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National Geographic: Mysteries of Mankind

By Unknown

The earth does not easily yield
its secrets.
Yet around the world scientists
are unraveling
the compelling story
of human evolution.
It is a saga that blends the rigors
of science
with the romance of a detective story.
We have only traces that hint
at who our ancestors were
and how they may have lived.
It is like a gigantic puzzle with
most of the pieces forever missing.
Today, biological scientists may
quibble over the details of evolution,
but they all agree that evolution
is a fact.
Animal studies now shed light
on why some distant ape like creature
became an upright walker
and how it may have confronted
the perils of life on open ground.
Once barely noticeable
on the landscape,
humans would come to
dominate the earth.
The tool, mother of all inventions,
was a key to our success.
Tools chipped from stone helped
bring us to where we are today.
Now new tools help us
better understand what paths
we may have traveled along the way.
Much of our current knowledge
our understanding of who we are
and where we came from
has come about only
in the last 30 years.
Can we reconstruct the past?
Can long silent voices be summoned
across the vast reaches of time?
Join us as we probe
the MYSTERIES OF MANKIND.

By nature mammals are
intensely curious.
We humans are the most curious of all.
And perhaps nothing arouses
our curiosity
more than the intriguing question
of our origins.
What about the cavemans?
Caveman?
Well, what do you think he is?
A caveman.
At the close of the 16th century
when William Shakespeare wrote:
All the world's a stage, and
all the men and women merely players,
no one had any concept of the
vast array of players who preceded us.
Today we yearn to know iust
who the actors were
in this greatest of dramas.
When did they appear on the stage
and when did they finally depart?
The story is elusive at best,
like peering into mists that float
above an unfamiliar land.
Here and there through a dusky veil
we think we catch a fleeting echo
of some distant call
feel primordial eyes watching us
across the ancestral dark.
A thread of kinship surges within us.
Then, iust as we grasp at a clue,
the phantom voices melt away.
In the early 1900s the scientific
world believed that the cradle
of mankind was in Asia.
Then, in 1924,
South African anatomist Raymond Dart
was brought a skull workmen had found
in a limestone quarry.
Dart outraged the scientific community
by announcing that this primitive,
apelike child
was a hominid a member

of the family of man.
And, he said,
it had walked upright iust as we do.
Dart named the species
Australopithecus africanus
southern ape of Africa.
For more than a decade
Dart's only vocal supporter
was paleontologist Robert Broom.
Dart was finally vindicated
when Broom, in the 1930s and 40s,
discovered an assortment of
adult australopithecine fossils.
Africa's Great Rift Valley has been
geologically active
for millions of years
an ideal setting for the burial
of fossils and their later re-exposure
here, Olduvai Gorge would become known
as the '"Grand Canyon of Evolution'"
because of two maverick scientists.
Coming here in the 1930s,
Louis Leakey and his wife, Mary,
undertook one of
the most persistent efforts
in the history of anthropology.
What particularly excited the Leakeys
about Olduvai
was the presence
of primitive stone tools
scattered across the eroded landscape
Their passionate dream:
To find the remains of the creatures
who fashioned these tools to find
the earliest known human.
It would be nearly a quarter
of a century
before their single-minded
perseverance finally paid off.
The year was 1959.
We appeared to have got
what we were looking for.
Here at last was a man or
a man-like creature,

apparently the earliest known man
in the world.
It would turn out to be a
teen-aged male,
and not a true human,
but a more primitive hominid
an australopithecine.
And yet surely, like us,
he had cried when hungry as a baby,
wobbled his way onto two upright legs,
knew pain, love, and ioy.
Then in the way of all flesh, he died.
The boy died near the edge
of what was then a lake.
The skeleton is missing,
perhaps washed away or destroyed
by scavengers.
Fortunately,
the skull was buried by sediments.
Over the centuries water
soluble minerals turned bone to stone
as layer upon layer of deposits buried
the skull ever deeper into the earth.
Some layers were volcanic ash laid down
when a nearby volcano erupted.
Gradual geological uplift typical
of the Rift Valley
and subsequent erosion brought
the fossil once again to the surface.
The odds of finding a hominid fossil
are said to be one in ten million.
Because the Leakey's fossil was found
in a deposit with volcanic ash,
it could be accurately dated.
Volcanic ash contains radioactive
potassium that decays
into argon gas
at a known rate over time.
Human evolution was then believed
to begin no more
than one million years ago.
Yet here was
a fossil nearly double that age.
The scientific world was stunned.

Today, the addition of lasers
to the dating technique
enables scientists to date minuscule
samples even more accurately.
A single grain of ash,
seen magnified here many thousands
of times,
can produce a date much more
reliable than ever before possible.
The name and age of
a fossil tell little
about how the creature actually lived.
But perhaps the behavior
of living primates can.
Charles Darwin wrote that we are most
closely related to the African apes.
But at that time no one knew how
closely or to which species.
The answer would come from
a most unlikely source
the test tubes of molecular biologists.
Twenty years ago Dr. Vincent Sarich
and his colleagues at the University
of California
were among a small group of scientists
dating evolution with molecules
and test tubes instead of fossils.
Sarich's group compared a blood
protein in 13 species of primates,
including humans,
and charted when each had diverged
from a common ancestor.
The dates differed radically
from those obtained from fossils.
Among the great apes,
beginning millions of years ago,
the line that led to orangutans
was the first to split off
from a common ancestor.
The evidence suggests gorillas
were next.
According to Sarich,
chimpanzees and man
may have diverged as recently as four

to five million years ago.
Such a recent divergence
was almost impossible
for many scientists to accept.
Laymen were equally reluctant
to listen.
There is still a very strong
resistance to looking
at human beings in an evolutionary
context, especially behavioral.
Because we want to
retain a separateness.
We don't want to see ourselves
as having any non-human
in our ancestry.
There are significant differences
between us.
We are essentially hairless
Oh, he likes the beard.
We are habitually upright walkers,
we have a much larger brain,
and we have the gift
of spoken language.
But genetically humans and
chimpanzees are 99% identical.
Chimps may even be more closely related
to us than they are to gorillas.
In 1960 Louis Leakey,
with uncanny intuition,
sent a young woman into the field
to study chimpanzees.
Jane Goodall's 27-year old study has
become a classic
and confirms Leakey's conviction that
chimps have much to teach us
about the behavior of early humans.
Understanding of chimp behavior today
helps us to understand the way in which
our early ancestors may have lived.
Because I think it makes sense
to say any behavior shared
by the modern chimpanzee
and the modern human
was probably present

in the common ancestor.
And if it was present in the common
ancestor, therefore in early man.
A mechanical leopard was instrumental
in an experiment
with chimpanzees conducted
by scientists
from the University of Amsterdam.
Anthropologists have
long puzzled over how
our ancestors defended
themselves against predators.
How could such small creatures,
not yet intelligent enough to make
stone weapons, have possibly survived?
Leopards are natural predators
of chimpanzees.
Here, as the chimps attack,
we catch a glimpse
of how our ancestors,
having left the safety of the trees,
may have first met the challenges
of life on the ground.
Once the leopard is decapitated,
the chimp may not comprehend
that it is '"dead,'"
but it clearly knows the enemy
is no longer a threat.
If a chimpanzee has the intelligence
to defend itself with natural weapons,
it seems likely our early ancestors
did the same.
The chimpanzee has never
become an habitual upright walker.
Why did we?
Upright walking is so fundamental
we seldom think about it,
and yet it is one of the crucial ways
we are set apart
from all other mammals on earth.
When did our ancestors take that first
tentative step out of the trees
to brave the vast African landscapes?
Lmportant answers would be found in

the Afar Triangle region of Ethiopia.
Here, in 1974,
an international expedition
of 15 specialists
headed out to
the remote badlands known as Hadar.
Co leader of the team,
Dr. Donald Johanson
describes himself as superstitious.
After two frustrating months
on the sun scorched slopes,
he woke up one morning feeling lucky
and so noted in his diary.
Later that very day
the team discovered bones
that made headlines around the world
at the time the oldest,
most complete hominid ever found.
To anthropologists
who usually consider themselves
lucky to recover a tooth
or a broken fragment of bone,
this 40% complete skeleton
was a bonanza.
Nicknamed Lucy,
she quickly became the obiect
of intense study.
What is most exceptional
about a skeleton
as complete as Lucy
is all the information that
we as anthropologists can glean
from a skeleton like this.
For example, looking at
her femur or her thigh bone,
which is only about
we know that she was no taller
than three and a half or four feet.
Now that brings up the question
of was it perhaps a child?
If we look at the state of development
for example, of the third molar
or the wisdom tooth,
it is fully erupted and

is already beginning to wear.
So that relative to modern humans,
she was an adult when she died.
We're able to tell from
the weight bearing area
of the hip socket, for example,
that she probably only weighed
about 50 or 55 pounds.
From the size of the brain case,
there is enough
of the brain case preserved
to suggest to us
that the brain was very small
about one fourth the size
of a modern human brain.
Historically, large brains have been
considered the fundamental human trait.
In the 20s when Raymond Dart suggested
a small brained creature walked upright
he had only a skull to work with.
Here was a significant portion
of a skeleton a creature
with some very ape like features
that walked upright.
Lucy had an ape like brain,
a human like skeleton,
and teeth both ape and human like
a startling mixture of traits.
Yet clearly she was a hominid,
a member of the family of man.
Returning to Hadar the following year,
the team combed the slopes hoping
to discover newly exposed fossils.
They never dreamed they would find
anything as exciting as Lucy.
But the Johanson luck proved even
better than the year before.
We have the femur and
the foot and the knee!
They had come across the
first fragments of 13 individuals,
possibly members of the same band.
They may have all perished together
perhaps in a flash flood.

The fossils from Hadar
and similar ones from Tanzania
represent from 35 to 65 individuals.
Based on the abundant evidence,
Johanson and
his colleagues felt confident
in announcing an entirely new species.
They called it
Australopithecus afarensis
and put forth
the still controversial idea
that it is the common ancestor
to other Australopithecines
who eventually died out,
as well as the line
that led to true humans.
In the laboratory fragments
of skulls and iaws
from several males were combined
into a composite plaster skull
by Johanson's colleague, Dr. Tim White.
After initial discovery and analysis
scientists rarely work
with an original, fragile fossil.
In fact,
the fossils are usually returned
to the country where they were found.
But these durable casts
are exact replicas
down to the most minute details.
In Alexandria, Virginia,
the composite skull begins
a magical transformation
in the hands of anthropologist
turned artist, John Gurche.
Gurche has been fascinated with
human evolution since childhood.
Today he combines the talents
of an anatomist
with those of a master sculptor.
His workroom is a cross
between an artist's studio
and a scientific laboratory.
Placing the eyes

is often a special moment.
I base the position of the eyes
on scientific data,
but there's also often a mystical side
of it as well.
That is often the moment when I begin
to feel that I'm being watched
by the thing I'm working on
that it is not so much a thing
of clay and plaster,
but is actually a living being.
What I really want to do is get
at the human past,
and having the scientific data
behind me
makes it much more rewarding for me
because I can believe
in what I'm doing.
I can believe that the face
that's developing
in front of me is very much like
the face
of the individual that it
actually belonged to.
The really fascinating thing
about working
with Australopithecines is
that you have something that's right
on the line between being human
and not human.
You have a lot of features
that are ape like
and yet it's in the process
of becoming human.
The reconstruction will take
Gurche more than two months.
It is painstaking,
arduous work that often continues
well into the night.
I'd really like to be able
to make the claim
for this kind of
work that it's a hard science.
Unfortunately, it's not.

It's as good as it can be
without actually going back
in time and coming face to face
with our ancestors.
The end result is often
a surprise even to me.
I'm basing the restoration on
clues one by one
that I'm getting from the bony anatomy
and the cumulative effect
of those clues is often a surprise.
A face long lost to the tides of time
emerges out of plaster and clay.
We come face to face with one of
out earliest known relatives
across a chasm of three million years.
More than half a million years
before Lucy
and more than a thousand miles away,
a volcano erupted
spewing ash across
Tanzania's Serengeti Plain.
Then a moment was frozen in time.
An amazing sequence of
chance events created a record unique
in the pageant of prehistory.
Soon after the eruption the rain
clouds that had been threatening parted.
Then three hominids,
perhaps of the same species as Lucy,
walked by.
Their footprints left an impression
in the dampened ashfall.
Only because the sun then came out did
the footprints harden.
And only because continued eruptions
laid down yet other layers of ash
were the traces entombed more than
three and a half million years.
Today this area,
not far from Olduvai Gorge in
northern Tanzania, is called Laetoli.
Here, in 1978,
a team led by Dr. Mary Leakey

finds what is one of the most
astounding archaeological discoveries
of all time the very footprints
not seen on this earth
since the eruption of
one volcano millions of years ago.
Dr. Leakey and her team begin
the delicate process
of removing the cement hard rock.
To Dr. Leakey the prints
are more evocative than any fossil.
They tell a vivid story
of one fleeting moment in time.
The track of footprints that
you see here on my left
was a truly remarkable find
that we made this season.
It's a trail left by three people
who walked across a flat expanse
of volcanic ash
three and a half million years ago.
We can say they were relatively short.
We can estimate that their height was
probably between four and five feet.
We can say they had
this free striding walk.
One assumes they were
perhaps holding hands or
They are so evenly spaced, the tracks,
and they're keeping step,
always left foot for left foot
and right foot for right foot,
that it may, for all we know,
have been a family party.
The emotional impact of the footprints
is universal,
but scientifically they arouse debate:
Were these creatures related to Lucy,
and could their upright walk so long
ago have been the same as ours today?
Tim White helped excavate
the Laetoli footprints.
Now, to answer some of
the questions raised,

he has devised an experiment.
With our closest living relative,
he walks across an expanse of wet sand.
Its consistency is roughly the same
as damp volcanic ash.
Here we have my footprint
with a strong heel strike
and the big toe in line with
the other toes.
The chimpanzee's footprint is here and
the knuckle print is right behind it.
We see the chimpanzee's toe
is divergent,
whereas the human toe is
in line with the other toes.
The human foot also has
a dramatic arch to it.
The chimpanzee foot and
its print lacks this arch.
And at Laetoli we have evidence from
three and a half million years ago
of a large toe in line with the rest
of the toes and a longitudinal arch
and a strong heel strike.
In other words,
the human pattern has been established
three and a half million years ago
in Tanzania with these early hominids.
Some scientists feel that only by
studying the locomotion of apes
can we know how Lucy and our
other early ancestors actually walked.
At the state University
of New York at Stony Brook,
a team led by anatomists Randall Susman
and Jack Stern
videotapes the movements
of an orangutan.
They have also extensively
studied chimpanzees.
Come on.
Electrodes implanted in the arm
and leg muscles
send signals to monitoring equipment.

Clothing holds the transmitter
in place on the animal's back.
That's good bipedalism. Keep him going.
On their screen Susman and
Stern receive a superimposed image
of the electrical output
of the muscles as the animal moves.
One intriguing finding:
The hip muscles used by apes
in climbing are used in many
of the same ways as human hip muscles
are in walking.
So the transition from tree dweller
to ground walker
may have been relatively simple.
The pattern of muscle usage
was already in place.
Good boy.
But Susman and Stern, unlike Johanson,
White, and others,
believe that these ancestors
did not walk exactly as we do,
but more like an ape when it walks
on two legs.
They maintain that those creatures,
like apes,
still spent much time in the trees
and had not yet fully adapted
to life on the ground.
In earlier days,
anthropologists compared and
contrasted stones and bones,
but could only ponder questions
about behavior.
Today they can directly address
some of the fundamental issues
of our ancestry.
How did Lucy and the others live?
Where did they sleep?
What did they eat?
In the line of other Australopithecines
to which Lucy may have given rise,
there were smaller creatures
known as graciles

and robust ones
with puzzlingly massive iaws and teeth
The fossil teeth themselves hold clues
to what these hominids were eating.
Thousands or millions of years later,
the wear on the teeth remains.
Let's see if
we can't acquire that image.
Dr. Fred Grine, also at Stony Brook,
studies diet, using a scanning electron
microscope and computer graphics.
Different foods leave distinctively
different marks on teeth.
Comparing the two patterns
of a gracile
and robust australopithecine side
by side,
it becomes quite evident
that the wear patterns
are very dissimilar,
and that, therefore,
the foods they would have eaten would
have been dissimilar.
The scratches and
the polished surfaces found
on a gracile Australopithecine molar
would have been produced
by soft foods such as soft fruits
and leaves,
whereas the pitting which characterizes
a robust Australopithecine molar
would have been produced
by hard food obiects such as seeds
and nuts.
Shrouded in myth since their discovery
Australopithecines were
long characterized
as blood thirsty killer apes.
It now seems far more
likely they were vegetarians
who should be seen
in their more rightful place
in the human evolutionary drama.
Robust Australopithecines flourished

for well over a million years,
then disappeared an apparent
evolutionary dead end.
It is possible they lost out
in competition with another,
more intelligent species
a hominid tool user
a line that would eventually lead
to modern human beings.
Like the remains of their predecessors
the fossil bones of the tool users are
almost always discovered
in deposits formed along lake shores
or streams.
The areas around Lake Turkana
in northern Kenya have a record
of both human
and animal life that is
perhaps unmatched in the world.
Every week during the field season,
a light plane from Nairobi brings
expedition leader Richard Leakey,
son of Louis and Mark Leakey.
Despite an early decision not to
follow in his parents' footsteps,
Richard's passion for
paleontology won out.
For two decades he has been
digging here with remarkable success.
Over the years since 1968 the Turkana
region has yielded ten
to fifteen thousand fossil remains.
Most are animal, but amazingly
more than 300 are early human.
Leakey has been called the '"organizing
genius of modern paleontology'".
He heads a team that scours
the exposures daily
for several months at a time.
They cover every foot of
the 600 square mile area each year.
Looking for new evidence in any
scientific discipline is exciting.
In our field it's

particularly rewarding
because every year there
is a new opportunity.
These vast areas of desert
are periodically washed by rain.
And every time it rains,
there's a chance that something new
will be exposed something new
that's going
to tell us something that
we never knew before.
It's going to expose
a completely new chapter
in our understanding of human origins.
And it's really great fun
to be out there
on the desert realizing that although
you were there the year before,
this year it will be different
because it rained a few months ago
and something new must have
washed up somewhere.
It's simply a question of finding it.
In 1984 a small piece
of skull was found.
It was immediately recognized as human
by Leakey's colleague Kamoya Kimeu.
With anatomist Alan Walker
and the rest of the team,
he went on to unearth a seemingly
endless array of bones.
The rest of the skull
and face were found
and painstakingly glued together
from 70 separate pieces.
The bones were clearly those
of a Homo erectus,
a species on the path
that eventually led to modern humans.
The skeleton, a boy of about 12,
was dated at more than a million
and a half years old.
Far more complete than even Lucy,
it is one of the most remarkable finds

in the study of human evolution.
The boy differs little
from a modern human
in stature and body proportions.
An artist imagines
what he might have looked like;
Richard Leakey reconstructs
what his life may have been like.
The area that he was living
in was probably lake margin,
swampy ground near the lake edge.
There was grassland;
there were forests;
there were permanent rivers running
into the lake.
Probably an enormous amount of
animals plains animals,
carnivores, scavengers.
I suppose one could visualize an area
like one of the better national parks
in East Africa today,
teeming with wildlife ideal conditions
for an early human.
I think it's remarkable
because it's so complete.
But perhaps another aspect that is
often overlooked
is that many people
who don't like the idea
of human evolution have been able to
discount much of the work we've done.
On the basis that it was built
on fragmentary evidence
iust little bits and pieces.
And who knows.
Those little bits of
bone could belong to anything.
To confront some of these people
with a complete skeleton that is
so manifestly human
and is so obviously related to us.
In a context where it's definitely one
and a half million years or a little
more is fairly convincing evidence.

And I think many of the people who
are fence sitters on this discussion
about creationism versus evolution are
going to have to get off the fence
in the light of this discovery.
A Homo erectus head would have
looked very different from our own.
It had a heavy brow ridge,
iutting face, and a smaller braincase.
It is very likely their skin was dark
nature's protection against
the tropical sun.
Some scientists believe Homo erectus
was the first hominid to hunt.
In earlier times our ancestors,
themselves prey,
were probably accepted without fear
at Africa's water holes.
But when they began to hunt,
the other animals would sense them
as a threat.
Exactly when hunting began may never
be known.
But it is clear that the tools made
by erectus were far more sophisticated
than any that had been made before.
Even the earliest and
most primitive tools marked
a momentous advance for humankind
the first evidence of culture.
And, as intelligence grew over time,
tools became ever more refined
and specialized.
Learning how tools
may have been made and used
provides a window into the behavior
of our ancestors.
Dr. Nicholas Toth of Indiana University
has become a master of the technique.
Many scientists had believed
that the obiective
of the earliest toolmakers was to
create these large cobbles
and that the chipped off flakes

were merely the debris.
Toth's experimentation led him
to conclude it was quite the reverse.
The razor sharp flakes, he believes,
were often the tools our
ancestors made and used.
If you take a hard look
at your average human being,
we're very poor carnivores.
We have small canines;
we don't have slashing claws;
we're not very strong;
we don't look anything like
a hyena or a lion.
And I think with
the simplest flake stone technology,
you can butcher an animal
from the size of a gazelle
to the size of an elephant
with absolutely no problem.
Even hyenas will not tackle
the biggest bones on a carcass.
But with the simplest tools used
like a hammer and anvil,
an early hominid could get
at the marrow inside.
Almost completely fat,
marrow is high in calories,
essential to a hominid roaming
the African landscape.
When an animal bone is butchered,
the edge of the tool leaves cutmarks.
Often ignored in the past,
cutmarks are now recognized as vital
clues to the behavior of early humans.
They can tell us, for instance,
which animals our ancestors ate,
which parts of these animals
they may have favored,
and ultimately they may reveal when
hominids became successful hunters.
In the past scientists often
suspected cutmarks were man made
if tools were found nearby.

Today they know many factors from the
natural world can plant false clues.
One factor not often considered came to
light in unusual experiment conducted
by Dr. Kay Behrensmeyer.
In Asia she had been puzzled
by grooves and scratches
on bones eight to
nine million years old,
long before hominids existed.
Later, in Africa,
she saw how bones frequently
are trampeled by migrating game herds.
Could random trampeling, she wondered,
leave marks that could be confused
with those made purposefully by a tool.
Dr. Pat Shipman of
Johns Hopkins University
has been experimenting
with cutmarks since 1978.
She believes that
by creating them herself
and examining them microscopically,
she and other can better define
what is a true cutmark and what is not.
Into a scanning electron microscope,
or SEM,
she inserts a gold coated cast
of the marks she has made.
Compared with regular microscopes,
the SEM offers greater depth
of field to look
at three-dimensional structures.
It seems likely that marks
on bones found
in sandy soil may remain open
to interpretation.
But for others,
Shipman has found that
what distinguish a true cutmark
are the fine lines within a groove.
Experimenting, she says,
is the best way
to suggest what happened

to a bone thousands or millions
of years ago.
The problem for us today
is to tease out of the past,
to coax out of the evidence
the specialness of early hominids.
And once we know where we started
and how we started
and what was important then,
we may have a very different idea
of what it is to be human.
Homo erectus was the
first human species to leave Africa.
Sometime after a million years ago,
their fossil remains,
and those of a number
of African mammals,
first appear in other tropical regions
of the world.
Some scientists believe that
by then meat had become an
appreciable part of the diet.
With the addition
of this important protein,
this intelligent and curious creature
would have been well equipped
to expand out to unknown lands.
We know from preserved remains and
tools that erectus reached China,
Java and southern Europe.
On the Sussex coast of England,
quarry workers were the first
to unearth a site called Boxgrove.
It may hold answers to the life style
of the species that came
after Homo erectus.
About 350,000 years old,
Boxgrove is
an unusually important site.
It covers a hundred acres,
and it contains vast numbers of tools
and animal bones that
are extraordinarily well preserved.
Erectus probably never reached

this far north in Europe,
but his descendants did.
They were the earliest form
of our own species, Homo sapiens.
Here flags mark the locations
where their tools
or fragments have been found.
Animal bones abound.
Deer teeth.
Part of the lower iaw of
an extinct bear.
A large pelvic bone with cutmarks
that hint at a tool user's presence.
Yet strangely,
no human remains have been found.
So untouched is the site that if one
could peer back through the centuries,
here would sit an ancestor
chipping stone to make a tool.
Nearby, what may have been that very
tool is held again in a human hand
for the first time in 350,000 years.
Perhaps it was used to scrape wood,
prepare a hide, or dig for roots
in the ground.
It may have helped kill the deer
or bring down the bear.
But where is the maker of the tool?
Once Boxgrove was a beach front,
ideal for the preservation of fossils.
Why no people have been found remains
iust another missing piece
in the human puzzle.
These pre modern Homo sapiens
seemingly evolved from Homo erectus,
but their exact relationship
to erectus,
as well as to the more modern humans
who followed, is still unclear.
One of the most puzzling of these pre
modern Homo sapiens was Neandertal.
Some scientists think they were a short
lived side branch on the family tree.
Indeed, the longest ongoing controversy

in paleoanthropology has been
who were the Neandertals?
But there are more questions
than answers.
We do know the Neandertals
were not the dimwitted brutes
so often portrayed by cartoonists.
But one characteristic attributed
to them is true.
They were cave people.
At Kebara Cave in Israel,
a Neandertal excavation in run iointly
by Israeli and French teams.
When carefully studied,
layers in a cave can tell a rich story.
Too often in the past they were dug
with reckless abandon.
Thirty years ago Kebara was attacked
with pickaxe and shovel.
Today, dental probes and fine brushes
move methodically, inch by inch.
Each pail of dirt is screened for even
the tiniest fragment of bone or stone.
Each piece will then be washed,
identified, labeled, and catalogued.
By far the greatest number
of finds at Kebara
have been these well fashioned tools.
Literally hundreds of thousands
have been unearthed.
The leader of the Israeli team
is Professor Ofer Bar Yosef.
He has clear evidence that over
many thousands of years
Neandertals repeatedly occupied
Kebara Cave.
What we can see here
are the fireplaces as built
by the people around
And this is one of
the special features of Kebara Cave
that we can see these fireplaces
which are built one on top
of the other

and always at the same place
in the central area of the cave.
They were either heating the area
of the cave during wintertime
or also using them for cooking.
And then when you still have
the hot ashes,
spreading them
so they can sleep on them.
One problem that we should always keep
in mind is that we cannot
and we should not perhaps excavate
the entire cave area
because we have to preserve part of
it for future archaeologists
who will probably use better techniques
of excavation or better approaches.
And, therefore, we'll never know
the entire picture
of what really happened everywhere.
We do know Neandertals camped
in this natural shelter,
or at least came here with food,
perhaps huddling in groups around
the warmth of a fire.
We also know some of them died here.
Neandertals were the first people
to bury their dead.
This skeleton,
except for the missing skull which
may have been used in some ritual,
is among the most
complete Neandertals ever found.
What the meaning of burials was in the
life of these long vanished ancestors
cannot be known for certain.
But the fact that they buried
their dead links them
to us in deep and meaningful ways.
From Neandertal excavations throughout
Europe and the Middle East,
a picture of how they lived
has gradually emerged.
Theirs was a non-settled existence.

A socially organized people,
they traveled in groups
as they moved from place to place
in search of food.
Hardy and robust, they were probably
much stronger than most modern people.
They survived even in
harsh Ice Age conditions.
Whether they had language
as we know it is unclear.
But surely, in some sophisticated way,
they communicated with their own.
Then about 30 to 40,000 years ago
these intelligent,
well-adapted people
mysteriously disappeared.
They may or may not have evolved
into modern Homo sapiens.
If modern Homo sapiens evolved
elsewhere and then migrated,
Neandertals may have simply
lost out to them.
Anatomically much like us,
these early modern humans stood
at the threshold of
everything we usually define as human.
Farming and the rise of
great cities would await a later time.
But these early modern humans were
the very first to create fine art.
This rich record of the past
ranks among the greatest artistic
achievements of humankind.
We know these people spread to every
habitable part of the globe,
but where had they come from?
One scientist at the British Museum
of Natural History in London
thinks the answer has been found.
Physical anthropologist
Dr. Chris Stringer.
The research on the origin of
modern people is interesting obviously
because it deals with the origins

of all living people alive today.
And my idea of an African origin
is based partly on the fossil evidence.
I feel that modern people
appeared earliest in Africa
and then later on in other parts
of the world.
But there is also genetic data,
and the genetic data also support
the idea
of an African origin of modern people.
At the University of Hawaii one of
the primary genetic researchers
in this field investigates
the migration patterns of modern races
Dr. Becky Cann believes her research
adds rather startling information
to the theory of an African origin.
All humans who are alive today
can trace their ancestry
in their genes back to a single female
who, we think, lived in Africa
sometime perhaps
two hundred thousand years ago
Dr. Cann bases her theory on studies
of DNA extracted from women.
She traces backward in time one part
of the DNA molecule that
only females can pass on.
The genetic work is supplemented
with interviews about
the women's maternal ancestry.
Could I ask you about your maternal
grandmother, your mother's mother?
My grandmother was born
on August 10, 1903 in Macau,
Macau is the coast of China.
Dr. Cann has studied Americans
of European,
African, and Asian descent,
as well as Australian Aborigines.
By comparing small segments of DNA
from these women,
Dr. Cann assesses the similarities

and the differences.
The more alike the DNA,
the more closely related
two individuals are.
With a computer,
Cann suggests different migration
patterns over the centuries.
If she is right, modern humans,
like earlier hominids,
evolved in Africa.
In Africa it seems that the evolution
of modern people first began
and from there
we all trace our ancestry.
So we're all very closely related.
And that goes for
all people American Indians,
Australian Aborigines, Eskimos,
Europeans we all trace our origin
to Africa,
and under the skin we are all Africans.
Old concepts of
human diversity die hard.
But certainly we must consider
the possibility that human equality
is a fact of our evolution
that it's in our very genes.
We are all time travelers together,
the most recent players
in a drama that began
at least four million years ago.
In the detective story
of human evolution
we know in a broad sense
how the plot turned out.
But we know very little about
the chapters along the way.
There are too many fossils
that are merely fragments
and too many gaps in time
for which we have no fossils at all.
The science of anthropology is
little more than a hundred years old.
But as it moves forward,

it opens new mysteries,
poses greater riddles.
To begin filling
in the numerous blanks,
the discovery
of new fossils is essential.
New technologies will add other pieces
to the expanding puzzle.
But that is all we can expect
random puzzle pieces.
Never can the entire picture be known.
For scientists the excitement
of the quest never diminishes.
And as the rains come again next year
and the next,
they know that somewhere
in thousands of square miles,
with a bit of luck,
they will find new and
even more provocative clues
to the ongoing drama of our human past.