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The Real Eve

By Unknown

This woman is
the mother of mankind.
The genetic Eve
from whom we all descend.
She lived 150,000 years ago
in East Africa...
and every one on Earth
is related to her.
Her daughters and granddaughters
would take humans out of Africa...
to populate
the rest of the world...
the most important journey
mankind would ever make.
Genetic tracking, for the first time,
gives us a route map of our journey.
With it, we can follow our families
as they travel through the world...
overcome hardships, separate and go
different ways to discover new lands.
It tells, for the first time, who
we are and where we come from.
The most profound questions
that have troubled mankind...
since we first raised our heads
and looked at the stars.
This new science
is a breakthrough.
Every one of us can now trace
our part in this incredible story.
We took samples from
these people in Chicago.
Genetic testing will show how their
ancestors traveled the world...
to reach this destination.
150,000 years ago, the world
was in the grip of an ice age.
The ice caps have advanced.
Sea levels dropped 400 feet.
North Africa is a vast desert
with small islands of green.
On these islands,
are tiny groups of people.
These are the first

modern humans...
recognizably like us today in
physique, intellect and abilities.
We are the same people
they were.
The brain that first started chipping
stone tools also took us into space.
They are hunter-gatherers,
living in widely scattered groups.
Roaming each year
over great distances...
sheltering where they can,
gathering seeds and fruit.
150,000 years ago,
hunting was the key to survival.
It explains much about the way
the human race developed.
Hunting needs careful thought and
planning. It needed cooperation...
that demanded enhanced intelligence
and communication skills.
Genetic tracking is unlocking more
secrets than we believed possible.
In just 7,000 generations,
modern humans have left Africa...
and penetrated
every corner of the globe.
And through the unbroken genetic
thread binding us to our past...
we can begin to understand
why it happened.
Archaeologists can tell us in detail
how modern humans lived.
But, to understand who we are
and where we come from...
we must look at
our genetic heritage.
Genetic Eve, the woman
from whom we all descend...
was not the only woman living at
the time or even the most fertile.
But her mitochondrial genes
were the most successful...
and the only ones to survive.

Everyone alive today can trace
a common ancestral line...
back to this one woman through
a unique part of our DNA...
mitochondrial DNA.
DNA, the blueprint of life,
is our own molecular pin code...
and uniquely identifies
each of us.
Mitochondria are tiny structures
found inside nearly all human cells.
It is separated from the normal
chromosomal DNA...
that dictates our height
or the color of our eyes.
Men inherit it from their mother,
but they can't pass it on.
In women, it carries on
from mother to daughter...
down the endless generation,
almost unchanged.
This is how we can
trace our way back...
to our genetic Eve
and her daughters.
So, written within it, is the
history of the world's women...
and, therefore,
the human race.
Professor Rebecca Cann
was the pioneering scientist...
who uncovered
the first all-important clue.
I started working on
human mitochondrial DNA...
so that I would have a view
that was objective...
that would help me and
other people understand...
how humans around the world
are related.
With this new science,
she could.
Harmless mutation happens all the

time in the mitochondrial DNA...
leaving minute markers
at every change.
These markers are like bar codes
and can be read in the same way.
Cann discovered the changes
happen at a fairly constant rate.
The groups with the earliest markers
were the Africans living in Africa...
and wondered if they might be
the oldest people in the world.
I was very excited when
I first started to get evidence...
and it was so counter-intuitive.
I put 20 Europeans
and 20 African-Americans...
on a sheet of X-ray film...
and every African-American
showed differences...
and all the Europeans
looked the same.
I thought I'd mislabeled something
or I'd made some drastic mistake.
We kept repeating things, as we got
more samples from different areas...
I realized that it was
a difference in the pattern.
And that this new type of evidence,
based on mitochondria...
was going to change the way we
thought about modern humans.
In 1987, Cann and her colleagues
published a paper...
showing for the first time that the
markers stretched back to Africa.
Showing quite clearly that this was
the birthplace of the human race.
New Guinean tribesman,
Parisian bartender...
American teacher, Polynesian farmer,
all were improbable relatives...
linked through one black woman
150,000 years ago.
Their findings

caused a sensation.
The responses of people
were sort of amazing.
The public was genuinely interested
in certain aspects, but there was...
a tendency to misinterpret the
data because of the terminology.
It was to describe this woman,
African Eve.
People thought it meant the biblical
Eve, the single woman...
in the Judeo-Christian bible,
the wife of Adam.
I have to say even my own uncle
sent me a Christmas card...
the year that our study
was published saying:
"How dare you?
You know grandma wasn't black!"
Her work is rewriting
human history.
Through it, we now know the first
mutations took place in Africa...
maybe 150,000 years ago,
and belong to our genetic Eve.
Professor Christopher Stringer,
Britain's leading paleoanthropologist...
was involved in the dating of
the earliest modern human skulls.
This skull is
as close as we can get...
to what the face of mitochondrial Eve
would have looked like.
It's a very complete skull
found in sediments in a cave...
dating from about
120,000 years ago.
And we can see here
that it's a modern human.
We've got a high-rounded
vault to the skull...
a face that's tucked in
under the cranial vault.
And this is what she looked like.

Using forensic reconstruction techniques, muscle and flesh... have been added to the skull and provide us with the first glimpse... of how our genetic mother might have looked 150,000 years ago. This is the closest we can get. Africa is the birthplace of all the human species to walk this planet. This vast natural laboratory molded humans over endless cycles... of alternating desert and green. And, it is the climate records that give us the next clue. Modern humans made many attempts to make the long trek out of Africa... settling in different parts of the old world, but they didn't survive. Climatic records indicate a brief, but devastating global freeze up... at the time, that turned the whole Middle East into extreme desert. Trapped in the northern quarter by the Sahara, there was no return... and few places to take refuge. Neither they nor any of their line survived. They would die in severe drought about 110,000 years ago. Their bones were discovered in Qafzeh caves... near Nazareth, in Galilee, in 1933. 13 fragile skeletons. One a woman, a tiny baby at her feet. When these bones were first uncovered... they were the oldest complete modern human skeletons ever found. The numerous skeletons that have been found in caves in Israel... at Qafzeh and Skhul shows that there were modern humans...

outside of Africa
over 100,000 years ago.
They may have gone out
to the Nile corridor...
through Sinai and
into the Middle East.
But they didn't go any further.
In a sense, they were a dead end.
It would be 40,000 years
before they would try again.
80,000 years ago the world
was cooling down again.
Once again, the ice caps were
advancing, drying out the lands.
Life became much harder.
As Africa dried up,
so did the drinking water.
Ocean records show sea levels
dropping dramatically...
as the world's water
became locked in ice.
As the game spread north,
our hunter-gatherers...
were forced to become fishermen
and beachcombers.
This is our new Eve,
our new family.
Direct descendants of the daughters
of the original genetic Eve...
now living on the coast,
surviving on the harvest of the sea.
Our entire survival has always
been at mercy of the climate.
When times were good
we could spread out.
A bigger range meant more food.
But the ice age froze the world
and the deserts closed in...
forcing our groups into smaller
territories on the coast.
Their beachcombing diet consisted
of fish, scallops, oysters and clams.
But the Red Sea became
much saltier...

making fishing and beachcombing more difficult. Until recently, there was little evidence our ancestors occupied... the coastal areas of east Africa or exploited marine resources. This is Sifi Bearhay, a geologist. In 1999, he was part of an international expedition... Looking for evidence of modern human occupation in Eritrea. In the Gulf of Zula, they stumbled on a remarkable discovery... of stone tools imbedded in an ancient fossilized coral reef. The reef was dated 125,000 years old. This is the world's first recorded oyster bar. 6,5 kilometers long and 15 meters above the current sea levels. It's the oldest evidence of beachcombing in the world. Buried in it are human tools, along with fossilized oyster... clam and scallop shells. It's a clear evidence that our ancestors were exploiting the sea. This is the unit where we have an inter-stratified layer... of big oyster and mollusk shells at the base. They're pretty quite horizontal. And this was a platform where modern man used to be walking... and dumping their stone tools and some of the shells they were eating. This is a hand ax, with a sharp end... and some of the shells that have been shed from this layer. They've been using this for breaking the shells and eating them.

And when they were finished with it,
they would dump the hand ax...
and also the shells
and walk to the next site.
But the most important thing is not
this, because you cannot date it.
It's what you find "in situ" which
makes it very, very important.
If you see this one,
is an obsidian tool.
They have been used to smash some
of these oyster bedded that you see.
You don't see both completely
enclosed, they have been smashed...
and the goodies have been eaten.
And these are some of those
very important stone tools...
that have been discovered.
This is the first place where
beachcombing for marine resources...
have been documented worldwide.
And very well.
These shell remains
are also a vital clue...
to the reasons why our ancestors
made the long walk out of Africa.
On a constant diet of seafood, maybe
more children would have survived.
But the increasing numbers made
the demand for food more desperate.
Camps like this one would have
numbered just a few hundred.
At one time, there were only about
10,000 humans alive in the world.
We were as endangered a species
as the great apes are today.
When the beachcomber's spearfishing
failed to support them...
they no longer had a choice.
If they would survive, they had
to move across the Red Sea.
Freak monsoons were watering the
green inviting hills of the Yemen.
Scientists have always thought our

ancestors migrated from Africa...
many times, group after group.
And it was believed they always went
north via Egypt and modern Israel.
But the DNA trail
tells a different story.
Professor Steven Oppenheimer is one
of the world's foremost authorities...
on current genetic research
into DNA tracking.
By putting together the genetic tree
with prehistoric weather patterns...
he's one of the first to come up
with the extraordinary idea...
that our ancestors came out of
Africa by a single southern route.
This beach is on the west coast
of the Red Sea, the African side.
Over on the other side, we can see
the mountains of Yemen.
I believe this is where our ancestors
crossed on the first stage...
of their journey
to the rest of the world.
These straits are known locally to
fishermen as the Gates of Grief...
because of the terrible
fierce currents crossing.
But 80,000 years ago, the sea level
was 150 foot further down.
As a result, a number of islands
and reefs appeared...
which allowed
our ancestors to cross...
as it were on stepping-stones
over to the Yemen.
Man had to come out of Africa in the
end, all his primate relatives had...
but the timing and the route were
determined by climate swings.
Driven by hunger, shrinking habitat,
and maybe the first stirrings...
of the restless human curiosity
about the land ahead...

our precious group of modern
humans prepared to leave.
There were two routes out of Africa:
the north of the Red Sea...
across the Suez,
and into the Middle East.
And here in the south, across
the Gates of Grief, into Yemen...
and on through the
south Arabian coast to India.
Both routes are possible.
But, to get through to the north...
our ancestors would have
to cross the Sahara desert.
And at the time,
it was even drier than it is today.
Here in the south, all they
had to do was to cross...
this short stretch of water, only
10 miles across to the Yemen.
So, this was a region they
could go to with confidence.
I think this beach is very
important in human history...
because I think this is the place
that our ancestors crossed...
from Africa to the Yemen...
on the first step of their journey
to the rest of the world.
This was the only place that they
had a successful exit from Africa.
I believe the most important journey
the human race ever took...
started here on this beach
80,000 years ago.
One small group of people,
one exodus.
The single most important event
in the population of the world.
This is no single trudge
across the sandbanks.
This was an epic struggle
to stay alive...
not just for themselves,

but the rest of mankind.
Those who survived the crossing,
who didn't succumb...
to the dangers of the Gates of
Grief, came to a virgin land.
This is the new frontier in the
beginning of the rest of the world.
Yemen beaches were on the edge
of an almost empty world.
Our group were the
first modern humans...
the first of their kind
outside Africa...
surviving in this place
at that time.
This group was on their own
at the edge of the new world.
Life would have been a bit better for
our migrants across into the Yemen.
For starts, the beach combing
in the Gulf of Aden...
would have been a lot better
than on the Red Sea.
Unlike the parched,
salty beaches they had left...
the Yemen was green and fertile,
full of fresh water...
game and shady oasis,
safe haven for a family to settle.
They were probably a small group.
Maybe, maximum about 250 persons.
They would have been scattered
around in family units...
of five to 20, but networking with
the other groups in the population.
Anything less than about 200
would not have been viable.
They wouldn't have been able to cope
with epidemics of disease or famine.
We know Eve and her daughters
were among the survivors...
because from them are descended
everyone in the world outside Africa.
The new science of tracking

is a breakthrough.
Using the single unbroken
mitochondrial genetic line...
scientists constructed
a vast family tree.
Pinpointing the markers,
fixing them by time and place.
It shows that once outside of
Africa, our ancestors split up.
Some going north and west,
some going east and south.
Once they had left Africa
and the Yemen...
they went their separate ways,
never to meet again.
When they first arrived here, they'd
have a selection of African lines.
A group of 250 people may have had
at least 5 or 6 different lines.
But over a thousand years...
if this population
stayed isolated...
gradually, those lines would
have reduced and reduced.
The total number of the population
would have stayed the same.
It's rather like a Welsh hill
village, or a village in Italy.
After some generations, everybody
gets to have the same surname.
This process of reduction
of lines is called drift...
and it happens in all small,
isolated communities.
The smaller and more
isolated a group is...
the faster the mitochondrial
DNA line comes down to one.
Not to one person,
or even to one group...
but one mitochondrial DNA line.
Some women have no daughters.
Some daughters don't survive.
So, in the end,

only one line is left.
Totally isolated, they can breed
only amongst themselves.
The genetic map shows it would
take about a thousand years...
for the mitochondrial line
to be reduced to one.
One genetic lineage shared
by all non-African people...
everywhere throughout history.
The single line convinces Oppenheimer
he is right about our ancestry.
The implications of the single
exodus from Africa are enormous.
For starts, there's a simple
observation that Australians...
New Guineans, Southeast Asians,
Chinese, Native Americans...
Europeans and Indians all come
from the same small group.
That means that this small group
in the last 80,000 years...
has diversified into complete
physically different populations...
in different parts of the world that
adapted physically and culturally...
to the new environments that
they've found and explored.
Through the Gulf of Aden out of
Africa families stayed put...
waiting until the climate changes
allowed them to move.
Their descendents would be
the people of the Middle East...
spreading north into Europe
40,000 years later...
and founding the vibrant,
cosmopolitan cities we know today.
Others will continue past the gulf,
moving east...
beachcombing their way along
the coast of the Indian Ocean...
Looking for warm
and gentle places to stop.

Within 6,000 years
of reaching the Yemen beaches...
our ancestors would
eat their way to Malaysia.
6,000 miles from Africa, our family
are in the tropical rain forests...
of Southeast Asia. These are
the descendants of Eve...
hunting in the jungles of Malaya,
roaming in small bands...
staying in one place long enough to
reap the harvest of wildlife...
and then moving on.
Their bodies are beginning to
adapt to the rainforest conditions.
Away from the harsh African sun
their skins become lighter...
their stature reduced
by lack of meat.
Like hunter-gatherers
in the jungle today...
they live on fish, rats,
squirrels and lizards.
On canopy game, fruits and roots.
They camouflage themselves
to conform to the foliage...
and imitate animal calls
to deceive their quarry.
Life in the forest is shared with
venomous snakes, cobras...
pythons and predatory animals.
Between leaving Africa
and arriving in Australia...
there's no clear archeological evidence
of the presence of modern humans...
or their amazing migration.
No skulls, no skeletons or graves.
Sea levels were 160 feet lower.
So, whatever our family left behind...
on their coastal journeys
have been reclaimed by the sea.
The genetic trail
is all we have.
It's not until we reach Malaysia that

new evidence begins to fill the gaps.
The great Toba eruption
in Sumatra, 74,000 years ago...
was the single biggest explosion
in the last two million years.
The plume was 25 miles high
and plunged much of the world...
into six dark years
of volcanic winter.
Northern Malaysia, India
and the Middle East...
were covered in a deadly shroud
of thick volcanic ash.
The most destructive event
in the last 2 million years...
provides positive clues about
our family's journey.
These are the Semang people,
shy hunter-gatherers...
of the interior jungles
in the lake peninsula.
Much darker than the other
Malaysians around them...
they are part of
the Orang Asli group.
Steven Oppenheimer thinks
they could be surviving remnant...
of our out of Africa family that
came through here 74,000 years ago.
If our ancestors
had passed this way...
on their route from Africa
to Australia and New Guinea...
it's likely they would
have left a genetic trace.
And we know, from previous surveys,
that the Orang Asli...
as a group of tribes in the
Malay peninsula of Malaysia...
are among the oldest
people in this region.
And the Semang are probably
the oldest of all.
Steven Oppenheimer has come

to this remote Semang village...
to collect swab samples of DNA.
These, he hopes,
will confirm his idea.
If my theory is correct, that they
left Africa 80,000 years ago...
they'd have had to have traveled
6,000 miles in 6,000 years...
in order to be here at the time
of the Great Toba explosion.
That means about a mile a year,
which is entirely feasible...
for that sort of nomadic lifestyle
of moving down the coast.
But to determine whether or not
they belonged to that group...
we need to look at their genetic
lines. The mitochondrial DNA...
will tell us whether or not
they come straight out of...
the two daughters of Eve
that originated just outside Africa.
If they have their own
unique lines that suggests...
they've been isolated since
that time, 70 or 80,000 years ago.
And that they have developed
completely on their own.
If on the other hand, we might even
find that their lines are ancestral...
to people further down the line, like
the Australians or the New Guineans.
Again, our genetic tracing will
help us to see if that's the case.
The genetic survey may prove
the Semang are an ancient race...
but it can't tell us exactly
when they were here.
We have to look for other
evidence to validate the theory.
These crude tools were found in a
wooded valley called Kota Tampan...
near Penang. There are other sites
nearby with the same sort of tools.

What makes these so interesting
is that they are embedded...
in a fall of Toba ash
dated 74,000 years ago.
Professor Zorinana Najeeq was
looking for an ancient river terrace...
when she stumbled upon
the Kota Tampan site.
What Professor Najeeq had actually
found was a stone tool workshop...
which could be pinpointed
to 74,000 years ago.
The ash covered
the working floor.
That ash has been dated
to 74,000 years ago.
This is a hammer stone
that they used...
and you can see that it's very
comfortable to hold it in the hand.
And this is the edge
that was used.
This is a chopper.
A type that is seen
in a lot of Asia...
and Southeast Asia.
What they were after
was the edge angle.
The edge angle
had to be right...
and the edge had to be sharp.
This was used for heavy-duty work.
It's heavy, it's got a sharp edge...
probably for felling trees.
Najeeq is convinced that
they were left by modern man.
Kota Tampan also revealed
man who had a complex mind.
His total technology
reveals a rational...
systematic and
organized mind.
The mind of Homo-sapiens.
These Kota Tampan tools

are crucial...
for the dating of modern man's
presence in Southeast Asia.
They're the first tangible evidence
we have of the whole journey...
from Africa to Australia. Combined
with Steven Oppenheimer's...
genetic tests, they could be real
proof of our ancient migration.
Has he found the
evidence he needs?
For the first time, archeology and
genetics gives us the same answer...
at this crucial point
in our journey.
Now we can be sure our ancestors
came this way 74,000 years ago.
The results are very exciting.
The Orang Asli...
the Semang group here,
have their own...
unique genetic lines
which suggest...
that they may have been in that
first trip 75,000 years ago.
They have their
own unique lines...
coming out of the first
two daughters of Eve outside Africa.
And they trace right back there, and
are not shared with anyone else...
in Southeast Asia
or in East Asia.
At that time, the sea levels
were 160 feet lower.
Most of the islands of Southeast
Asia were joined together...
into the single landmass
of the Sunda continent.
The survivors of the volcanic winter
would take our genetic journey...
onto its next great move,
the unknown continent of Australia.
100 miles of shark-infested sea

separated them from the new land.
This is the second great exodus
in the migration of mankind.
But this time there are no
green hills in the Yemen...
to give them the comfort
of a safe arrival.
Why did they risk all
on such a dangerous venture...
not even knowing if they would
make landfall at the end?
Some scientists believe
they were blown off course...
and arrived in the
unknown shore accidentally.
But new clues from the
genetic evidence says no.
It shows that Australian aborigines
have a number of genetic lines...
unique only to them, leading straight
back to the first daughters...
of our new Out of Africa Eve.
So many lines,
carried by so many women...
arriving in such a short time
suggest deliberate intention...
not accidental raft raid.
The first group arrived
70,000 years ago.
More followed
over the next 5,000 years.
All descendants
of our Out of Africa Eve.
These were the first people to walk
on this vast and empty continent.
They would stay undisturbed
for thousands of years.
The Australia they entered
was home to giant creatures...
megafauna, 3 meter high kangaroos
and tortoises as big as cars.
The cave of this vanished world
has been dated to 61,000 years ago.
But suddenly,

10,000 years later...
this fantastical creature and all
the other megafauna were extinct.
The climate didn't alter. There are
no sites indicating over-hunting.
But humans change the world
wherever they are.
This sudden extinction
is evidence of their presence.
It seems likely our ancestors
destroyed the leafy habitat...
with fire and the larger plant-eating
animals simply died away.
This dry lakebed is one of the places
where the theory might fall apart...
in spite of the matching
of archeology and genes...
back up on the trail
in Malaysia.
Mungo Man 3.
When he was found, the earth around
him was dated 62,000 years old.
When the bones were tested
for DNA, sensationally...
the DNA did not match anyone,
anywhere in the world.
To those who don't believe
in the Out of Africa theory...
this seems to be proof
that modern humans...
had evolved at different times
and at different places in the world...
into the people we are today.
But other scientists, like Professor
Chris Stringer, are doubtful.
There are many problems in extracting
DNA from a skeleton 60,000 years old.
So, firstly it might be that
the DNA that's been picked up...
is contamination, we're not sure.
But even if it's genuine DNA...
other analyses have shown that
it can reasonably be derived...
from an Out of Africa ancestor

just as the rest of us can.
So, in my view, the Mungo evidence
both from the bones...
and from the DNA,
if it's genuine...
still supports a recent African
origin for our species.
Australian aborigines
are an ancient people.
But they no longer look like
their ancestors...
who arrived all those
thousands of years ago.
Their bodies adapted, retaining the
characteristics needed to survive...
as hunter-gatherers
in the harsh desert environment.
Under the skin,
we are all very much alike.
Our DNA shows that we come
from one very small gene pool.
If we look at the DNA of all of us,
Australians, Africans...
Europeans, we find that comparing
the mitochondrial DNA of all of us...
we show less variation, even though
we're spread over the whole world...
we show less variation in the
mitochondrial DNA than we'd find...
in a small group of chimpanzees
or orangutans or gorillas.
Those apes show more variation,
even in their small groups...
than the entire human race.
But if all the people from
around the world...
descend from such
a small gene pool...
why do we all look
so completely different?
Natural selection and
adaptation to the environment...
are the most important factors.
Sexual selection is crucial.

Climate dictates body shape.
The colder the environment,
the shorter and more stocky...
you become to retain heat.
Height relates to diet.
The most obvious and
striking difference is color.
And that's also part
of our genetic inheritance.
Mila Jabloski, a scientist looking
at the evolution of skin color...
was working on the importance of
folic acid in fetal development...
when she stumbled,
by chance, on the answer.
I started doing research on
the evolution of skin color...
after preparing a lecture
for a class over 10 years ago.
Preparing for the class, I realized
that there was very little known...
about the evolution of skin color,
and what was known wasn't cogent.
I discovered an interesting paper
when I was preparing that lecture...
that showed that there's an interesting
and important relationship between...
ultraviolet radiation and a very
important biomolecule called folate.
Folic acid is crucial
for embryonic development...
and too much ultraviolet radiation
from the sun destroys it.
So, our ancestors in Africa needed
to be dark to protect their survival.
But too little ultraviolet prevents
the formation of Vitamin D...
causing rickets,
which can kill.
So, as they migrated to the North,
they had to grow paler to survive.
She has uncovered a very simple
evolutionary equation.
When we look at the pattern

of skin pigmentation...
among indigenous people today,
we see very dark people...
in equatorial regions
with high UV...
and significantly lighter people
as we get toward the poles.
And it turns out that melanin,
the natural sun screen...
is phenomenally good at screening
out ultraviolet radiation.
To some extent, it's too good.
In order for us to be able to make
enough Vitamin D in our skin...
we have to reduce the amount
of melanin that exists in the skin.
And so, what we see in the
course of our species' history...
as we've moved from an area
of high UV to areas of lower UV...
our skin has become
more and more depigmented.
She calculates that it takes 20,000
years to turn from black to white.
All that distinguishes color in people
are tiny genetic differences...
laid down long ago.
During the epic beachcombing
migration from Africa to Australia...
our family left behind colonies.
One group made their way up through
Asia into China and beyond.
Another went from north India,
past the Himalayas...
onto the vast Asian steppes. And
another stayed in the Arabian Gulf.
Large fresh water lakes allowed
our Out of Africa families...
to colonize these pockets of lush
vegetation surrounded by desert.
Continuous occupation occurred
here for more than 30,000 years.
Their bones and artifacts becoming
submerged as sea levels rose.

About 50,000 years ago, genetic lines began for the first time... to spread north into Europe. But the timing has always been a puzzle. If modern humans were able to reach Australia... as early as 70,000 years ago, why did they not arrive in Europe... until 50,000 years ago? It is a much shorter journey. Steven Oppenheimer thinks he has the answer. I think the answer to this question is that they were stuck. They were not able to get up to the near East, Israel and the Lebanon... because there was a great desert in their way. That desert was the Saudi Arabian desert and the Libyan desert. And between 80,000 and 50,000 years ago... this was completely impenetrable. The climate was so dry that the fertile crescent... the route from the gulf into... Lebanon, and Israel, and Europe was closed. Then, 50,000 years ago there was a sudden improvement of the climate. After centuries of domination by the desert, the rains came. Monsoon rainfall increased in Arabia and India... and the fertile crescent opened up. Rivers swirled and game spread north. Our families and genetic lines followed them. They walked north from the Persian Gulf, into the fertile crescent... following the rivers between

the Zagros mountains...
and the Syrian desert.
The idea that Europeans
came in through North Africa...
is very firmly fixed.
But Steven Oppenheimer's
evidence does not support this.
Genetic evidence completely
does not support it.
There's no evidence of the
early branches and, in fact...
only one of the main branches that
people the world is found in Europe.
Of course,
that does upset a lot of...
fixed views about the origins
of the Europeans...
and forces us
to consider the fact that...
Europeans were part of
the same single family...
that came out of Africa
through the southern route.
This new genetic evidence
will rewrite European prehistory.
These families founded the first
successful modern human colonies...
in the Middle East,
Syria and Lebanon.
A land that lay between
the rivers Tigris and Euphrates...
Two great rivers flowing from
the high lands of Turkey...
in the north,
down to the gulf.
We have taken the first steps
to the civilizations...
that would develop writing,
warfare and found the great empires.
All from one
direct genetic group...
back to our
Out of Africa migration.
During this time there was also

an explosion of new technology.
The stone tools and spears
modern humans manufactured...
became even lighter
and more effective.
The Zagros were full of game,
and good hunting makes stability.
They began to establish the fixed
geography of burial grounds...
in sacred places.
In Ksar Akil, in the Lebanon...
the burial of a 12-year old
modern child has been found...
dated 44,000 years ago.
His skull is broken.
His body tucked gently in the
shelter in the overhanging rock.
From these points new families spread
quickly to the Mediterranean...
south along the coast of Syria
into North Africa...
up through Turkey,
across the Balkans and into Europe.
This is our new family...
direct descendants of our
marshland Arabs in the gulf...
entering the unknown
territories of Germany.
But the land is not empty.
Others were there before them.
Neanderthals had been the masters
of Europe for over 250,000 years.
In 1856, in the
Neander Valley in Germany...
quarrymen were digging out mud
from a newly blasted site...
when they discovered some ribs,
part of a pelvis...
some arm and shoulder bones
of a large, humanlike animal.
They thought it was
a bear's skeleton.
Scientists later believed it was
some ancient northern savage...

who terrified
the Roman armies.
Professor Chris Stringer is an expert
on Neanderthals and their world.
They became known as Neanderthals,
and the center of the debate...
about human evolution, whether
these people were our ancestors...
or represented a strange
sidebranch of human evolution.
I've got a more complete skull than
the one found in the Neander Valley.
This was found at the beginning
of the last century in France...
and it shows us very well what the
head of the Neanderthal looked like.
There's a strong browage
over the eye sockets.
The whole face is pulled forward
and there's an enormous nose.
There's no chin
on the lower jaw.
We now think that the Neanderthals
were, perhaps, cold adapted.
They evolved for hundreds
of thousands of years in Europe...
under conditions colder
than the present day.
And their physique; they were short
and stocky, very powerfully built.
This nose may have been
part of the mechanism...
for breathing in
cold and dry air.
The Neanderthals were often
thought to be dimwitted brutes.
But they were fully human.
Their brains were as large as ours.
I think they're a different species.
But a closely related species...
a sibling species. One that had
common ancestors with us...
maybe only half a million years ago.
On that basis, they're fully human.

They're ten times closer to us
than chimpanzees are.
If they interbred with modern humans,
their genes have died out.
There's no trace of their
presence in our world.
Within 10,000 years,
the Neanderthals were extinct.
Modern humans would wipe out
all trace of their rivals...
and fill the space left behind.
The reason for their
disappearance is not clear.
They lived alongside modern man for
thousands of years. But in the end...
Neanderthals probably couldn't
adapt fast enough to the new world...
and their new resourceful rivals.
Neanderthals used their bodies
to mediate with nature...
modern humans
used their brains.
Into the void grew waves
of modern humans...
from the Middle East and Russia,
spreading throughout Europe.
Scientists think that with these waves
came 4 mitochondrial DNA lineages...
4 granddaughters
of our Out of Africa Eve.
They arrived between 45,000
and 10,000 years ago...
and most modern Europeans can
trace their lineage back to them.
Neanderthal technology had hardly
changed for over 200,000 years.
As soon as modern humans arrived,
a whole range of different tools...
suddenly appeared,
as well as ornamentations.
Archaeologists regard these ornaments
as a defining mark of modern humans.
And the first interest in ornament
in the 5,000,000 years of evolution.

Here, our most famous of these
statuettes from the Czech Republic...
made in baked clay and
about 27,000 years old...
from a site called Dolni Vestonice.
A beautiful little piece of work.
Some of them are covered with ocher
and others, polished for handling...
perhaps over many generations. These
were treasured valuable objects.
and obviously have ritual and
symbolic significance for its people.
Perhaps religious significance.
And here, one of the
most delicate pieces of art.
This is carved from mammoth ivory,
a really difficult material to work.
This is from the French site
of Brassempouy.
This is a beautiful representation
of the head of a woman...
with, again, an elaborate hairstyle
or perhaps a woven hat.
This is a really delicate
beautiful piece of work.
It's difficult to tell whether they
are representations of real people.
Or whether they're
in some way idealized...
to represent some
sort of ideal beauty.
In some cases, our data suggests
that they're based on real people.
And we find with these people the
arrival of evidence of sown clothing.
Here's one of the most direct bits
of evidence, it's a bone needle.
So, these people were sewing
cloths, sewing skins.
With evidence they were
even weaving fabrics.
This level of complexity would give
them quite a range of adaptation...
to climate, and more opportunities

for personal expression...
for things like fashion to develop.
We see this in some of the burials.
They have been buried with
garments, in some cases...
covered with thousands of beads
made from mammoth ivory.
And each of those beads represented
hours and hours of work.
So, we have evidence here of a real
richness and complexity of life...
that we don't find
with the Neanderthals.
This is an engraving of a mammoth
on a piece of mammoth tusk...
from a French site
that's about 15,000 years old.
But the Cro-Magnum didn't just
carve on pieces of bone and tusk.
They also sculpted, engraved,
and made models in clay.
And, of course, they painted
on the walls of their caves.
And this art goes back,
at least, to 35,000 years ago.
They depicted a variety of things,
often the animals they were hunting.
In some cases, dangerous animals
such as lions or woolly rhinoceroses.
In some cases, we can't recognize
what creatures are represented.
The creatures seem to be magical
symbols, imaginary creatures.
It's possible that some of this art
was being used in ceremonies...
and initiation rites.
Possibly even some of it was
created in a trance-like state...
linked with shamanism,
with magic.
Modern humans have come as far
as we could come on Europe.
Behind us, we have left
clear genetic footprints...

leading back to the one Out of
Africa movement 80,000 years ago.
10,000 miles away on the
other side of the globe...
and 6,000 years later, the invasion
of the new world would begin.
The world was cooling down again.
As the new ice age began...
modern humans have
found one place to settle.
Our genetic line's
now spread in all directions.
From the one southern
out of Africa route.
and the last remaining
frontier of America...
now has us trekking north from
India, Southeast Asia and China...
and east from the steppes in Siberia,
converging at the Bering Straits...
that fragile strip of land
joining Asia with America.
For a long time, archeologists
insisted no one had reached America...
before 15,000 years ago. But new
information from the DNA trail...
has our American ancestors crossing
the Beringia land bridge...
from Asia,
25 to 20 thousand years ago.
This is the last great journey
to populate the world.
And the genetic lines
all lead to one goal.
These are the first Americans.
25,000 years ago...
the world was moving into one of the
worst ice ages we'd have to endure.
In places the ice
was three miles thick.
But as the ice closes in...
this is the last possible moment
before it shuts off the land route...
from the Bering Straits into Alaska

and the rest of North America.
It would be another 8,000 years
before it'd open up again.
We know the first native Americans
got in about 20,000 years ago...
because we know which founding
types they brought with them.
Which mitochondrial founding types
they brought with them from Asia.
We have types in Asia similar to
the American, therefore we know...
the ones that actually
came into America...
as opposed to those which derived
since the arrival in America.
Now, on average,
the founders in America...
have accumulated
one mutation...
and since we know the mutation rate
for our genetic system...
is one mutation every 20,000 years,
we know that these founder types...
have been evolving for 20,000 years,
that's when they must have arrived.
In North America, the Laurentian ice
sheet smothered the central plains...
destroyed everything and forcing
our migrants down the west coast...
into South America.
As the ice retreated, we could
spread back into the liberated land.
There's evidence of a settlement of
a rock shelter on the Ohio River...
in Pennsylvania
called Meadowcroft.
Meadowcroft is very important
to the American story...
because it's dated at about 16,000
uncalibrated radiocarbon years...
and is one of the earliest native
American sites to be credited...
by archeologists. And this ties in
wonderfully with genetic estimates.

They must have come several thousand years before that to get to here. Dr. James Adavagio led the team of scientists who excavated the shelter. When we originally encountered it, we assumed... it would not contain any cultural material whatsoever. But, as it turned out, there were an assortment of artifacts... and other indications of the human presence several thousands of years... previous to what the estimate for the arrival of people in America was. Scattered across this surface and deeper occupation surfaces... in and around these fireplaces, are a series of artifacts... among the more notable of which are blade core fragments... like this, and the blades that have been struck... from these cores. What's unique about these items is not only they're not manufactured... for the most part, by later Paleo Indian groups in the Americas... but they bear a striking resemblance to blade cores from Northern China... that are 28 or 29 thousand years old. In fact, casts of these materials could be lost... in collections from North China and you wouldn't be able to tell them apart. What the evidence from Meadowcroft suggests to us is... along with data from a series of sites elsewhere in North America... is that there was no single migration of human beings to the new world... as was recently postulated in the last two decades. But instead a series of

pulses or emanations.
Multiple entries are now established
as the pattern for American migration.
These early settlers carried
many different genetic lines.
They came from Siberia,
China, Central Asia...
as far south as
Malaysia and Japan.
In 1996, a skeleton known
as Kennewick man...
was discovered along the
Columbia River, in Washington State.
When it was brought to Jim Chatters,
the forensic anthropologist...
he first believed the remains were
those of a 19th Century pioneer.
He was astonished when radio
carbon dating revealed it to be...
9,500 years old.
It was the oldest skeleton
ever found in North America.
But what really intrigued Chatters
was that despite his age...
Kennewick man did not resemble
modern Native Americans.
His skull was Caucasoid,
not Mongoloid...
and reconstruction of his face
showed distinct similarities...
with the Ainu who lived
in Northern Japan.
Kennewick man was an extremely
beaten up individual.
He had multiple broken ribs.
He had an injured left arm.
He had some injury to his skull.
Arthritis in his neck, knees, elbows.
Just, he'd certainly been
around the block a few times.
But, what was most distinctive about
him; the most interesting injury...
from a forensic standpoint, was a
spear point imbedded in his pelvis.

In fact, that's what caused us to radio carbon date the bones. All that can be seen is a little ovoid window in each side of the bone. But, when we cat scan it we can see there's a 2 inch long, 1 inch wide... quarter inch thick serrated edge blade in there. Now, what's interesting about this spear point is that it's of a style... that we only see after this man's death, in eastern Washington. We can see that style moving down the coast of British Columbia... around 10,000 years ago and on to 9,000 years ago. That's radiocarbon years. The people who bring this spear point... were the ones that we find with this spear point a little later in time... are very similar to modern American Indians. You can lose them in a crowd easily, American Indian skulls. So, a new population arrived with northeast Siberian characteristics. And it is beginning to replace the earlier arriving immigrants. This suggests in a broader way, that some sort of conflict was going on. In effect, it occurs that the time of the new arriving populations... the fact that Kennewick man looks different... both suggest that it's a competition over territory that's at issue. From the angle of entry, from the velocity of entry... it's fairly clear that this spear was coming directly at him... and that he could see it coming. Chatters believes that Kennewick man died by hypothermia and drowning.

Since his death, human populations
swelled from thousands to millions.
We've advanced from
primitive hunter-gatherers...
to farmers and traders,
town's people and city folk.
And from tribal domains
to empires.
In 5,000 generations we have arrived
in the modern world we know today.
Since the 80's, DNA samples have
been taken from thousands of people...
all over the world.
From Alaska to New Zealand.
From the Inuit to Icelanders.
By analyzing it, scientists
can trace similarities between...
personal pin codes and see which
people are most closely related.
All individuals can check
their mitochondrial DNA...
and trace the routes their ancestors
took in the journey around the world...
from Africa to every
corner of the globe.
In Chicago, we sampled 5 people who
are tracing their mitochondrial tree.
After analyzing their DNA swabs,
scientists discovered...
a remarkable connection between
a Greek and a native American.
Angela Trakis is a Greek who came
to the United States from Europe.
Leonard Maliterri is a Native
American, full-blooded Cree.
They are both from the same
small and rare branch...
of our family tree and share a
common ancestor 30,000 years ago.
Maybe in southern Siberia.
As modern humans populated
the empty world...
after leaving Africa,
some went north to central Russia.

There, a daughter was born,
carrying a new marker, X.
Her children separated,
some going west into Europe...
and some east from Siberia
and on into America.
They arrived in America from
opposite ends of the earth...
and now meet for the first time
in Chicago.
Their first family reunion in 30,000
years of our evolutionary history.
It kind of blows...
it just blows me away.
I think it's really exciting that
we all come from the same line.
Maybe people will stop putting
so much emphasis on differences...
and talking about the common person,
maybe that will help people...
be more tolerant and loving,
and maybe that will...
progress and maybe in a more relevant
manner than just science...
maybe just humanity in general.
I think that's very relevant today.
80,000 years ago a tiny
group of modern humans...
braved the terrors of the Red Sea
and left Africa forever.
They carried with them
the future of the world.
By 10,000 years ago, they have
penetrated every corner of the globe.
The most incredible and important
journey we have ever made.
For the first time,
we now know who we are.
Where we come from.
That we are the same people as our
restless and inquisitive ancestors.
But we have reached the end
of our migration.
There are no more

empty lands to move to.
Science tells us an unbroken
chain links us to our past...
and to each other.
All share the same genetic
inheritance from our ancestral Eve.
Perhaps that is the most
important message...
we should carry
into the future.