfectly content to watch the water because it was fast, noisy and carried things with it. A branch appeared upstream, spun around once and disappeared beneath the brown surface before emerging farther down, while smaller pieces of vegetation collected briefly against stones and were torn free again.

After a while, however, the river continued doing essentially the same thing.
The boy became bored.

He found a stick and pushed at the damp earth near his feet, watched an insect attempt to cross a patch of mud and eventually threw a small stone towards the water. It landed close enough to the edge to produce an immediate sound from one of the adults.

The boy moved away. Not very far, but far enough to acknowledge that a complaint had been made. He waited. The water continued.

Waiting is one of those activities humanity has spent an extraordinary amount of effort trying to eliminate. We invented clocks to measure it, chairs to make it more comfortable and eventually small glowing screens so that no human being should ever again be forced to spend three uninterrupted minutes alone with his own thoughts.

The boy had a stick. He drew something in the mud. Then erased it with his foot.

When water changes its mind

Eventually the flood began to weaken. More stones appeared above the surface, the violent brown current narrowed, and places that had disappeared beneath the water slowly became visible again. The boy noticed immediately and stood up.
The adults continued waiting. He looked at the water. Then at them. Surely they could cross now. Apparently not.
He sat down again.

Some time later the woman moved towards the channel. She tested the ground, watched the remaining current and crossed carefully where the water was shallower. Others followed.

When the boy's turn came, he stepped into water that still pushed harder against his legs than its depth suggested. He placed his feet where the people ahead of him had placed theirs and crossed without difficulty, although halfway through he felt the current pull strongly enough for the reason behind all that tedious waiting to become considerably clearer.

Then he reached the other side. And almost immediately, the dangerous water became interesting water.
A shallow pool had formed away from the strongest current, trapped between stones where the ground dipped. Another younger member of the group stopped beside it.

The boy looked at the water. The other child looked at the boy. The first splash hit him across the chest.
Within moments the careful business of crossing a dangerous flood had been replaced by the much more important problem of getting the other child wetter than he was.

An adult made a sound behind them. Both stopped for approximately the amount of time necessary to establish that the adult had turned away. Then the battle resumed.
There are aspects of human behaviour for which 1.6 million years may simply not be very long.

Smoke again

The flood was several days behind them when the boy smelled smoke again, and by then the brown water rushing through an apparently dry channel had become one experience among many, important while it happened but gradually pushed aside by new places, new hunger and the ordinary business of following the others through a landscape that never remained quite the same.

This smoke was different from the distant smell of the larger fire they had encountered earlier. There was less of it, and although the boy could smell the familiar dry bitterness in the air, he could see neither flames nor the dark column that had marked the previous burn. Others had noticed it too, and when one of the adults changed direction slightly, the group followed until they reached a small patch where fire had passed through dry vegetation and apparently died before travelling much farther. The ground was blackened in places, grass had disappeared into ash, and several branches lay where they had fallen, but there were no dead animals waiting to provide another unexpectedly warm meal.

The boy checked anyway. There were none. Apparently not every fire came with lunch.

He was already losing interest when a thin thread of smoke caught his attention near a fallen piece of wood. Most of the branch looked grey and dead, much like the one he had found several days earlier, but when he moved closer he could see that smoke was still escaping from somewhere beneath the surface. He reached towards it. His hand stopped.

For a moment he remained like that, fingers suspended above the grey wood, before withdrawing them and looking around for a stick instead. He used it to push at the branch until the brittle surface cracked and fell away, revealing a faint red glow underneath, and then crouched closer and blew gently across it. The red became brighter.

No burned fingers. No ash in his eyes. It was, by the standards of human progress, a modest achievement, but progress has often consisted of remembering which mistakes need not be repeated.

Something fire could do

The others were searching through the burned vegetation while the boy continued investigating the branch, scraping carefully at the grey surface and blowing whenever the glow began to weaken. He had already discovered that too much movement could make the red disappear, while air sometimes brought it back, although there was no reason to imagine that he understood why either happened. He simply watched what changed when he did something and tried again when the result interested him.

At some point one of the men noticed what he was doing and came closer. The boy moved aside enough to let him crouch beside the branch, and the man watched the glowing wood for a moment before removing some loose ash and shifting a few pieces of dry vegetation away from it. Then he picked up a thin dry twig and held one end close to the hottest part.

The boy watched. Nothing happened. The man changed the angle, waited and blew gently across the glow. Smoke began to rise from the end of the twig, at first so little that the boy leaned closer to see it, and then enough for him to pull his head back. A moment later a tiny flame appeared and moved onto the dry wood. The man lifted the twig. The flame came with it.
That was new.

The boy had seen fire move through grass and along branches, had watched flames consume vegetation and had carried a glowing piece of wood until it died, but now he had watched something different happen. The man had taken fire from one piece of wood and persuaded it to continue on another.

Whether either of them understood this in anything resembling our concept of transferring fire is another matter entirely. The boy did not require a concept. He had seen something happen and, as usual, wanted to see whether it would happen for him. The man gave him another twig.

His turn
The boy placed his twig against the glowing branch in approximately the same position and waited, but nothing happened.
He moved it closer, waited again and finally blew hard enough to send smoke directly into his face, which made him pull away coughing and blinking while the man remained beside him.

Some lessons, apparently, require revision.

When his eyes had cleared, the boy returned to the branch and tried again, this time moving himself so that the smoke travelled away from his face. He held the twig near the glow, blew more gently and watched the end slowly darken until a thin curl of smoke appeared. Encouraged, he blew again, and for a moment a tiny flame rose from the wood.

He stopped immediately. So did the flame. The boy stared at the darkened end of the twig, then lowered it towards the glowing branch and tried once more. Smoke returned first, followed by another flame, and this time he continued carefully until it seemed strong enough to survive when he lifted the twig away.

The flame travelled with it.

He moved his hand slightly and watched the flame bend. He moved it faster and saw it shrink almost to nothing, stopped again and watched it recover. For the moment the rest of the group, the landscape and even the possibility of food had become considerably less interesting than the small moving light at the end of the stick in his hand.

Humanity would eventually devote a remarkable amount of ingenuity to making this process easier. We would develop matches, lighters, gas burners, electric ignition and devices capable of producing a flame with a movement of one finger, thereby saving ourselves from much of the inconvenience the boy was experiencing.

Then, on pleasant summer evenings, we would buy charcoal, put it in a metal box and spend twenty minutes trying to make it burn.
The boy might have understood that part.

When the interesting thing ends

His flame did not last long. The twig was small, and after burning brightly for a while it began consuming the very thing that allowed the boy to hold it. He shifted his grip as the heat travelled towards his fingers, watched the flame become larger and finally dropped the twig when holding it ceased to seem like a particularly good idea.

It landed among the blackened ground where there was little left for the flame to catch, burned for a short time and then weakened.

The boy watched it. He found another twig and looked towards the glowing branch, apparently considering whether the experiment deserved repeating, but one of the adults had begun moving away and others were already following. Whatever interest the fire still held therefore found itself competing with something considerably more important. Not being left behind. The boy dropped the unburned twig and ran after them.

Behind him the remaining glow continued beneath the grey surface of the fallen branch, occasionally brightening when the wind reached it and slowly weakening when it did not.

The boy did not look back. He had other things to do.

The very large neighbours

Three mornings later, the boy woke in a place where he had not slept before, although there was nothing unusual about that. The group had continued moving since the burned country, sometimes travelling for much of the day and sometimes remaining within a smaller area when food, water or other useful things

gave them a reason to stay, and by now the boy had no expectation that the landscape waiting for him in the morning should resemble the one in which he had fallen asleep. Once there was enough light to see properly, his attention returned to the usual matters of hunger, the people around him and whatever the new day might contain.

Something very large had passed nearby during the night.

The tracks crossed a patch of softer ground not far from where the group had slept, pressed deeply enough into earth that still held moisture from earlier rain for the boy to notice them immediately. Several of the adults stopped to look, and he crouched beside one of the impressions, placing his hand inside it even though this added very little to what he already knew. The animal responsible had a foot considerably larger than his hand, but then he had known that before touching the track, because he had seen marks like these before and knew the kind of animal that left them.

One of the older people examined the ground farther ahead and looked towards the vegetation in the distance, apparently trying to learn something the boy had not yet seen. The tracks themselves were not mysterious to him; a very large animal had walked here and continued in that direction, and whether following roughly the same route was sensible depended on things that mattered considerably more than the name of the animal. How long ago had it passed? Was it still nearby? Was it alone? The boy could not answer all of those questions, but some of the older people might be able to answer enough of them, and when they continued, he followed.

They found the animals later that morning.

Several were moving slowly through open country beyond a line of scattered trees, feeding as they went, and even from a distance their size dominated everything around them. Thick legs supported massive bodies, while long trunks moved almost continuously between the ground, vegetation and branches, sometimes curling around something before pulling it free. A smaller animal remained close to one of the larger ones, occasionally disappearing partly behind its body before emerging again.

The boy stopped long enough to watch them because animals that large were difficult to ignore, but there was no astonishment in seeing something that belonged naturally to his world. He knew these creatures, had probably seen them many times before and understood at least the things about them that mattered to a boy sharing the landscape with them. They were extremely large, they could be dangerous, and at present they were far enough away for neither fact to require immediate attention.

To us they would be considerably more troublesome. The temptation would be to call them elephants, photograph them and move on, but the proboscideans of the Early Pleistocene were not simply modern African elephants waiting patiently for the invention of the camera. If we want to give the animals in this scene a species name, we will need the fossil evidence to do that work for us.

Turkana Boy had no such problem. They were the very large ones. That was enough.



For several minutes almost nothing happened. One animal pulled vegetation towards its mouth while another moved slowly behind it, and the smaller individual continued to remain close to the larger body beside it.
This would eventually become one of the peculiarities of wildlife documentaries: people would travel thousands of kilometres, carry enormously expensive equipment into difficult places and then wait patiently while a large animal spent twenty minutes eating leaves.

The boy had neither travelled thousands of kilometres specifically to see them nor brought a camera.

He watched anyway.

Eventually one of the animals began moving towards the route the group had apparently intended to take, and the adults responded without anything resembling panic. Nobody ran, nobody attempted to defend the route, and nobody appeared to consider challenging several tonnes of animal over who had arrived first. They simply changed direction and gave the animals more space, taking the boy with them as they moved towards thicker vegetation.

Modern humans would eventually develop traffic regulations, road markings, signs and complicated rules about right of way.

The people around Turkana Boy had a simpler system. When the other road user weighed several tonnes, the other road user had priority.

The path that was not a path

The detour carried them into thicker vegetation, where movement became slower and the large animals disappeared from view, although branches occasionally broke somewhere behind them with enough force to remind the boy that being unable to see something was not the same as it no longer being there. After a while they reached easier ground, worn in places by repeated movement and crossed by tracks belonging to several kinds of animals, some recent and others already softened by wind, feet and time.

Nobody had built the route and nobody maintained it, but feet, paws and hooves had been solving the problem of moving through difficult vegetation for a very long time, and there was little reason for the humans to invent a more troublesome solution when so many animals had already demonstrated an easier one. The group followed the worn ground for some distance, moving in a loose line where the vegetation narrowed around them, and for a while the boy walked behind the broad-shouldered man, placing his feet almost automatically where passage was easiest.

Then something near the edge of the route bothered him. There had been no sound and he had seen no movement, yet something among the dry stems and broken shadows seemed not quite to belong where it was. He slowed and looked more carefully, but at first the harder he stared, the less certain he became that there was anything there at all. The broad-shouldered man continued several steps ahead while the boy remained behind, trying to separate one shape from another in vegetation that seemed determined to remain nothing more than vegetation.
Then he saw part of it.

The recognition did not arrive as a complete animal suddenly becoming visible. A line became a shape, the shape connected with another, and something that his eyes had almost accepted as dry vegetation became something alive and close enough to the route that continuing towards it no longer seemed sensible.

The boy made a sound. The broad-shouldered man stopped and turned, and the people behind the boy stopped as well. The older woman looked towards him, followed the direction of his gaze and remained still for a moment while she found what he had found. Whatever the hidden animal was, nobody seemed interested in getting close enough to examine it properly, and within moments the

group had altered its route, passing around the place with considerably more distance between themselves and the vegetation.

As the boy passed the older woman, she looked at him. Perhaps the look meant something. Perhaps it did not. We have already invented enough of his day without pretending that 1.6 million years have somehow left us a reliable translation of facial expressions.
But she had stopped because he had stopped. That much was enough.



By afternoon it no longer mattered
By afternoon the incident had been buried beneath everything that came afterwards, because the boy did not spend the rest of the day considering whether he had become a better observer. He became hungry again, found something to eat, investigated an object beneath a piece of bark that remained fascinating for considerably less time than he had expected, lost sight of one of the younger children for a while and later found him again, and continued moving with the group when there was reason to move.

The older woman did not gather everyone together to discuss his progress, nor did anyone produce a certificate confirming successful completion of Advanced Looking at Things. Human beings would eventually become extremely enthusiastic about documenting what children had learned, sometimes requiring several sheets of paper to confirm something the child had demonstrated perfectly well five minutes earlier.

Turkana Boy had no progress report. Several days before, he had almost walked past something hidden until the woman stopped. Today she had stopped because he did.

Tomorrow he would almost certainly fail to notice something else. And life would continue.

Days without a story

Several days passed during which nothing happened that would have persuaded anyone, 1.6 million years later, to write a book about them. The group moved when there was reason to move and remained longer when a place provided enough water and food to make travelling unnecessary, while the boy woke each morning with approximately the same immediate priorities he had possessed the morning before. He ate when food was available, searched when it was not, followed the people who knew where they were going and occasionally wandered far enough from them to discover that someone else had a very clear opinion about how far was far enough.

The country through which they moved continued to change in small ways. Some mornings began among scattered trees and dry grass, while others found them closer to water or in places where recent rain had encouraged new vegetation to push through older growth. The boy did not think of these changes as passing from one kind of landscape into another; there was simply the place where he was now, connected in his memory to places where he had been before and to other places he expected to find if they continued in a certain direction.

Occasionally he recognised something. A particular slope told him what might lie beyond it, a line of trees suggested water lower down, while a patch of vegetation reminded him of food they had found there before. At other times he had no idea where the group was going and followed because the people ahead appeared to know, which remained a perfectly effective system until someone eventually expected him to know the way himself.

We might find this lack of geographical precision alarming. The boy possessed no address, no map and, as far as we know, no concept corresponding neatly to latitude or longitude, yet he was not lost. Being lost requires knowing that you ought to be somewhere else.

He was with his people. For the moment, that was where he belonged.

The important business of being young

Not everything the boy did was useful.

This deserves mentioning because there is a danger, when looking backwards across 1.6 million years, of turning every action into evidence of survival strategy. A child picking up a stick may indeed be learning something about objects, movement, balance or the physical world, but there remains another possibility that science should perhaps occasionally allow. The stick was fun.

The boy had found a particularly good one. It was long enough to reach things without standing immediately beside them, light enough to carry and flexible enough to bend when struck against the ground. He used it first to disturb a patch of vegetation, then to push something he found beneath it, and eventually for no obvious purpose except making the end whistle through the air when he swung it quickly.

Another younger member of the group noticed. This immediately changed the value of the stick. What had previously been an interesting object became an object worth possessing.

The other child reached for it, and the boy pulled it away. A second attempt produced the same result, although this time accompanied by a sound that made the intention considerably clearer. The boy responded with a sound of his own, and for a short while two young members of an extinct human species were engaged in a disagreement whose intellectual complexity would remain familiar to parents for the next 1.6 million years.

Eventually the other child found another stick. It was longer. The boy looked at it. His own stick suddenly seemed less satisfactory.

Civilisation would later develop property law, contracts, courts and elaborate philosophical arguments concerning ownership. None of these were immediately available, so the boy attempted the older solution of taking the better stick. He failed.

The disagreement became louder until an adult turned towards them and produced a sound that apparently required no translation whatsoever. Both children stopped, separated and spent the next several minutes behaving with conspicuous innocence while remaining close enough to ensure that neither had actually surrendered anything.

Then something moved in the grass, and both sticks were forgotten.



Not everything needs a reason

The moving thing proved to be small, quick and much more interesting than the dispute they had been having. Both children followed it for a while, losing it beneath vegetation, finding movement again farther ahead and eventually arriving at a place where neither could see any sign of it. They searched. Nothing.

The boy pushed aside grass with his foot while the other child investigated beneath a low plant, and after some time they appeared to reach the unspoken conclusion that whatever they had been following had ceased to justify the effort. They returned towards the others without the sticks they had previously considered important enough to fight over. Neither went back for them.

Objects could become valuable very quickly in the boy's world and become completely worthless almost as quickly when something better appeared. There were no cupboards waiting to be filled, no garage in which a useful stick might be stored in case it became necessary next Tuesday, and nobody had yet discovered the modern satisfaction of owning seventeen objects designed to perform almost exactly the same task.
The boy kept what mattered until it stopped mattering. Then he usually left it behind. His stone flake was an exception. It was still with him.

The old edge

By now the flake had changed considerably from the sharp little object that had cut his finger when he first made it. The edge had been used against plants and meat, knocked against other things while he carried it and damaged in places until parts that had once been sharp no longer cut particularly well. The boy nevertheless brought it out when he needed it, because a tool did not have to be perfect to be better than fingernails and teeth.

One afternoon he tried to cut through a tough stem and discovered that the edge was becoming more trouble than help. He changed his grip, tried another part and finally pressed hard enough for the flake to slip sideways without cutting much of anything.
The man who worked stone was nearby. The boy looked at him. The man looked at the flake. For a moment neither did anything, and then the man held out his hand. The boy gave it to him.

He examined the damaged edge, turned the stone and struck it carefully with another piece. A small fragment came away. He changed the angle, struck once more and ran a finger close to the new edge before handing it back.

The boy tried the stem again. The stone cut. He looked at the edge, then at the man, who had already returned to whatever he had been doing. The boy continued cutting.

There was no lesson, at least not in the form we would recognise. No explanation of edge maintenance, no demonstration followed by supervised practice and certainly no written assessment at the end.

There was simply a problem, someone who knew more about it, and a boy who was watching.

For most of human history, that appears to have been a remarkably successful educational system.

Someone else was watching

The group remained in the area until the following morning, and when they moved again the boy found himself crossing increasingly open ground where scattered trees stood far enough apart for him to see considerably farther than he had among the thicker vegetation of the previous days. The sun climbed steadily behind them, the remaining coolness of morning disappeared, and before long the familiar heat had begun to rise from the ground while insects moved through the dry grass and birds called from trees that offered more shade than the country between them.

There were animals ahead, although at first the boy noticed them only because one of the adults had slowed. Several medium-sized grazing animals stood beyond a patch of lower vegetation, feeding quietly and moving a few steps at a time as they worked across the open ground. The boy had seen animals like them many times before and would probably have continued without giving them much attention, but the people around him were watching, so he watched too.

One of the animals raised its head.

For a while it remained completely still, looking in their direction, and then another stopped feeding and did the same. The humans had seen the animals. The animals had seen the humans. Neither discovery appeared particularly welcome.

The group continued more slowly, not directly towards the herd but across ground that would eventually take them past it, and the boy noticed how the animals kept returning to their food while never quite returning to the relaxed behaviour they had shown before. One would lower its head, feed briefly and look up again, while another moved a few steps farther from the approaching humans before resuming.

The boy knew this pattern. Sometimes animals allowed people to come surprisingly close before moving away; others began leaving while the humans were still far enough away to appear harmless. There was no fixed distance at which the world announced that an animal had become nervous, and the people

around him seemed to judge it from movement, posture and whatever else years of watching animals had taught them to notice. Eventually one animal turned. The others followed.
Within moments the herd was moving away, slowly at first and then faster, until the distance between animals and humans had grown large enough for everyone involved to return to whatever they had been doing.

Nobody chased them. The boy continued walking. For the animals, this had probably been a successful encounter. For the humans, it had been a walk.

The one who read the ground

Later in the morning the woman who often noticed tracks stopped beside a patch of bare earth and crouched. The boy was close enough to see her touch one of several marks crossing the ground, although to him the surface initially appeared to contain little more than the usual confusion of feet, hooves, wind and yesterday. He moved closer.

The woman followed one set of impressions for a short distance, stopping where they became clearer and then looking ahead towards a line of vegetation. She returned to another mark, touched the edge and pressed a finger into the softer earth beside it before standing again. The boy looked down. There were tracks everywhere.

Some were obvious, while others overlapped or disappeared where the ground became harder, and the more he tried to understand which ones had interested her, the more the entire surface seemed to become a collection of unrelated holes. She began walking.

The boy followed, looking down more often than ahead and occasionally finding what he thought was the same trail before losing it again. When the impressions disappeared across harder ground, the woman continued without hesitation, and for several steps the boy could see nothing that explained why. Then another mark appeared in softer earth farther ahead. He recognised it. The next one was easier.

For a while he moved from one to another, pleased with himself until the trail crossed a place where several animals had passed and everything became confused again. He stopped, searched and chose a set of marks leading slightly to one side. The woman continued straight ahead. The boy looked at his tracks. Then at hers. He abandoned his.

A million and a half years later, people would spend considerable sums of money learning to track animals in the bush and would sometimes describe the experience as reconnecting with ancient human skills.

The boy was currently reconnecting with the woman because he had followed the wrong footprints.

What tracks do not tell you

The trail led eventually towards thicker vegetation near lower ground, where the woman slowed and the others spread slightly rather than following directly behind her. The boy could smell water before he saw it, although the smell carried other things as well: damp earth, vegetation and the unmistakable presence of animals that had used the place recently.

The tracks became easier to see here. Hooves had cut deeply into the softer ground, larger feet had flattened patches near the edge, and in several places the mud had been disturbed so thoroughly that the boy could no longer tell which mark belonged to which animal. He recognised some and not others, but knowing that an animal had been there was not the same as knowing whether it remained nearby. That distinction mattered.

The woman stopped before reaching the water and looked around. The boy did the same, this time paying more attention to the vegetation than to the tracks beneath his feet, because experience had already taught him that the thing one could not see was occasionally more important than the thing one could. Nothing moved. They waited a little longer before approaching.

The water itself was shallow and muddy near the edge, and the boy drank where others drank, using his hands and taking enough to satisfy a thirst that had been growing throughout the morning. When he finished, he sat back and looked across the water while the others remained nearby.
Something had made a broad mark in the mud opposite them. He stared at it. He knew that mark. More importantly, he knew something about the animal that made it.
The boy stood.

The sound from the water

At first there was nothing to see on the opposite bank except mud, vegetation and water dark enough in places to hide whatever lay beneath the surface. The boy continued looking because the track had changed the meaning of the place; a moment earlier he had been looking at water, while now he was looking at somewhere an animal had recently entered or left it. A small disturbance appeared near the edge. The boy stepped backwards.

One of the adults noticed his movement and looked across the water, and soon several others were watching the same place. For a while nothing happened, but then something large moved just beneath the surface and disappeared again, leaving widening circles behind it. The group did not wait for a better view.

They moved away from the water, and the boy went willingly, glancing back once before vegetation blocked his view. He had seen very little of the animal itself, but he did not need to see teeth, jaws or a complete body to know that standing at the edge was no longer a particularly attractive idea.

We would probably have wanted a photograph.

This is one of the more curious differences between modern tourists and people who actually have to share a landscape with large dangerous animals. When something potentially lethal appears, our first instinct is occasionally to move closer while holding a small rectangular object in front of our faces.
The boy had no camera. This may have improved his life expectancy.



A little farther away

They did not abandon the area entirely, because water remained water even when something unpleasant occupied part of it. Instead the group moved farther along the lower ground until they found another place where access was more open and visibility better, and there they remained for a while, drinking again, searching nearby vegetation and doing whatever else made the stop worthwhile. The boy returned to the tracks.

Not the ones beside the dangerous water, but a clearer set crossing damp ground farther away. He followed them for a short distance, lost them where the surface became hard and searched ahead until he found what might have been the continuation. This time he did not immediately decide that he was right. He looked back towards the woman. She was watching him.

The boy looked at the ground again, changed direction by several steps and found another impression. That one matched. He continued.

The woman went back to what she had been doing.

Nothing had been said, and perhaps nothing needed to be. The boy was still bad at reading tracks compared with someone who had spent years doing it, and by the following morning he would undoubtedly misread another mark, overlook something obvious or confidently follow evidence left by an entirely different animal.

But for several footprints that afternoon, he got it right.

That was enough for one day.

When there was enough

For once, they remained in the same general area for several days. There was water, vegetation offered enough to keep people searching, and animals continued to pass through the lower country, leaving tracks in the softer ground and occasionally appearing between the trees before moving on again. Nothing required the group to leave immediately, and so they did not, although the place never acquired anything that would have made it resemble a permanent home. People slept, woke, searched, ate and moved around it, while objects appeared where somebody had used them and disappeared again when they were no longer useful.

The boy seemed perfectly comfortable with this arrangement. During the first morning he stayed close to the others, but as the place became familiar he ranged farther around it, returning when something drew him back and disappearing again when something else attracted his attention. He knew where the water lay, where thicker vegetation began and approximately how far he could move before one of the adults became interested in his whereabouts, although the last boundary appeared to change according to which adult happened to notice him.

There were advantages to remaining in one place for a while. Food found nearby did not have to be carried far, younger children could spend more time doing things that achieved absolutely nothing, and the boy had time to investigate places that would otherwise have disappeared behind him after a single visit. There were disadvantages too, particularly when several people became interested in the same limited supply of something edible.

The boy discovered one of these disadvantages beneath a low tree.

He had been searching among fallen leaves when he found several fruits, small enough to gather quickly but sufficiently ripe to make the discovery worth defending. He ate the first immediately, picked up another and was reaching for a

third when a younger child arrived, saw exactly what he had seen and reached towards the same fruit. The boy was faster. The child objected. The boy ate the fruit. This did not improve the negotiations.

An older woman nearby looked towards them but made no attempt to intervene, perhaps because nobody was being injured and perhaps because adults have been allowing children to resolve minor disputes themselves for considerably longer than anyone has been writing parenting manuals. The younger child reached for another fruit, the boy moved towards it at the same time, and for a moment both appeared ready to transform a perfectly adequate food supply into a major social crisis.
Then the boy saw more fruit on the other side of the tree. He went there instead. The crisis ended.

Humanity would eventually invent markets, currencies, property rights, international trade and economic theories of impressive complexity. Sometimes scarcity can also be solved by looking behind the tree.

The sound everyone understood
That afternoon the boy was farther from the others than he had been during the previous days, following the edge of thicker vegetation where insects moved among leaves and small birds repeatedly disappeared before he could get close enough to see what they were doing. He was not alone; another younger member of the group was somewhere behind him, although the two had gradually separated as different things attracted their attention.
A sound came from the people near the water. The boy stopped what he was doing and turned immediately.

It was not loud, and to us it would probably have meant nothing, but its effect on him was unmistakable. He began moving back before hearing it a second time, and the other child emerged from the vegetation nearby with exactly the same idea. Whatever distinction future researchers might wish to draw between calls, gestures, proto-language and language itself was of no concern to either of them. Someone over there had made a sound, and both children knew what they were expected to do.
They returned.

Nothing dramatic awaited them. The group was preparing to move towards another part of the area before evening, and whoever had called simply wanted the younger ones closer. The boy arrived, saw what was happening and joined the others without any visible disappointment that the urgent message had turned out to mean little more than come here.
Modern humans would eventually solve the same problem by giving children telephones. Results remain mixed. The group moved on.

A night with company

They did not travel far before stopping on slightly higher ground where the vegetation was more open and the water lay some distance below them. By sunset the boy had eaten enough for hunger to become temporarily unimportant, and as darkness gathered around the group he settled near people whose movements and sounds remained familiar even after their faces became difficult to see. The night was noisier than some.

Animals moved near the water below, occasionally producing splashes that carried clearly through the darkness, while insects filled almost every quiet space between larger sounds. Something called repeatedly from farther away, receiving an answer from another direction, and once a much deeper sound rolled across the lower ground strongly enough for several people to become still. The boy became still with them. He knew the sound.

Whatever had made it was not close enough to cause anyone to move, but conversation – if what passed quietly among the adults can be called that – ceased for a while as they listened. The sound came again, farther to one side this time, and gradually the tension disappeared. Someone shifted position, one of the younger children made a sleepy complaint, and ordinary night returned. The boy remained awake a little longer.

Darkness had removed most of the landscape, but it had not removed the information inside it. Water could be heard below. Insects marked the vegetation around them. The movements of people nearby told him where the group was, and sounds travelling across distances he could no longer see placed animals somewhere beyond the darkness.

We tend to think of darkness as the absence of useful information because most of us depend so heavily on sight. Then, when night becomes inconvenient, we press a switch and replace it with artificial daylight. The boy had no switch. He listened.



Morning leaves evidence

By morning the animals that had occupied the darkness were mostly gone, but they had left enough behind for the landscape to tell part of the night's story. Tracks crossed damp ground near the water, vegetation had been flattened in several places, and fresh dung lay where an animal had passed close enough to make the boy glad that nobody had decided to investigate the sounds during the night.

The woman who read tracks was already looking at the ground when he joined her. She followed one set for a short distance, and the boy watched from beside her until he recognised the broad impressions as belonging to animals he had seen before. Another set was less obvious.
He crouched, examined it and looked towards her, but she had already moved several steps away to inspect something else. He returned his attention to the mark.

There was no need to solve it. Nobody was waiting for his answer, no lesson would be failed if he guessed incorrectly, and the animal responsible was probably far away by now. He nevertheless followed the impressions until they crossed harder ground and disappeared, then searched beyond the gap as he had seen the woman do. Nothing. He widened his search. Still nothing.

For several minutes he moved back and forth between the last clear impression and the ground ahead until something farther to one side caught his eye. It was not the track he had expected to find, and for a moment he nearly dismissed it, but another lay beyond it and then another.

He followed them. The woman eventually looked towards him. This time he was going the same way she had gone. She continued with what she was doing. So did he.

The boy had not become a tracker overnight. He had simply become slightly less bad at something than he had been several days earlier, which is how most expertise begins, although it rarely sounds impressive enough for a biography.

And then they left

Later that morning, the group moved away.

There was no ceremony in leaving the place where they had spent several days, no final inspection and no sense that a chapter had ended. Things worth carrying were carried, things that no longer mattered remained where they were, and within a short time the water, the higher sleeping ground and the trees beneath which the children had argued over fruit were behind them. The boy looked back once. Then the land ahead required his attention.

If he returned one day, he might recognise the place. He might remember where the water lay, where animals approached it and perhaps even the tree beneath which a major dispute had been prevented by the discovery of additional fruit. Or he might never see it again. We do not know. The boy did not know either. He simply walked with the others into the morning.

The best piece

The group had been moving for much of the morning when one of the men returned from farther ahead carrying something that immediately attracted more attention than anything the boy had been doing. Whatever animal the meat had once belonged to was no longer present, and there was no reason for the boy to concern himself with how the man had obtained it; what mattered was that the piece in his hand was large enough to be shared and that the boy had been hungry for long enough to consider this the most interesting development of the day.

Others gathered as the meat was cut, and the boy moved closer with them, watching every piece as though there were some possibility that failing to pay attention might cause his share to disappear. He knew from experience that food did not necessarily arrive in equal portions, nor did everyone receive what they wanted simply because they wanted it, and when a piece containing more flesh than most was separated from the rest, his eyes followed it with particular interest. The broad-shouldered man took it. The boy watched him eat.
This seemed unfair.

There were smaller pieces available, and eventually one reached the boy, who ate it quickly and continued watching the larger piece with the quiet persistence of someone hoping that observation alone might alter its ownership. It did not. The man tore away another mouthful, chewed and looked towards the boy, who immediately became very interested in something else. When the boy looked back, the man was still watching him. He pulled a piece from what remained and held it out. The boy took it.



There was no ceremony, no visible negotiation and no reason to turn the moment into evidence of generosity, family structure or anything else that 1.6 million years have placed beyond our reach. One human being had food. Another was hungry. Food passed between them. The boy ate.
For most of human history, affection may often have looked considerably less complicated than we have since managed to make it.

The piece was good, although not large enough to prevent the boy from checking whether anything else remained. Very little did, and what was left attracted enough competing attention to make further efforts unpromising. He therefore abandoned the matter and moved a short distance away, where one of the younger children was attempting to break something open with a stone. The child struck it badly. The boy watched another attempt and then reached for the stone. The younger child resisted.

The boy made a sound and reached again, this time succeeding, although the expression he received suggested that assistance had not been requested. He turned the object, placed it against firmer ground and struck where a crack had already begun to form.

Nothing happened. He struck again. The crack widened. The younger child immediately reached for it. The boy pulled it away. Apparently expertise did not necessarily improve generosity. A sound came from behind him. He looked around. The broad-shouldered man was watching. The boy looked at the piece of meat still in his hand, then at the object he was withholding from the smaller child, and finally back at the man.
We cannot possibly know what passed through his mind.

What happened next is easier. He handed it back. The younger child took it and moved away before the arrangement could be reconsidered.
The man returned to his food. The boy finished his.

Somewhere he knew

They moved again before the day had become too hot, leaving the place where they had eaten and following ground that gradually rose away from the lower country. The boy walked among the others with his stone flake still somewhere among the few things worth carrying, although for most of the morning he had no use for it and paid more attention to what lay around him. The landscape was open enough in places for distant trees to appear long before they reached them, while elsewhere low ridges interrupted the view and made the country beyond them disappear until the group climbed high enough to see again.

For a long time the boy followed without knowing where they were going. This did not trouble him. There had been many mornings during the past days when

the direction chosen by the older people meant nothing to him until something familiar appeared, and there had been others when nothing familiar appeared at all.
He knew places in this country, not the country itself, and between those places lay stretches that existed in his memory only as fragments: a particular tree, a slope, water beneath a ridge, a place where fruit had once been found or somewhere an animal had made it sensible to walk another way.

Late in the afternoon one of those fragments appeared. It was only a tree.

There was nothing especially remarkable about it from where the boy stood, except that one side of the crown rose higher than the other and a heavy branch extended almost horizontally before turning upwards.
He had seen many trees during the previous days and forgotten most of them almost as soon as they disappeared behind him, but this one remained familiar enough for him to slow his pace while something else in the landscape began to arrange itself around it.

He looked beyond the tree towards a low ridge. There should be lower ground behind it.

The boy continued walking, now watching for something he expected rather than merely following what appeared, and as they came closer to the ridge he moved gradually towards the front of the group. Nobody stopped him.
The older woman was some distance behind, while the broad-shouldered man walked farther to one side, and for once the boy was not looking at either of them to discover where he should go.
At the top of the rise he stopped long enough to see the country beyond.

The ground descended exactly as he remembered it, although the vegetation had changed since he had last been there. Some places were greener, others had dried, and the tracks crossing softer ground below belonged to animals that had come and gone while he was somewhere else.
Farther ahead stood another group of trees, partly hidden by the slope.

The boy knew what should be beyond them. He started down. The others followed.

Nobody announced that he was leading them, and perhaps he was not. One of the adults may already have intended to take exactly the same route, and there is no reason to transform a boy recognising familiar country into a heroic moment simply because we happen to know where his bones will one day be found.

He simply knew where he was. For the moment, that was useful.

Where food had been before

The trees were familiar too, and as the boy approached them he began searching before the others had reached the same place. He remembered finding fruit here, although memory could tell him only what had once been true, not what would be waiting today. The first branches offered nothing, and neither did the next, while beneath one tree he found the remains of fruit that had fallen long enough ago for insects to have developed a considerably stronger claim to it than he had. He continued searching. Farther along, something hung among the leaves.

The boy reached for it, discovered that it was too high and tried again from another position. When that failed, he found a fallen branch and used it to pull the thinner branch above him down far enough to reach what he wanted. The fruit came free, and he ate part of it while still holding the branch.

Another member of the group had begun searching nearby. Soon others were doing the same, and what had for a moment been the boy's discovery became simply another place where people were finding food. He did not mind.
There was enough.

We could give the place coordinates. We could calculate the distance from the water they had left behind, mark the tree on a map and describe the route using compass bearings the boy had never heard of. Given sufficient technology, we could probably stand exactly where he was standing and have a satellite tell us our position to within a few metres. The boy's system was less impressive.
He remembered where food had been before and went to see whether some of it was still there. It was.

Before dark

They remained near the trees as the afternoon weakened, and when the group eventually moved again it was only far enough to find ground where spending the night appeared preferable to remaining lower down. The boy went with them, no longer particularly interested in where they were going because his stomach was reasonably full and the day had already provided most of what he required from it.

Behind them lay places he could remember and others he had already begun to forget. Somewhere far back was the burned country where grey wood had bitten his fingers, somewhere else the empty channel that had become a river beneath a sky that remained dry above him, and in another direction stood the tree where the younger child had nearly become an enemy over a piece of fruit. There were tracks he had followed correctly, tracks he had followed incorrectly, animals he had seen and animals he had known only from a sound, a movement in water or the marks they left behind.

The boy did not arrange any of this into a story. We do that. For him there had simply been days.

As the light began to disappear, he climbed the last part of the slope with the others and found a place among people whose shapes would soon become shadows around him. Somewhere below, animals were already moving towards water, and birds that had occupied the trees during daylight were being replaced by sounds belonging to the night. The boy sat down. He was tired. Tomorrow could wait.

The sounds in the dark

By the time darkness had settled properly over the higher ground, most of the landscape the boy had crossed during the day had disappeared.
The trees below were reduced to shapes against a sky that still held a little light, the lower country beyond them had become impossible to distinguish, and even the people nearest to him were gradually transformed from familiar faces into movements, breathing and voices whose owners he recognised without needing to see them.

The boy was tired, but he was not yet asleep. Someone nearby shifted position, another person made a quiet sound in response, and one of the younger children had already fallen asleep close enough for the boy to hear the uneven rhythm of breathing.
Somewhere beyond the group insects continued with the night's apparently endless business, while farther down the slope something moved through vegetation with enough weight to break a branch and then became silent again.

The boy listened without appearing particularly concerned. Darkness had changed the world around him, but it had not emptied it, because much of what disappeared from his eyes remained available in other ways.
He knew approximately where the others were from their breathing and occasional movements, knew that the water lay somewhere below even though he could no longer see the lower ground, and could hear small animals moving close enough to be of no importance and larger ones far enough away that, for the moment, they were someone else's problem.

A call came from somewhere in the darkness.

The boy opened his eyes.

It came again, deeper this time or perhaps simply clearer, travelling across the country from somewhere beyond the water. One of the adults nearby became still, and the boy did the same, listening until the sound faded and the insects gradually filled the silence it had left behind. He knew that sound. We do not.

We can reconstruct much of the world around him from fossils, sediments, ancient environments and the marks left in stone and bone, and we can argue with considerable sophistication about which animals shared this landscape with him. We can identify species that disappeared long ago, estimate what they ate, reconstruct their bodies and sometimes even understand how they moved, but no fossil has preserved the sound that had just travelled through the darkness.
The boy needed none of that. He had heard the animal before.

He knew whether the sound meant that it was close or far away, whether it was moving towards the group or away from them, and perhaps whether there was any reason to remain awake. Whatever information the call contained, nothing in the people around him suggested that anyone needed to move, and after listening for a little longer the boy allowed his body to relax again. The sound did not return.

Gradually the ordinary noises of the night reclaimed the space around him, and what had briefly demanded attention became only another part of a world he had been learning since long before the days in which we happened to follow him. Tomorrow there would be more tracks to miss and perhaps one or two he would recognise, food to find if he was fortunate and hunger if he was not, adults who noticed things before he did and occasionally something he might notice before them. The group might remain here for another day or move again in the morning, perhaps towards water he remembered, perhaps towards a place known only to someone older, or perhaps into country he had never seen before. He did not know. For once, neither do we.

The boy shifted closer to the warmth of the people beside him and closed his eyes. Around them, somewhere in the darkness of East Africa, animals continued moving between water, food and whatever places they knew, while the people among whom he slept rested until there was enough light to begin doing much the same thing.

Nothing marked this night as important.

No great discovery had been made, no new chapter of human history had begun, and the boy sleeping among the others had no way of knowing that approximately 1.6 million years later people would find his bones and give him a name he had never heard.

For him, it had simply been another day.

And tomorrow, he would be hungry again.

Notes

[NOTE 1] Smithsonian Institution, Human Origins Program, KNM-WT 15000. Nariokotome, West Turkana, Kenya; discovered by Kamoya Kimeu in 1984; approximately 1.6 million years old; classified by the Smithsonian as Homo erectus. The preserved skeleton is described as approximately 40% complete.

[NOTE 2] Smithsonian Institution, Human Origins Program, KNM-WT 15000. Overview of the preserved skeleton and its importance for reconstructing body size, body shape and growth in Homo erectus.

[NOTE 3] Dean, M. C. & Smith, B. H. (2009), Growth and Development of the Nariokotome Youth, KNM-WT 15000, in The First Humans: Origin and Early Evolution of the Genus Homo, pp. 101–120; see also Dean et al. (2001), Growth processes in teeth distinguish modern humans from Homo erectus and earlier hominins, Nature 414, 628–631. These studies form an important basis for the younger age estimate derived from dental development. This book uses these sources as the basis for the reassessment from the older 11–12-year estimate towards approximately 8–9 years.

[NOTE 4] Graves et al. (2010), Just how strapping was KNM-WT 15000?, Journal of Human Evolution 59, 542–554; Ruff & Burgess (2015), How much more would KNM-WT 15000 have grown?, Journal of Human Evolution 80, 74–82. Their differing models produced substantially different adult-stature estimates, illustrating the genuine uncertainty surrounding the growth pattern of KNM-WT 15000.

[NOTE 5] The classification of the Nariokotome skeleton varies in the scientific literature. It is commonly assigned to Homo erectus, while Homo ergaster is also used, particularly when African specimens are distinguished from Asian Homo erectus. The distinction reflects continuing debate over how much anatomical and geographical variation should be recognised taxonomically.

[NOTE 6] The Nariokotome skeleton provides unusually extensive evidence for body proportions in early Homo, including relatively long lower limbs and a broadly modern terrestrial body plan, while the skull retains substantial differences from Homo sapiens.

[NOTE 7] Geological, palaeobotanical and faunal evidence from the Turkana Basin indicates changing Early Pleistocene environments that included open grassland, wooded habitats and riverine vegetation rather than a simple equivalent of the modern arid landscape. The reconstruction should therefore be understood as a changing habitat mosaic, not a single fixed landscape.

[NOTE 8] Fossil assemblages from the Turkana Basin document a diverse large-animal community during the Early Pleistocene, including bovids, suids, hippopotamids, giraffids, proboscideans and crocodilians. Exact species selected for illustrations and captions should be checked against the appropriate locality and chronological interval before final artwork.

[NOTE 9] Archaeological evidence from East Africa documents deliberate stone-tool production long before the lifetime of KNM-WT 15000. Characteristic fracture patterns, cores, flakes and repeated reduction sequences allow archaeologists to distinguish intentional manufacture from many forms of natural breakage.

[NOTE 10] Both simpler core-and-flake technologies and Acheulean large cutting tools belong to the broader technological world of Early Pleistocene East Africa. Their chronological overlap means that the appearance of Acheulean technology should not be understood as an instantaneous replacement

of earlier methods. The presence of these technologies does not demonstrate that KNM-WT 15000 personally manufactured any particular tool.

[NOTE 11] Evidence for early fire use remains debated because burning can result from both human and natural processes. Archaeological arguments therefore depend heavily on context, temperature, spatial patterning and associations with other evidence rather than simply the presence of burned material.

[NOTE 12] Early Pleistocene localities in East Africa, including FxJj20 AB at Koobi Fora, have played an important role in discussions of early hominin fire use. Heated or reddened sediments provide evidence of burning, but the behavioural interpretation — including whether fire was controlled by hominins — remains debated.

[NOTE 13] The relationship between fire, cooking and human evolution remains an active area of research. Biological arguments concerning the advantages of cooked food should not be treated as direct archaeological proof that routine cooking occurred in the time of KNM-WT 15000.

[NOTE 14] Early Pleistocene archaeological sites in East Africa preserve animal bones bearing stone-tool cut marks and percussion damage, providing direct evidence that hominins processed carcasses and deliberately broke some bones to obtain internal resources such as marrow. The evidence establishes carcass processing but does not, by itself, establish whether each animal was hunted, scavenged or obtained in some other way.

[NOTE 15] Reconstructing plant consumption is considerably more difficult because most plant foods preserve poorly. Dental evidence, isotopic studies and palaeoenvironmental reconstruction nevertheless support a broad and flexible diet in early Homo, and the prominence of animal bones in archaeological assemblages should not be mistaken for a complete record of everything eaten.

[NOTE 16] KNM-WT 15000 preserves relatively modern human-like limb proportions, particularly long lower limbs compared with earlier hominins. Studies of early hominin limb proportions and lower-limb structure place the Nariokotome skeleton firmly within a fully terrestrial bipedal pattern.

[NOTE 17] Biomechanical modelling of KNM-WT 15000 has investigated the energetic and mechanical consequences of its body proportions during walking and load carrying. The results support efficient terrestrial walking and suggest that relatively light loads could be carried economically, although such models do not demonstrate what KNM-WT 15000 personally carried.

[NOTE 18] Homo erectus became the first known human species to disperse widely through Africa and into Asia. Efficient terrestrial locomotion is relevant to understanding this expansion, although anatomy alone cannot explain the causes or routes of dispersal.

[NOTE 19] Aspects of KNM-WT 15000's lower-limb anatomy have been interpreted as fully human-like in terrestrial locomotion and potentially compatible with adaptations for endurance running. This should be treated as evidence of locomotor capability rather than proof of a particular running behaviour.

[NOTE 20] The tall, relatively narrow body reconstructed for KNM-WT 15000 is consistent with thermoregulatory adaptation to warm environments, increasing the effectiveness with which body heat can be dissipated.

[NOTE 21] Modern studies of Kenyan distance runners have examined relationships between lower-leg morphology and running economy. These findings concern modern athletic populations and

should not be interpreted as evidence of a direct biological connection between KNM-WT 15000 and modern Kenyan distance-running success.

[NOTE 22] KNM-WT 15000 is generally reconstructed with a cranial capacity of approximately 880 cm^3. Brain size increased substantially during human evolution, but endocranial volume alone cannot be translated directly into intelligence or an IQ-like measure.

[NOTE 23] Persistent stone-tool traditions provide evidence that technological behaviour was transmitted across generations. The precise roles of imitation, observation, practice and deliberate teaching among Early Pleistocene hominins remain matters of research and cannot be reconstructed for KNM-WT 15000 individually.

[NOTE 24] The speech capabilities of Homo erectus remain uncertain. Anatomical interpretations based on KNM-WT 15000 have been debated and revised, and the skeleton does not provide sufficient evidence to reconstruct language or demonstrate either modern speech or its absence.

[NOTE 25] KNM-WT 15000 does not preserve direct evidence for the size, composition or kinship structure of the social group in which the individual lived. Reconstructions of social life therefore depend on broader evidence from human evolution, primate sociality, archaeology and comparative behaviour rather than the skeleton itself.

[NOTE 26] Long-lasting stone-tool traditions demonstrate transmission of technological behaviour across generations, although archaeological evidence does not reveal the exact balance between observation, imitation, practice and deliberate teaching among Homo erectus.

[NOTE 27] Comparative primate behaviour demonstrates that social coordination and information transfer can occur through vocalisations, gestures, facial expressions and body movements without modern human language. Such comparisons establish behavioural possibilities rather than reconstructing the specific communication system of KNM-WT 15000.



TURKANA BOY
The Boy Who Waited 1.6 Million Years to Be Found

Written and designed by Poul Erik Larsen
Published by Swahili Coast Studio Books

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Illustrations are AI-assisted reconstructions based on the scientific and archaeological evidence available for the period. Where the evidence is uncertain, the illustrations should be understood as plausible visual interpretations rather than exact reconstructions.

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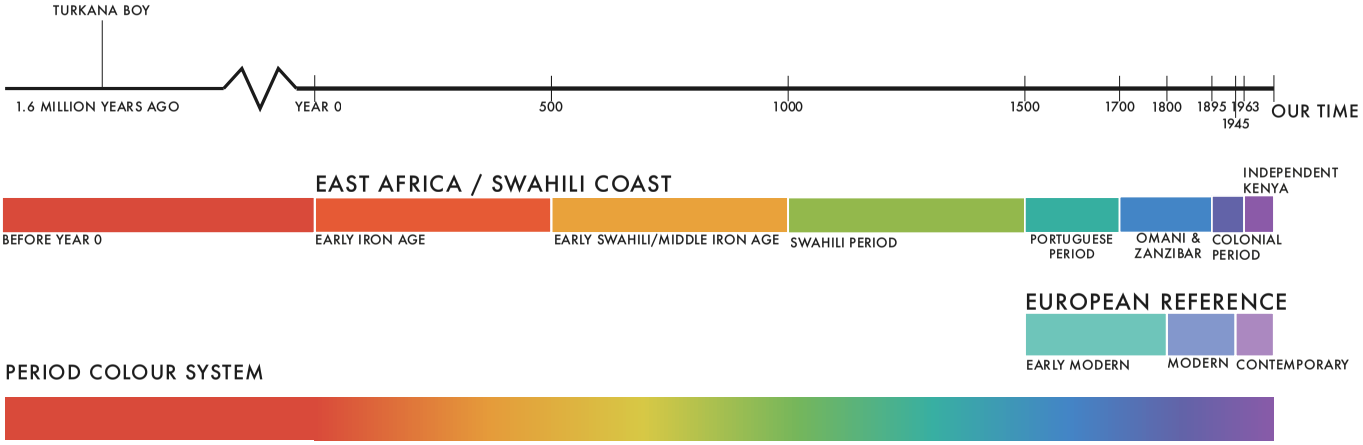
SWAHILI COAST STUDIO TIMELINE



1.6 million years ago,
a boy lived near the shores of an ancient lake
in what is now northern Kenya.

We do not know his name.
We do not know what he thought, what made him laugh,
or what he feared when darkness fell.

But his bones survived.

They tell us that he walked on long legs through an East African landscape
very different from our own.
They reveal something about how he grew, how his body worked,
and where he belongs in the extraordinary story of human evolution.

Turkana Boy begins with what science can tell us about KNM-WT 15000,
one of the most remarkable early human skeletons ever discovered.

Then the evidence is allowed to breathe.

In the second part of the book,
we follow the boy through a few imagined days in his world
– searching for food and water, watching animals, learning from others
and listening to sounds in the darkness.

The story is imagined. The world around him is not.

It is a journey into a human past so distant that almost everything familiar
has disappeared – except, perhaps, the experience of being young,
curious and hungry.

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