Human migration routes into the Urumqi region of Xinjiang, China: Perspectives from The Genographic Project and Google Earth

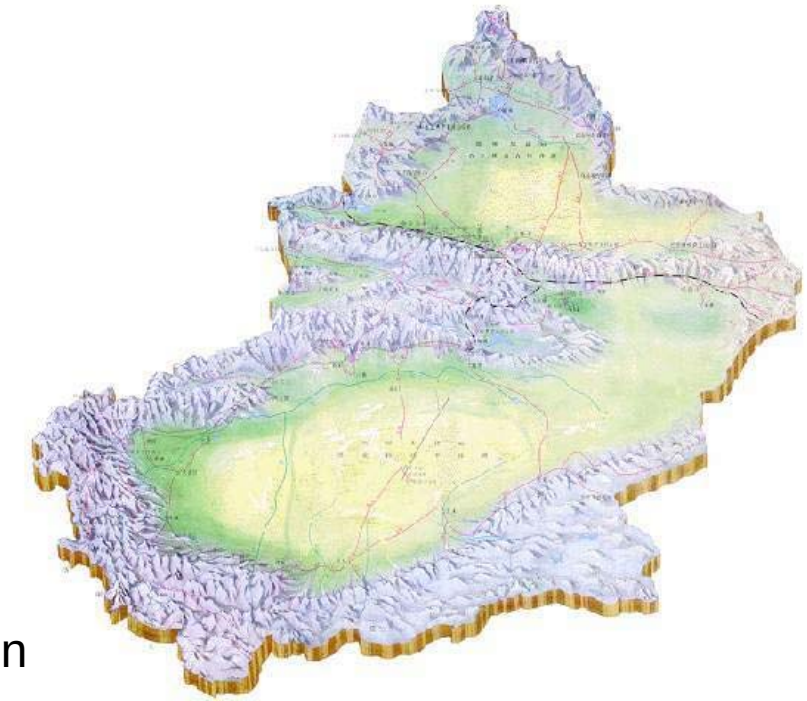
Carl Tape

May 8, 2006

Caltech GPS trip to Tian Shan (June 2006)

The Genographic Project (National Geographic)
https://www3.nationalgeographic.com/genographic/

Google Earth
http://earth.google.com



1. Name: Xinjiang Uygur Autonomous Region

2. Area: 1.6604 million square kilometers

3. Population: 19.25 million (the 2000 population census)

4. Capital: Urumqi

5. Geography: Xinjiang is situated in the northeastern border area of China. It borders Mongolia, Russia, Kazakhstan, Kyrgyzstan, Tajikistan, Afghanistan, Pakistan, and India, among others. In China, it adjoins Tibet, Qinghai, Gansu and other provinces.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© 2006 Europa Technologies
Image © 2006 TerraMetrics
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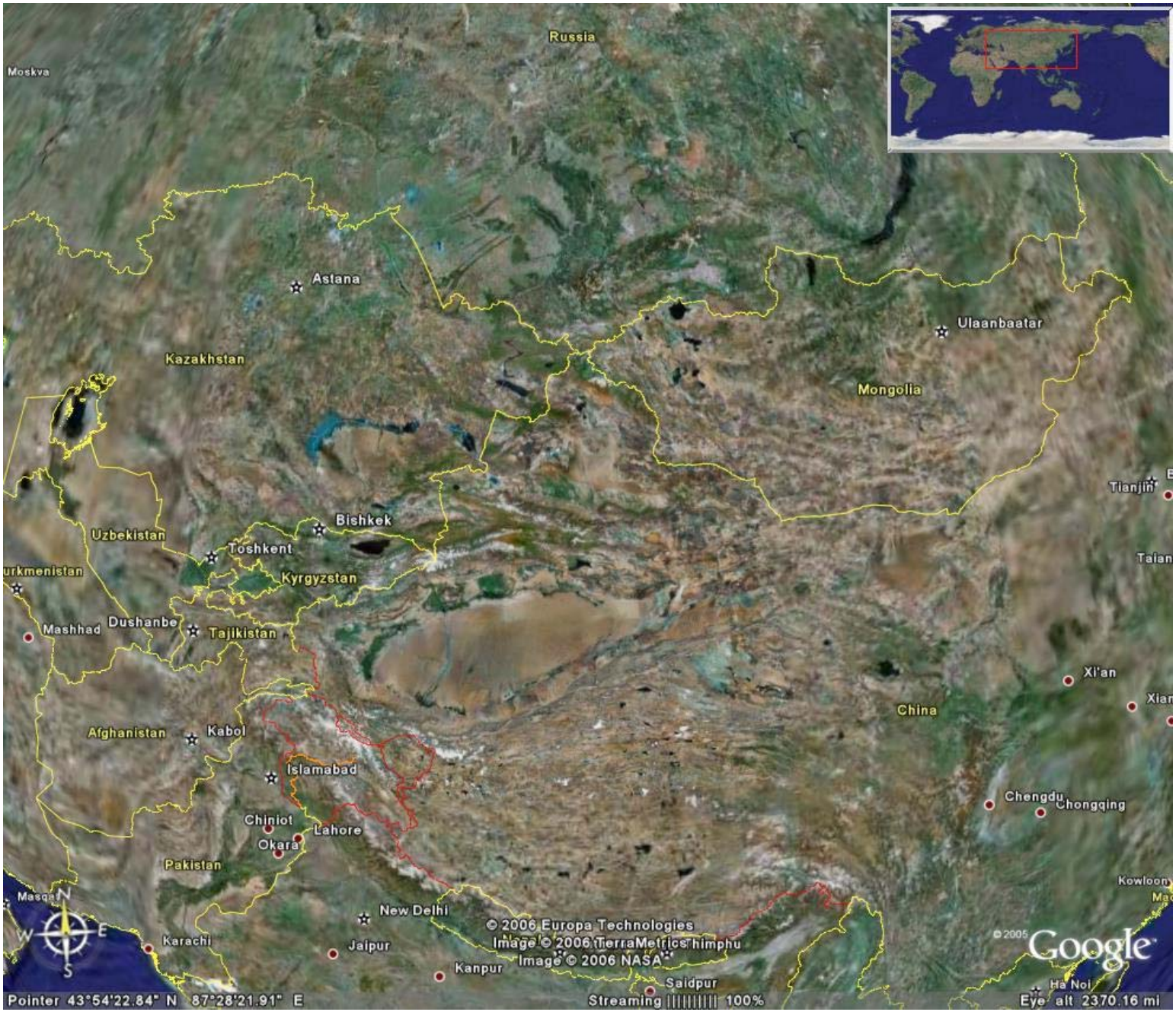
Pointer 43°54'22.84" N 87°28'21.91" E
Streaming 100%
Eye alt 4607.07 mi


Russia
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Tajikistan
Xi'an
China
Afghanistan
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Chengdu
Chongqing
Chiniot
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Okara
Pakistan
Kowloon
New Delhi
Karachi
Jaipur
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Saidpur
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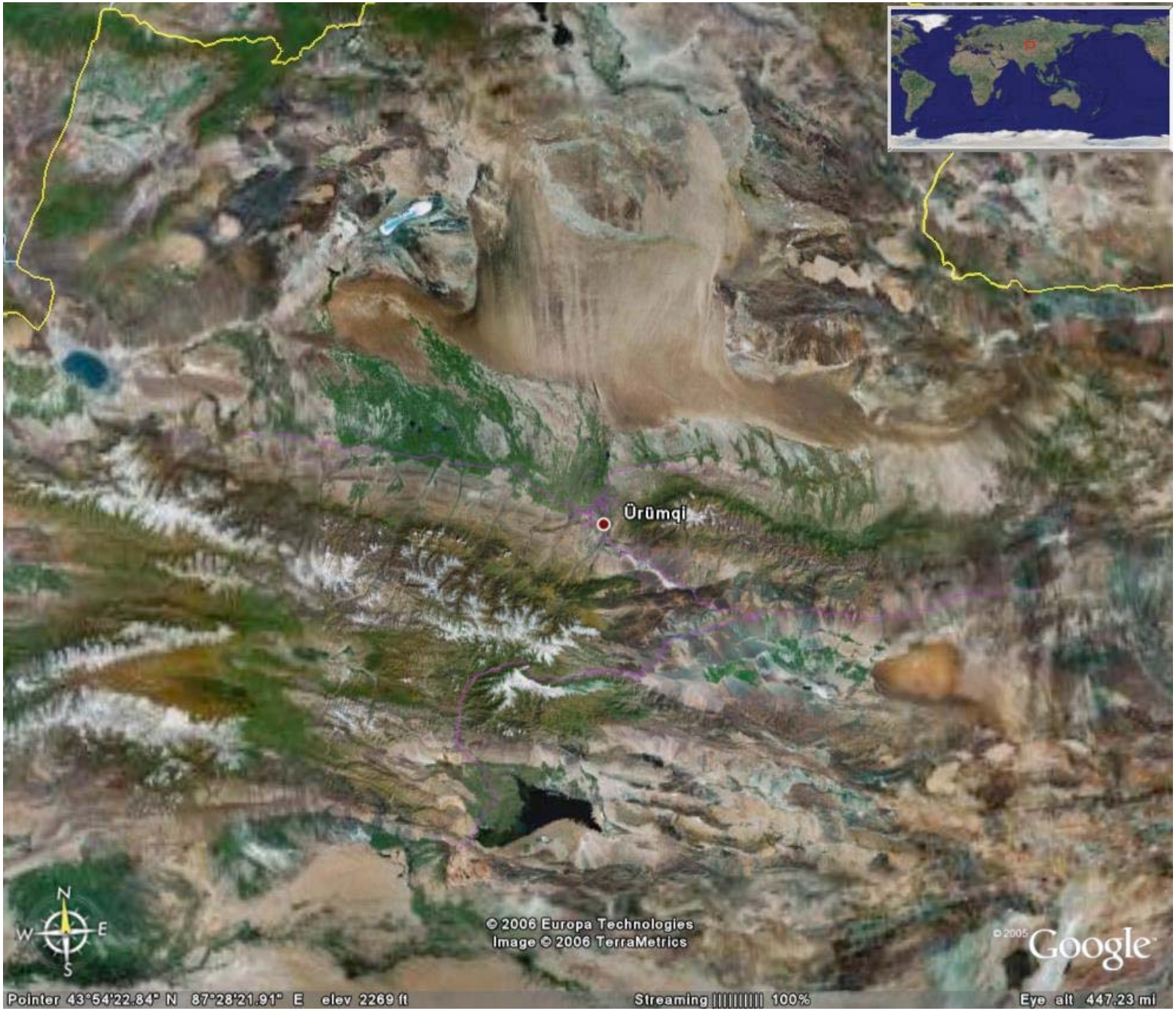
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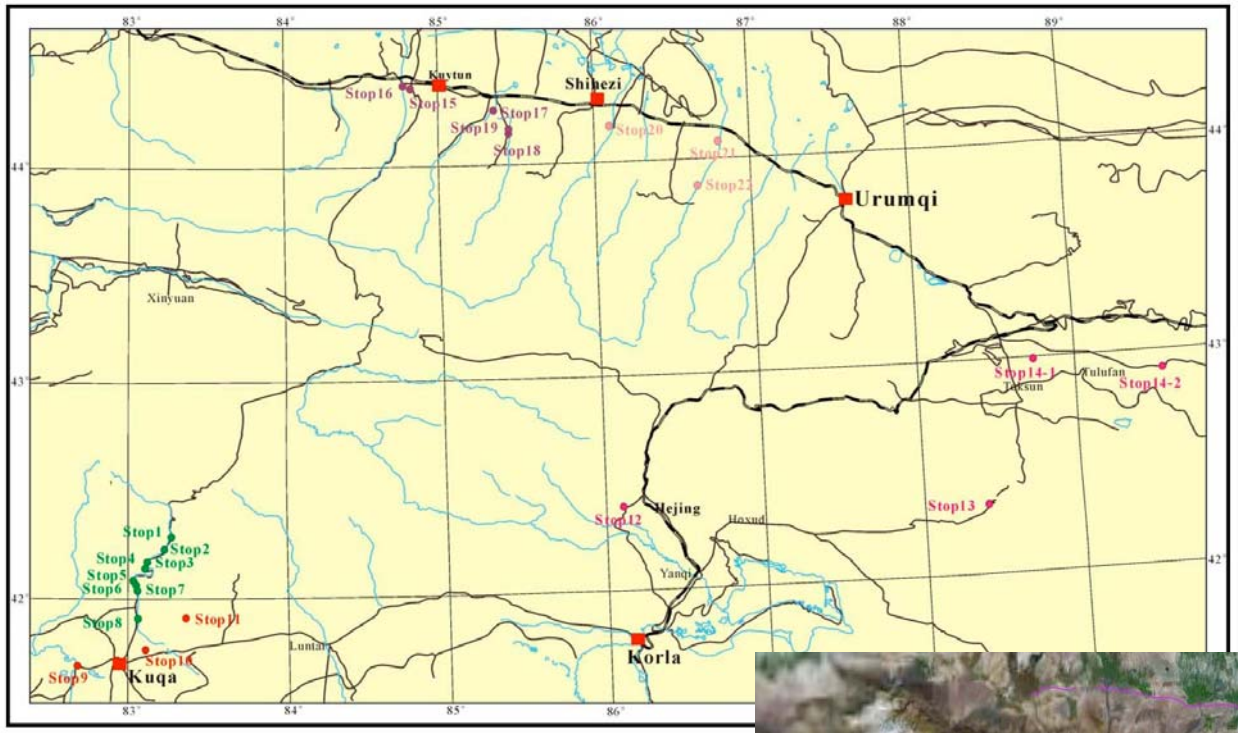
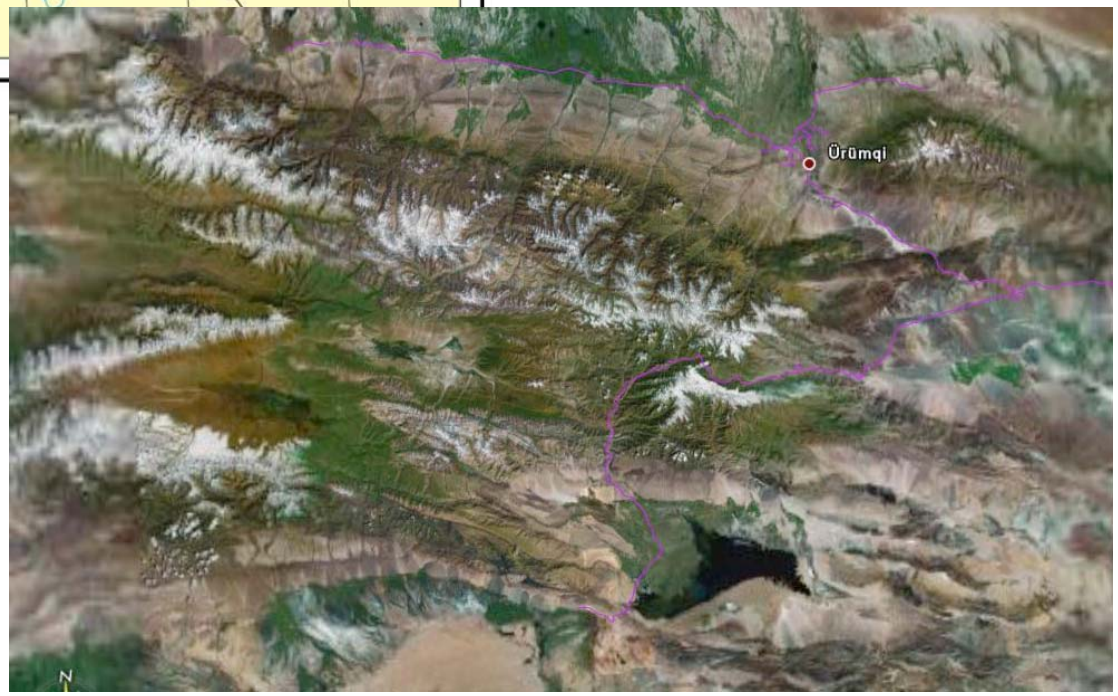
Field Stop Overview





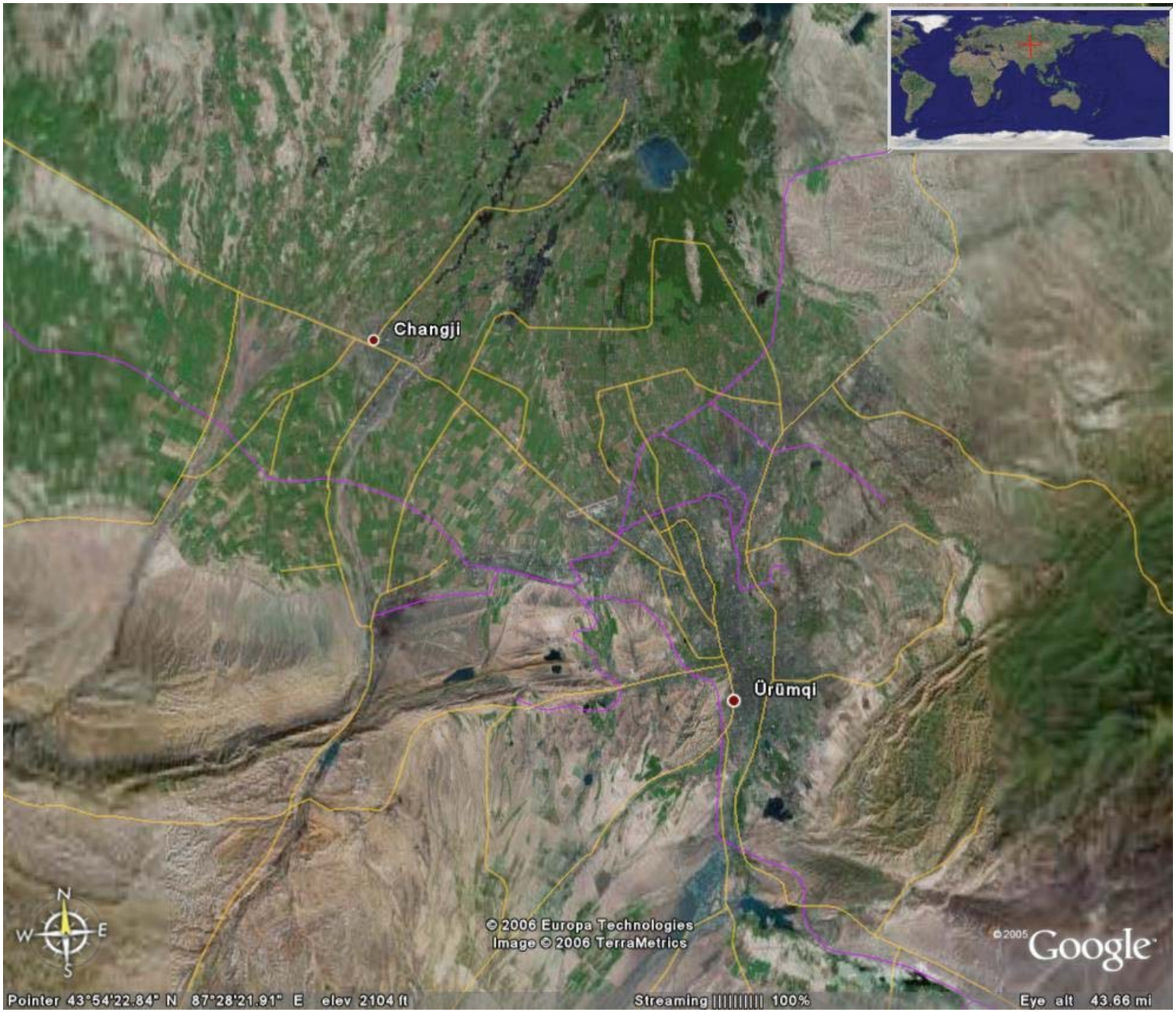

Changji
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Image © 2006 TerraMetrics
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Streaming 100%
Eye alt 43.66 mi


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Atlas of the Human Journey - The Genographic Project - Microsoft Internet Explorer

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that knows a Clementine from a Kumquat.

THE GENOGRAPHIC PROJECT POWERED BY IBM

MAIN MENU | GENETICS OVERVIEW | ATLAS OF THE HUMAN JOURNEY | YOUR GENETIC JOURNEY

Introduction | Introduction | 200,000 B.C. | 60,000 | 50,000 | 40,000 | 30,000 | 20,000 | 10,000 B.C.

SELECT AN ERA TO EXPLORE

ATLAS OF THE HUMAN JOURNEY

When humans first ventured out of Africa some 60,000 years ago, they left genetic footprints still visible today. By mapping the appearance and frequency of genetic markers in modern peoples, we create a picture of when and where ancient humans moved around the world. These great migrations eventually led the descendants of a small group of Africans to occupy even the farthest reaches of the Earth.

GO TO: GENETIC MARKERS + JOURNEY HIGHLIGHTS +

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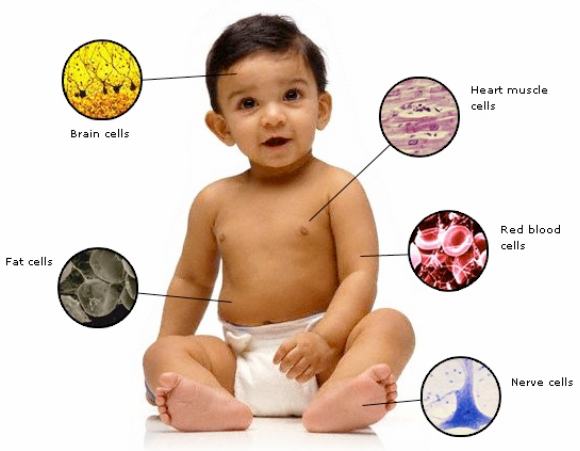
THE HUMAN BODY

1 2 3 4

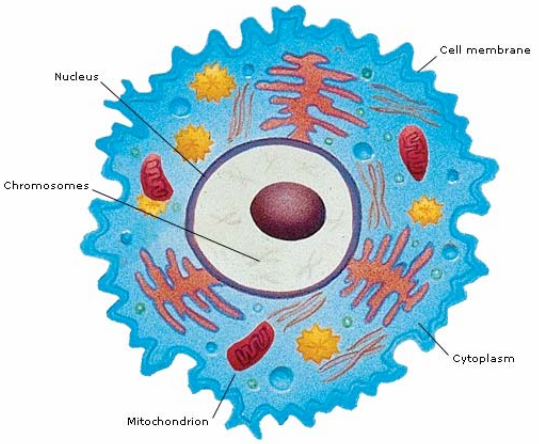
The human body is made of some 50 to 100 trillion cells, which form the basic units of life and combine to form more complex tissues and organs. Inside each cell, genes comprise a "blueprint" for protein production that determines how the cell will function. Genes also determine physical characteristics, or traits. The complete set of some



CELLS

1 2 3 4

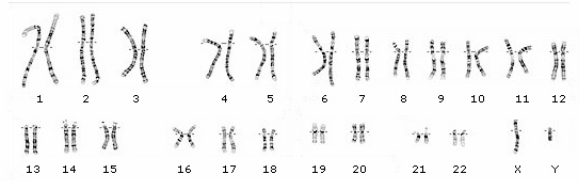
"little organs," called organelles. The most important of these is the nucleus, which controls the cell and houses the genetic material in structures called chromosomes. Another type of organelle is the mitochondria. These "cellular power plants" have their own genome, and do not recombine during reproduction.

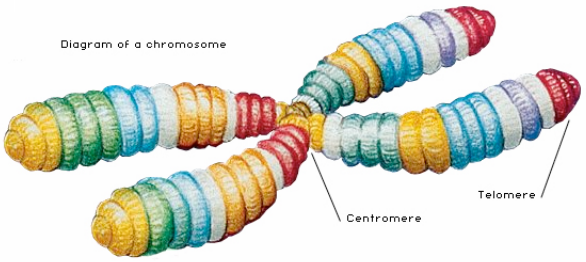


CHROMOSOMES

1 2 3 4

Chromosomes carry hereditary, genetic information in long strings of DNA called genes. Humans have 22 numbered pairs of chromosomes and a single pair of sex chromosomes; XX in females and XY in males. Each chromosomal pair includes one inherited from the father and one from the mother. If unwound, the microscopic DNA

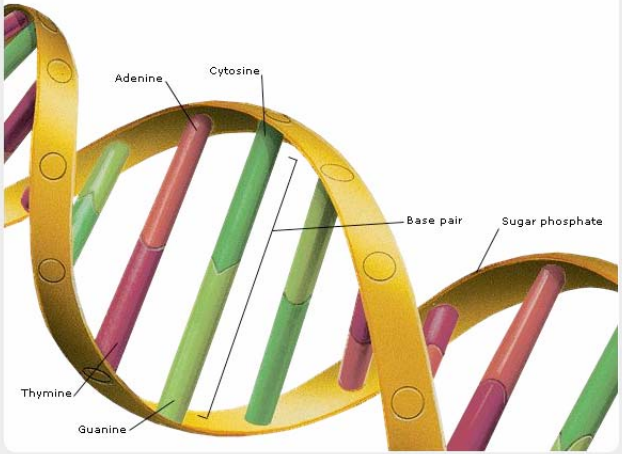




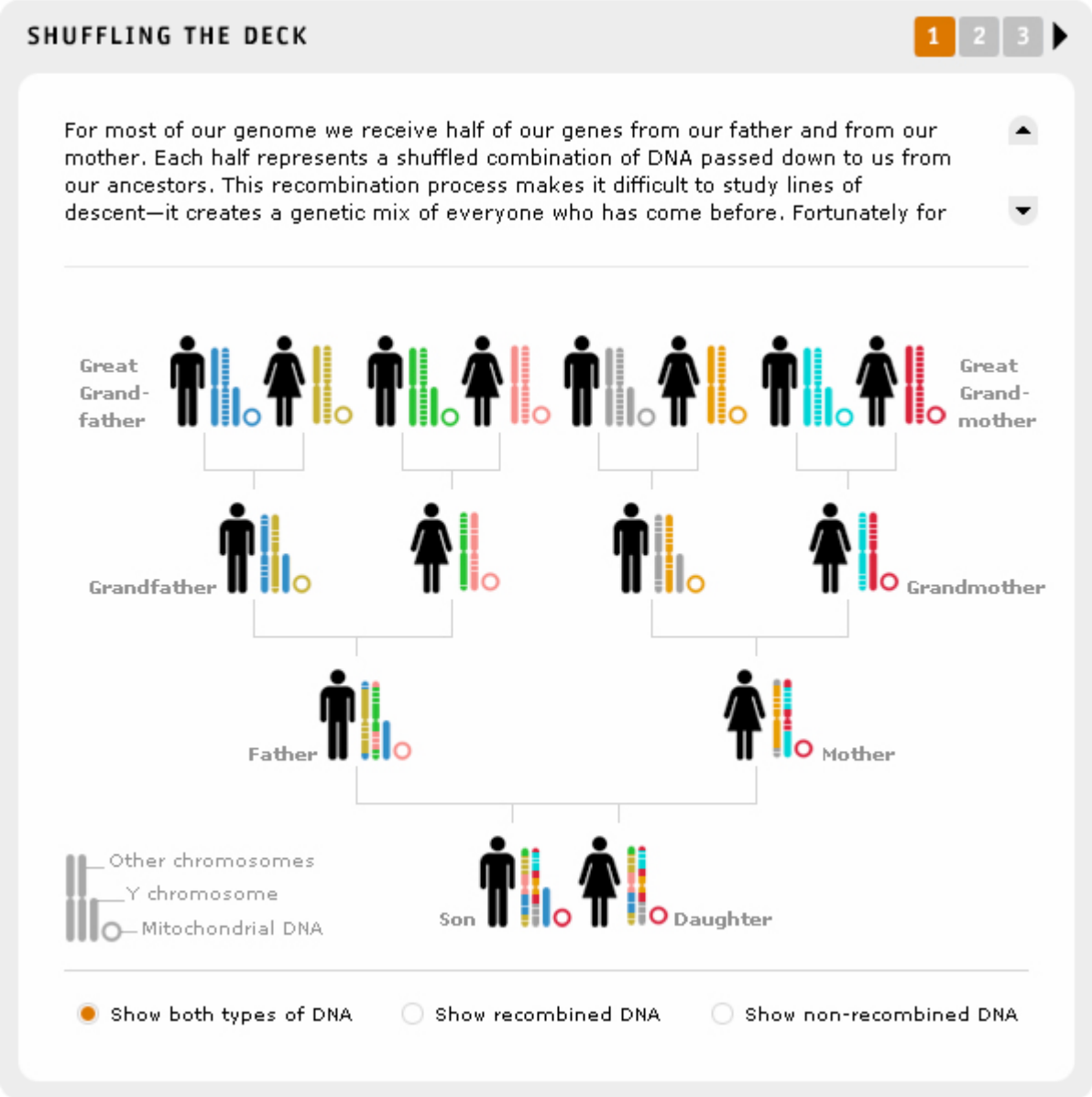
DNA

1 2 3 4

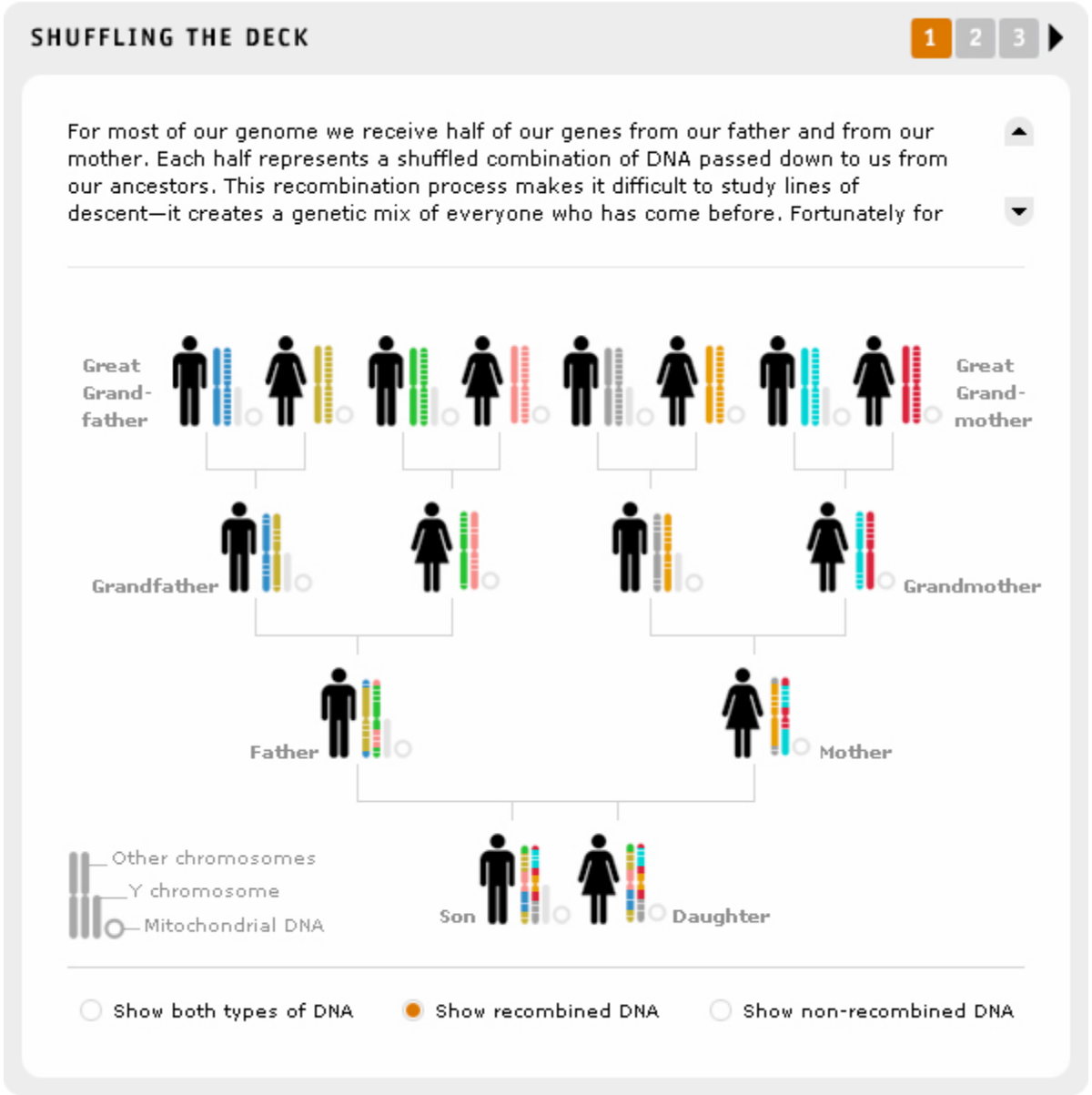
DNA (deoxyribonucleic acid) is the set of genetic instructions for creating an organism. DNA molecules are shaped like a spiral staircase called a double helix. Each stair is composed of the DNA bases A, C, T, and G. Some segments of these bases contain sequences, like A-T-C-C-G-A-A-C-T-A-G, which constitute individual genes. Genes



The Basic Idea



The Basic Idea



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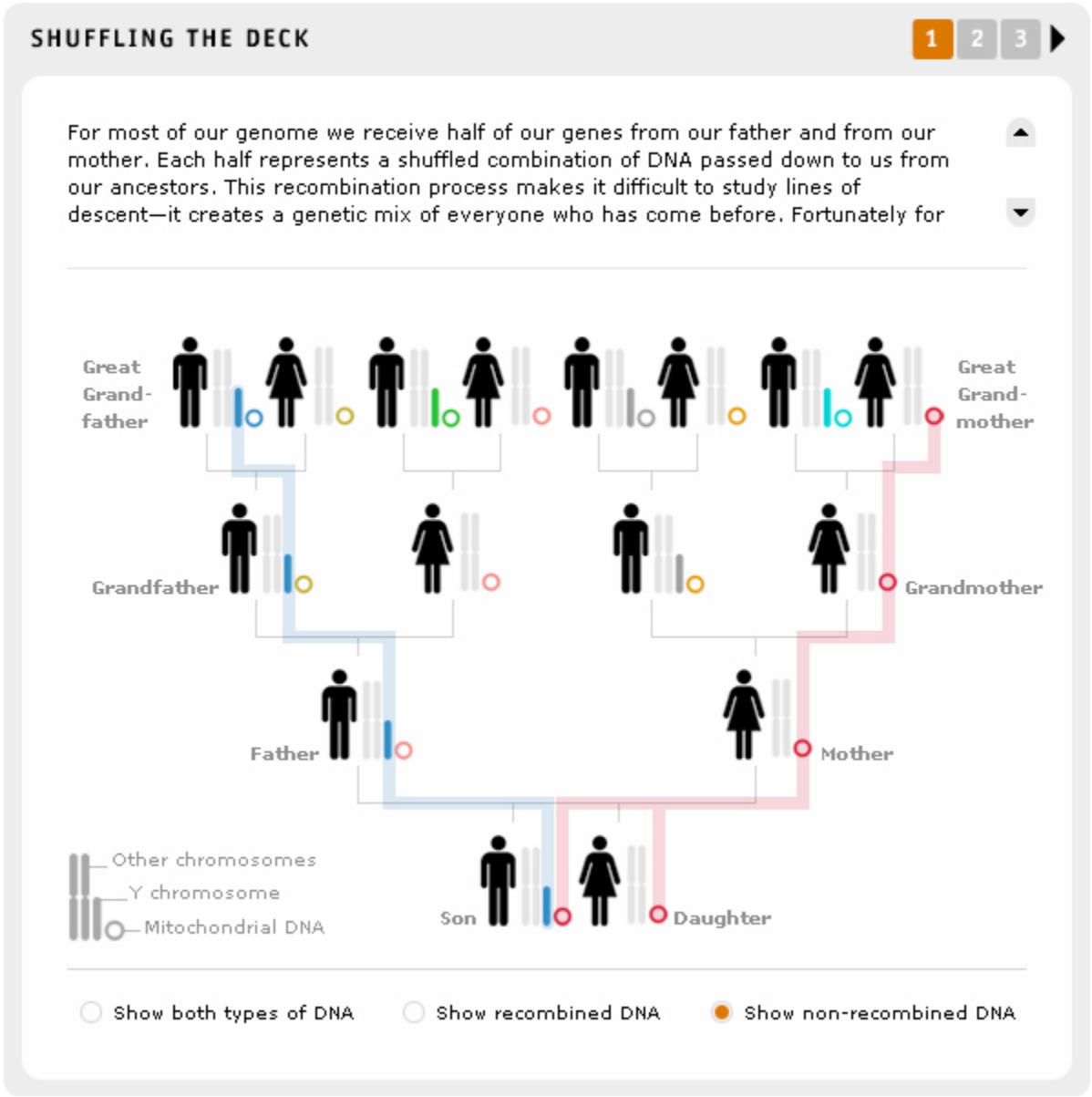
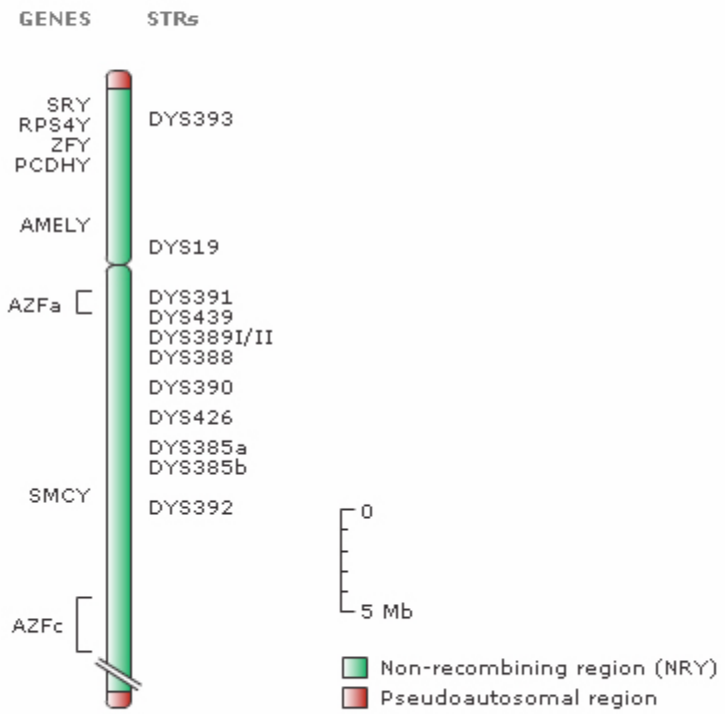


The Basic Idea

Y CHROMOSOME 1 2 3

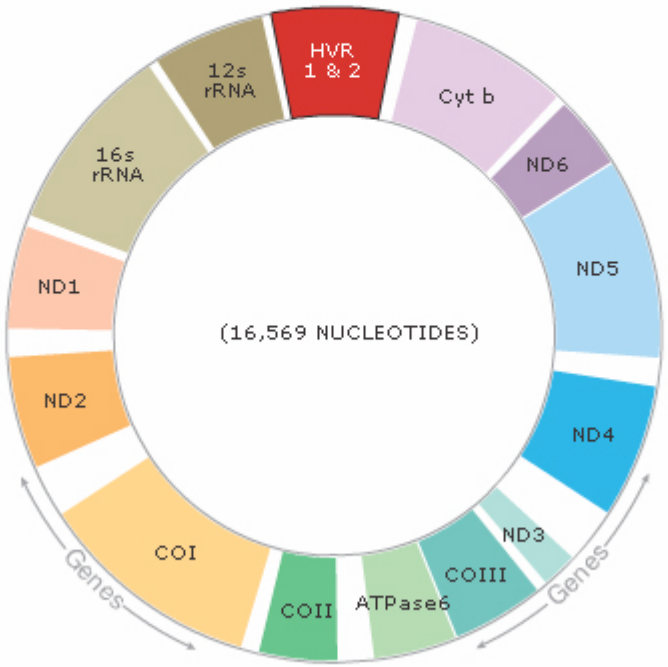
The Y chromosome is the sex-determining chromosome in humans. While all other chromosomes are found in matching pairs, it is the mismatch of the Y with its partner, the X chromosome, that determines gender—men have a mismatched pair (Y and X), while women have two X chromosomes. Because the Y does not have a matching



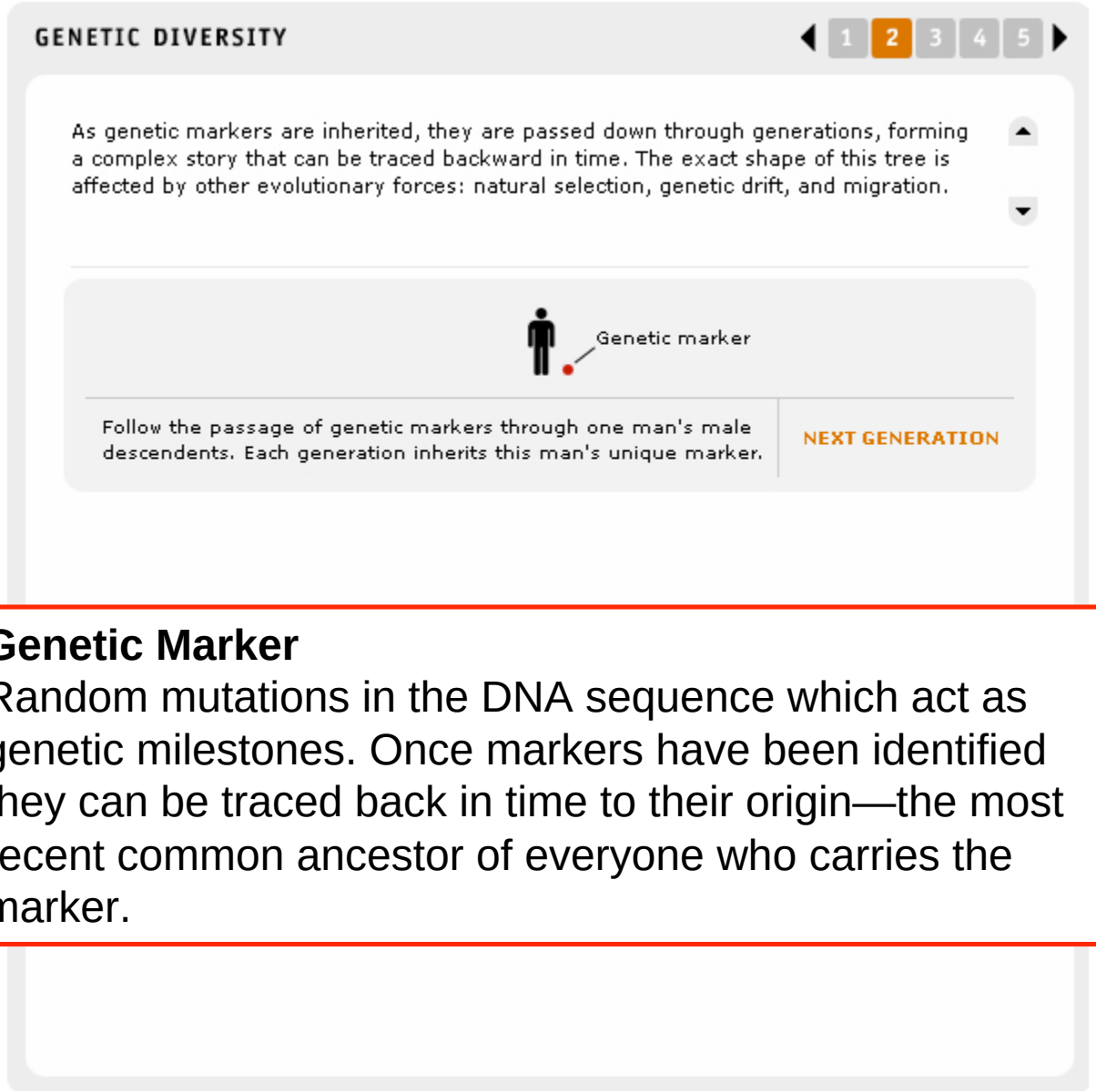
The Basic Idea

MITOCHONDRIAL DNA (mtDNA) 1 2 3

If the Y chromosome traces the male lineage back through history, then the mitochondrial genome (mtDNA) can be considered its female counterpart. Mitochondria are self-reproducing structures found inside the cells of all higher organisms, typically present in hundreds of copies per cell. They are responsible for

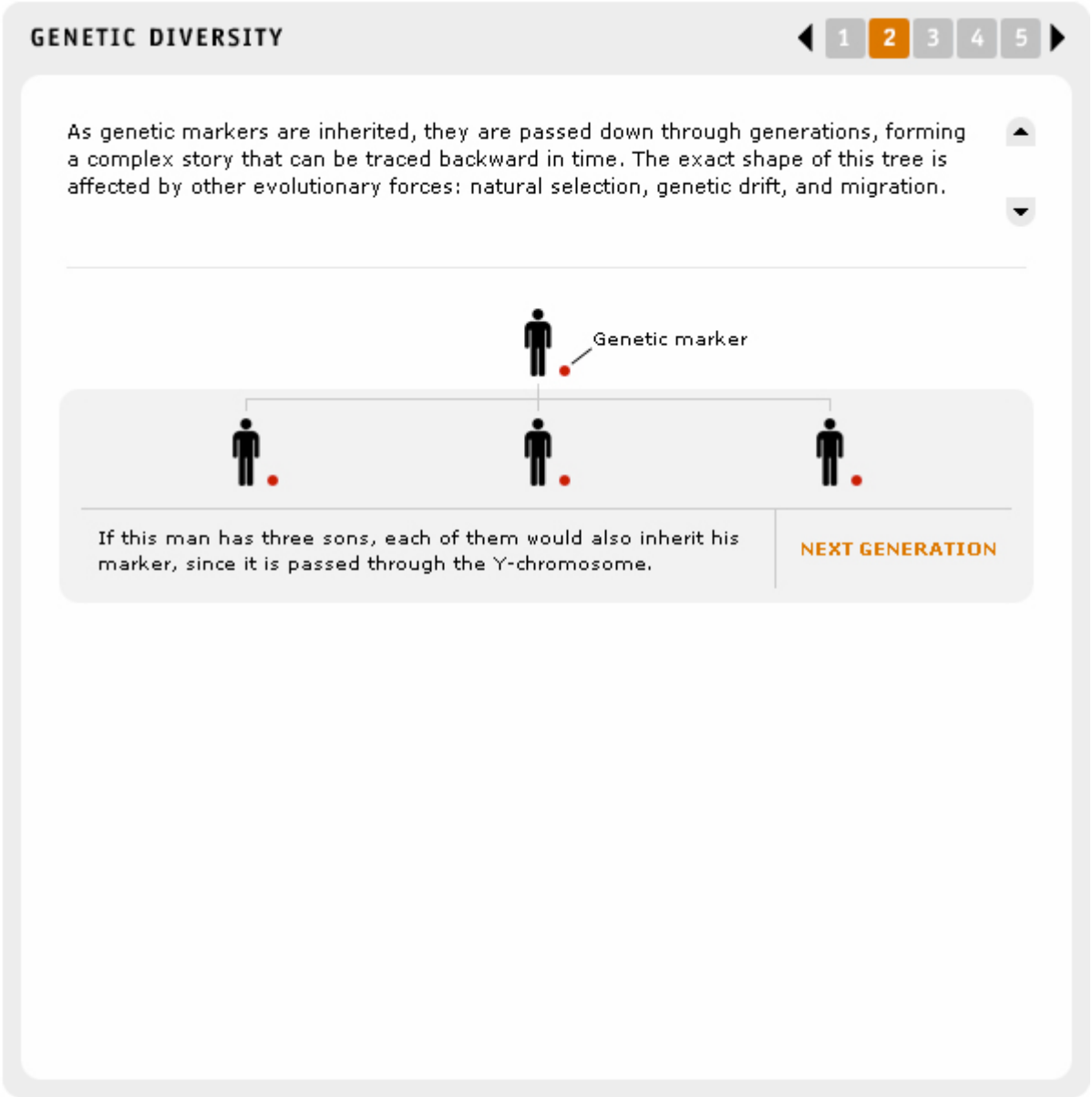


The Basic Idea



Genetic Marker
Random mutations in the DNA sequence which act as genetic milestones. Once markers have been identified they can be traced back in time to their origin—the most recent common ancestor of everyone who carries the marker.

The Basic Idea



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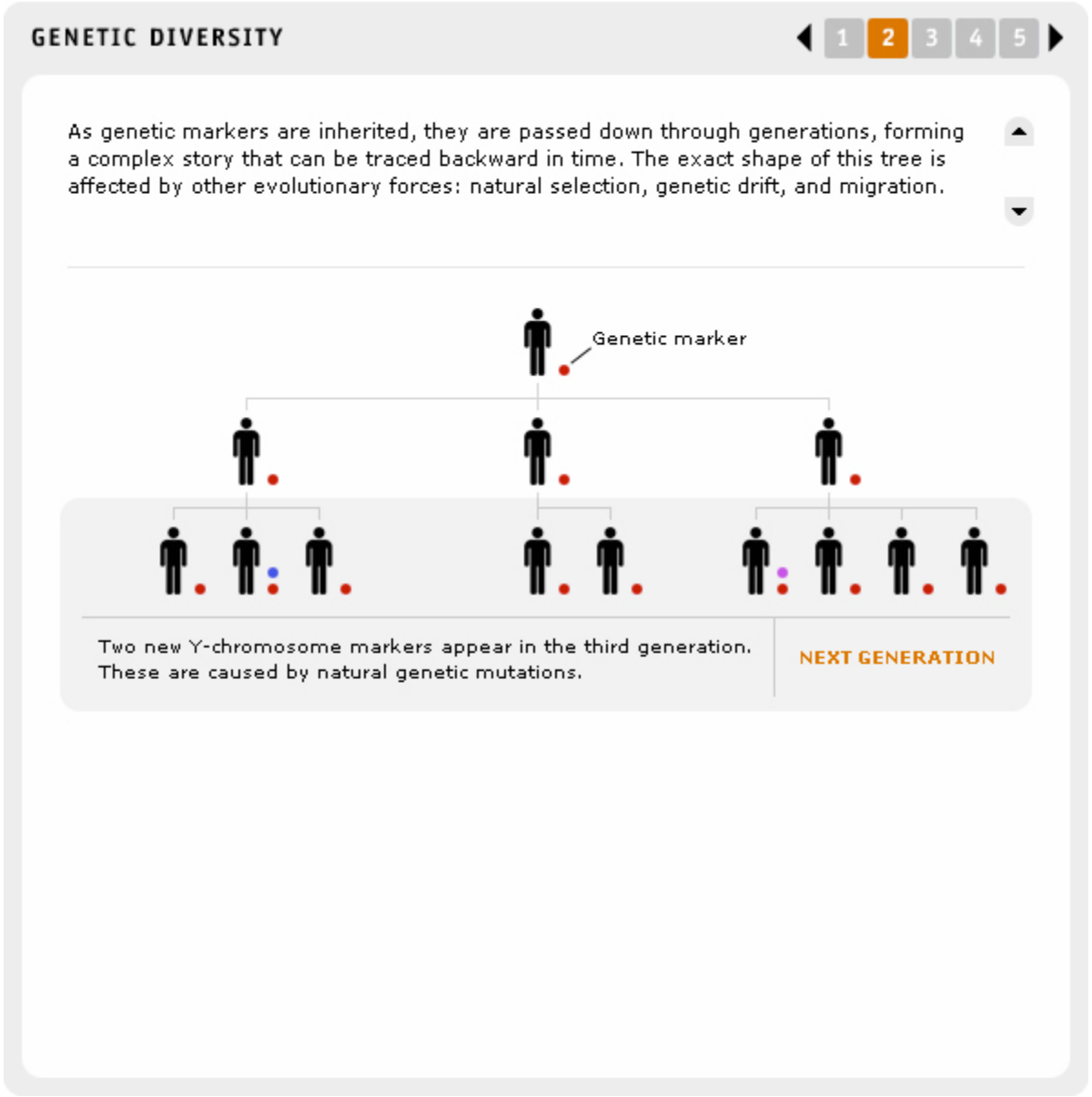

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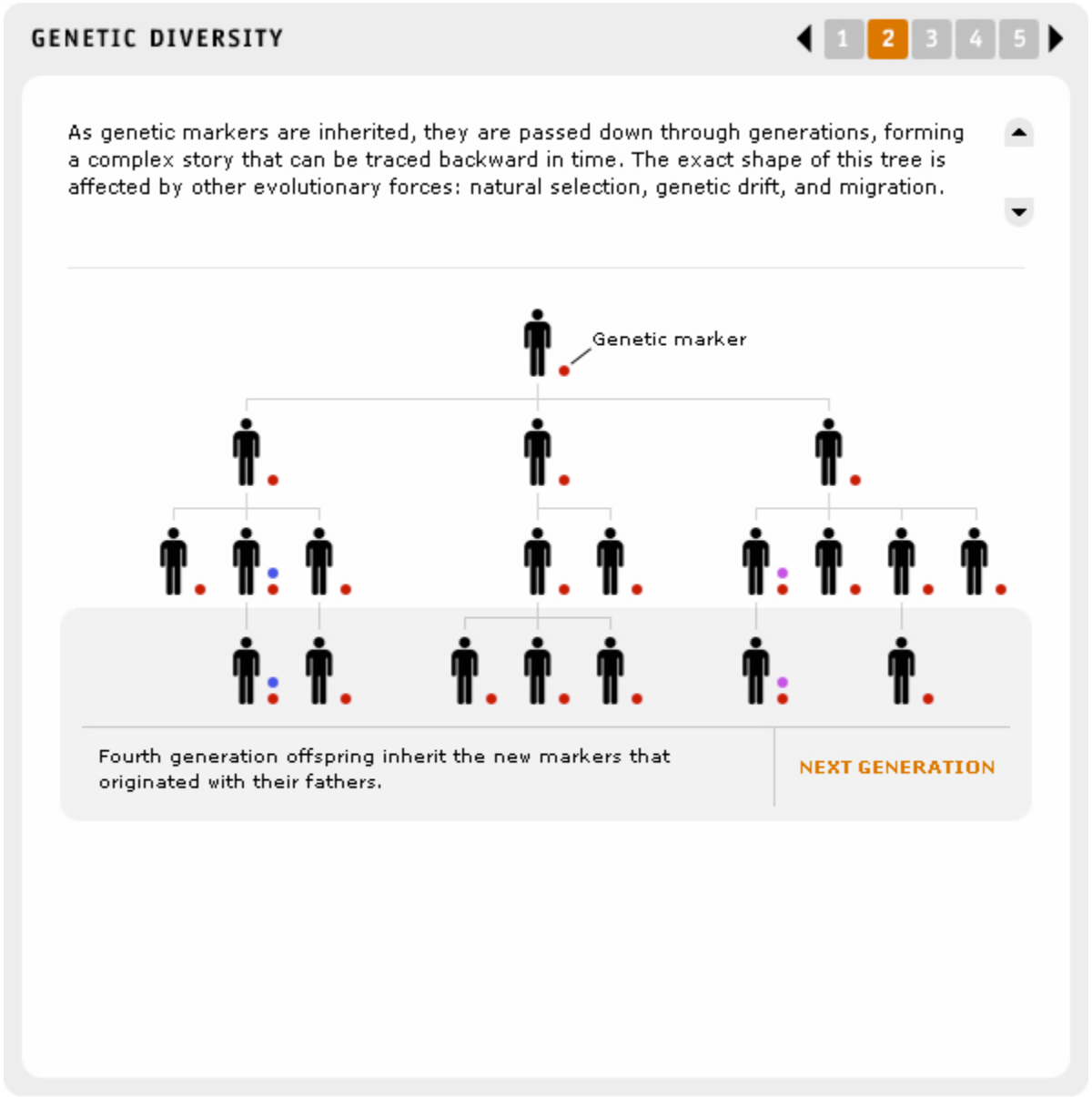

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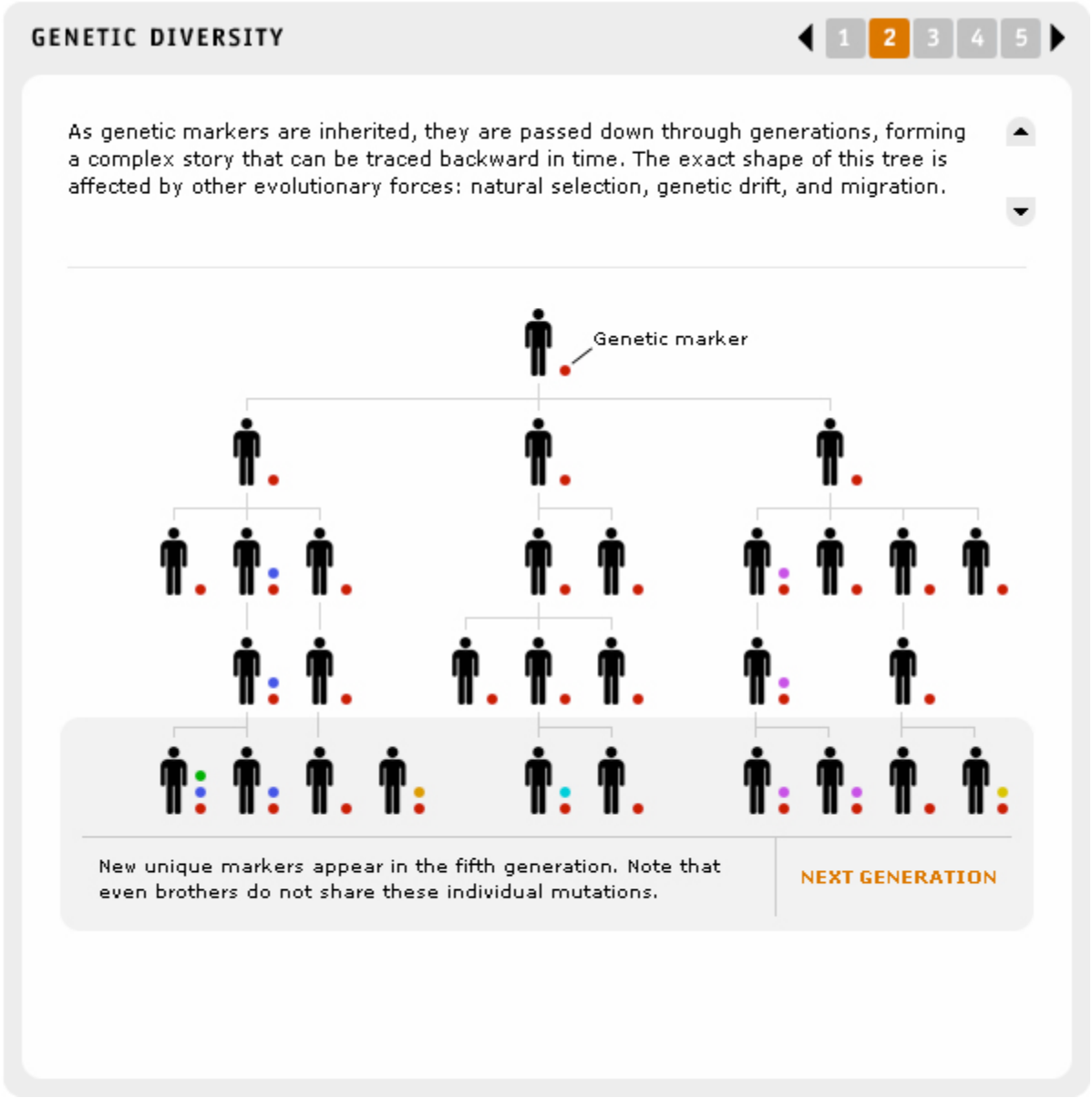

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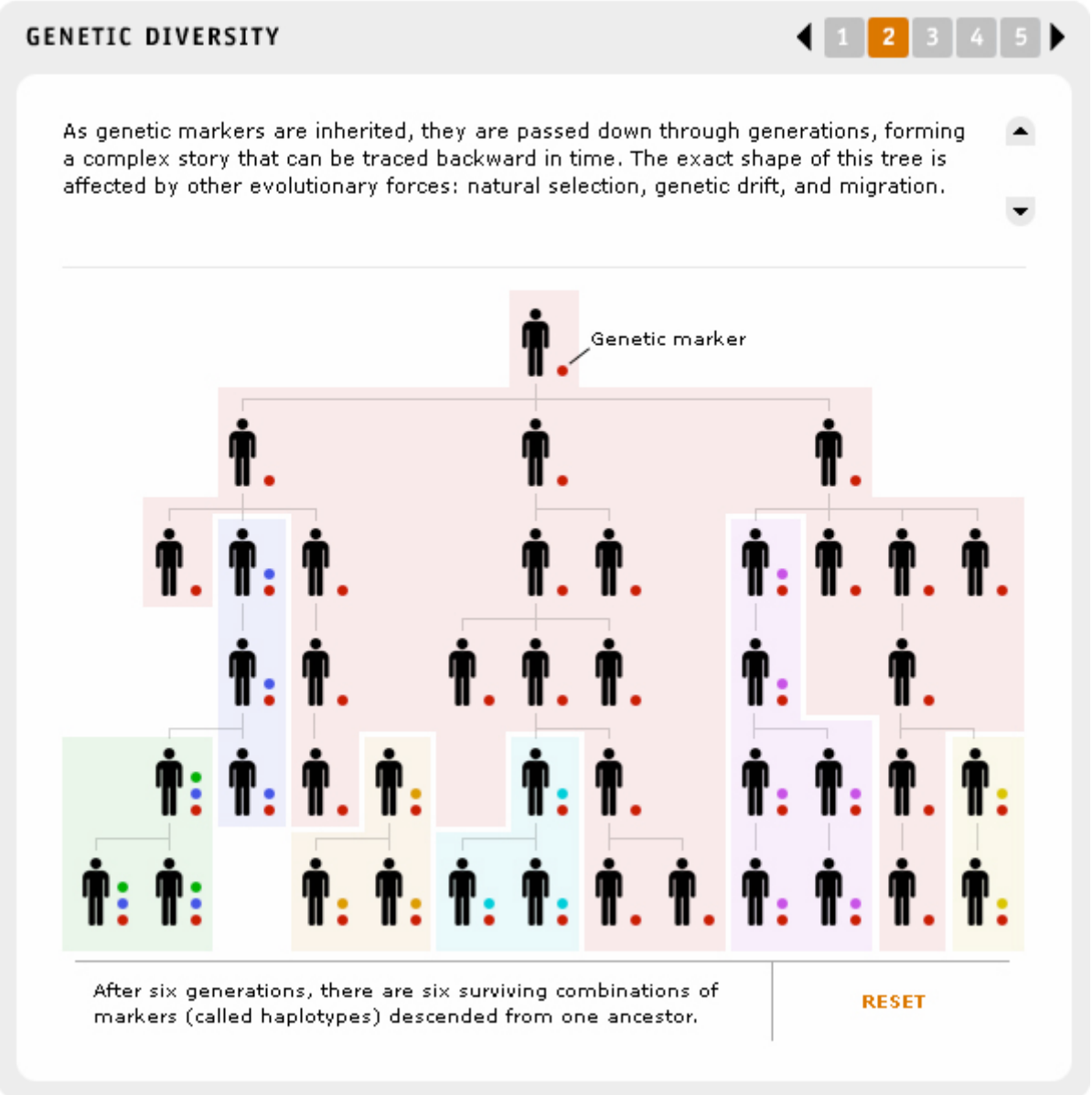

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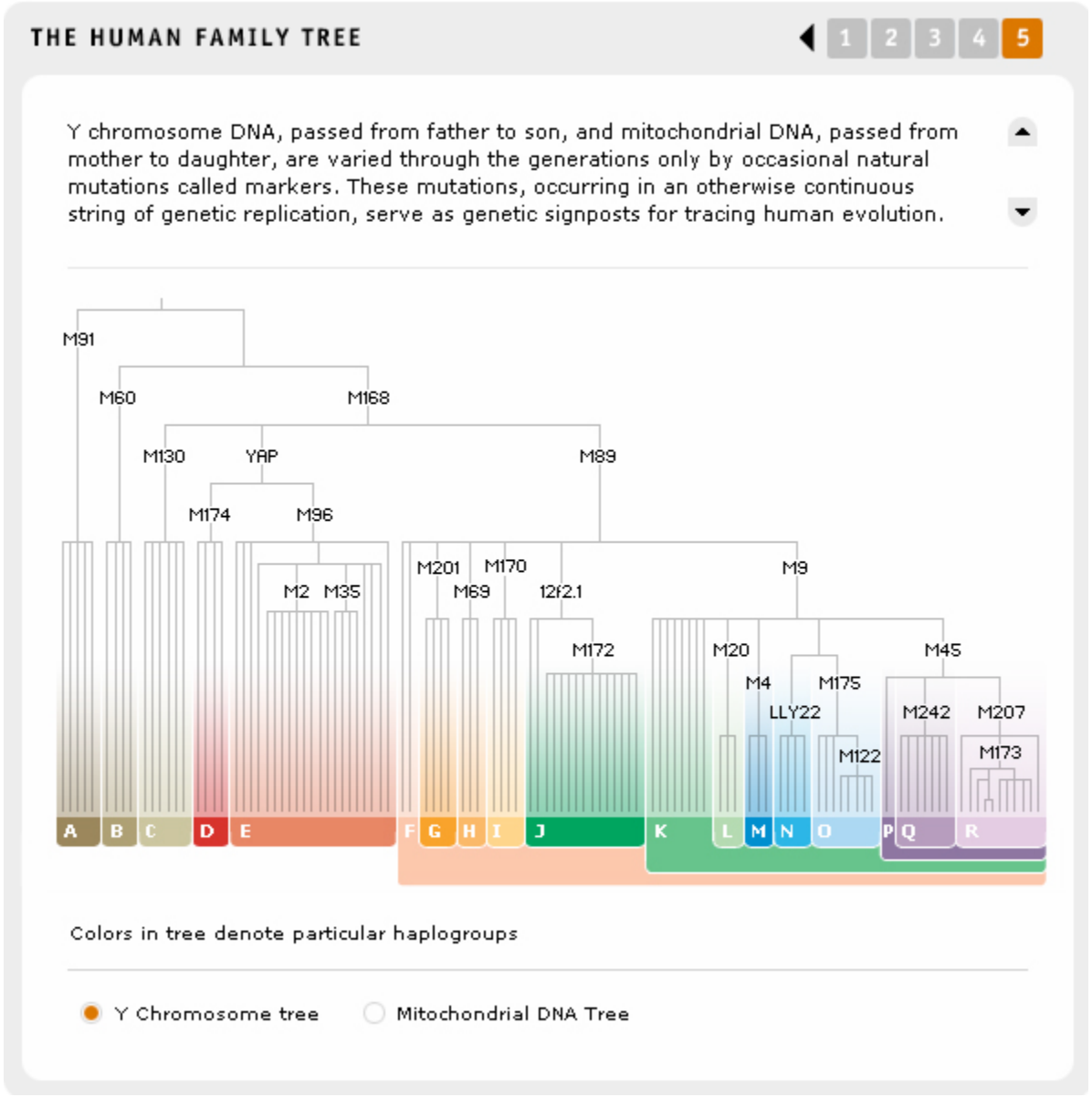


The Basic Idea (for $99.95)

YOUR GENETIC JOURNEY

Did you ever wonder about your most ancient ancestors? The Genographic Project will introduce you to them, and explain the genetic journeys that bond your personal lineage over tens of thousands of years.

Learn more about the results you will receive

STEP 1: TEST

Once you have purchased your own **Genographic Project Public Participation Kit**, you can begin the exploration into your deep ancestry. The first step involves a painless cheek swab to acquire a DNA sample. Once you have completed the cheek swabbing process, you will secure the swabs inside the transport tubes and mail the tubes off to the lab using the supplied envelope. It's that simple, and guaranteed anonymous.

STEP 2: TRACK

The exploration continues here in the Genographic Project Web site where you can track your test kit, step by step, through the various stages of DNA sequencing and processing. Along the way, multimedia presentations explain how scientists actually decode the information found in the molecules of your DNA.

STEP 3: EXPLORE

When your results are ready Project Director Dr. Spencer Wells will introduce you to your earliest human relatives—the members of your specific haplogroup. You'll receive a personalized genetic analysis, including an online overview of your deep ancestral history. The analysis reveals where and when your haplogroup originated and how they lived. You'll also receive a dynamic map, specific to your lineage, on which to trace your relatives' journeys across the planet.

Learn more about the results you will receive

200,000 to 60,000 B.C.

60,000 to 55,000 B.C.

55,000 to 50,000 B.C.

50,000 to 45,000 B.C.

45,000 to 40,000 B.C.

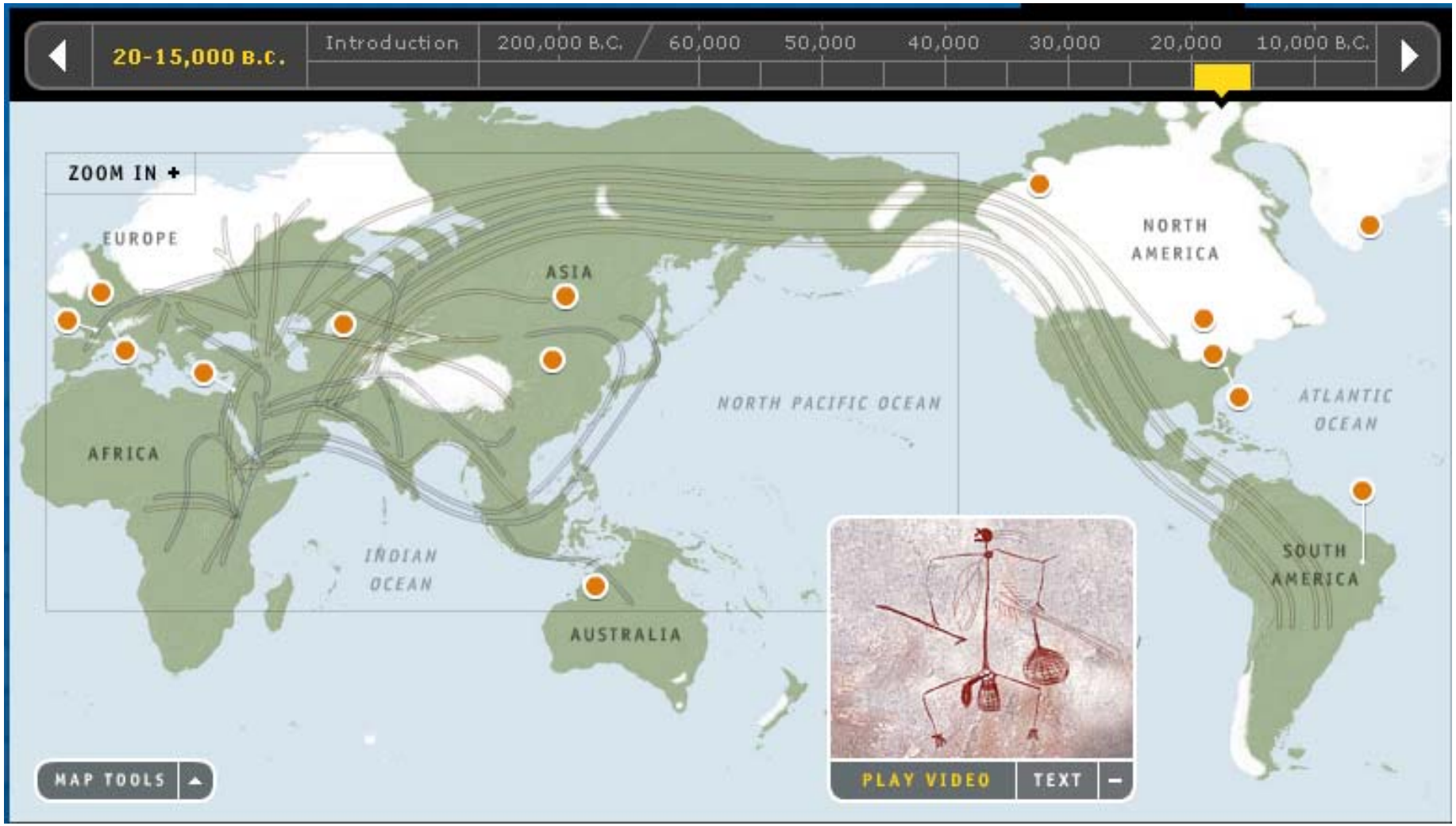
40,000 to 35,000 B.C.

35,000 to 30,000 B.C.

30,000 to 25,000 B.C.

25,000 to 20,000 B.C.

20,000 to 15,000 B.C.



15,000 to 10,000 B.C.

10,000 to 5,000 B.C.


45-40,000 B.C.
Introduction
200,000 B.C.
60,000
50,000
40,000
30,000
20,000
10,000 B.C.
ZOOM OUT –
EUROPE
ASIA
NORTH PACIFIC OCEAN
AFRICA
SOUTH PACIFIC OCEAN
INDIAN OCEAN
AUSTRALIA
MAP TOOLS

GENETIC MARKERS

HAPLOGROUP B

First Appeared
Perhaps 60,000 years ago

Type mtDNA

BACK TO WORLD MAP

Your haplogroup likely arose on the high plains of Central Asia between the Caspian Sea and Lake Baikal. It is one of the founding East Asian lineages and, along with haplogroups *F* and *M*, comprises around three quarters of all mitochondrial lineages found there today.

Radiating out from the Central Asian homeland, haplogroup *B*-bearing individuals began migrating into the surrounding areas and quickly headed south, making their way throughout East Asia. Today haplogroup *B*

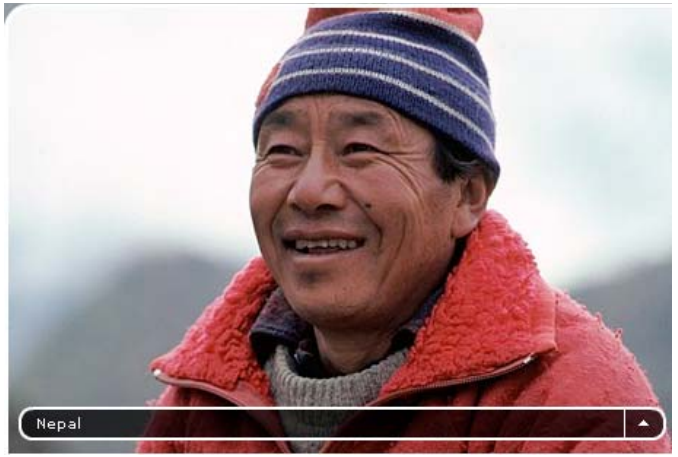

ASIA
Himalayas
ARABIAN SEA
BAY OF BENGAL
MAP TOOLS
GENETIC MARKERS
HAPLOGROUP F
First Appeared
To be determined
Type mtDNA
BACK TO WORLD MAP
This haplogroup likely arose on the high plains of Central Asia between the Caspian Sea and Lake Baikal. It is one of the founding East Asian lineages and, along with haplogroups B and M, comprises around three-quarters of all mitochondrial lineages found there today.
Radiating out from Central and Southeast Asia, haplogroup F-bearing individuals, your own distant ancestors, began migrating into the surrounding areas and quickly headed east. Today haplogroup F makes up over 25
China
Kashmir


ASIA
Himalayas
PACIFIC OCEAN
INDIAN OCEAN
MAP TOOLS
GENETIC MARKERS
M174 (HAPLOGROUP D)
First Appeared
50,000 years ago
Type Y-Chromosome
BACK TO WORLD MAP
Haplogroup D may have accompanied another group, the Coastal Clan (haplogroup C) on the first major wave of migration out of Africa around 50,000 years ago. Taking advantage of the plentiful seaside resources, these intrepid explorers followed the coastline of Africa through the southern Arabian Peninsula, India, Sri Lanka, and Southeast Asia.
Alternatively, they may have made the trek at a later time, following in the footsteps of the Coastal Clan. Pockets of these ancestors


Sri Lanka


Bhutan


Thailand


Nepal


Japan


Japan


ASIA
MAP TOOLS
GENETIC MARKERS
HAPLOGROUP Z
First Appeared
To be determined
Type mtDNA
BACK TO WORLD MAP
Haplogroup Z arose on the high plains of Central Asia between the Caspian Sea and Lake Baikal. It is considered a characteristic Siberian lineage, and today accounts for around three percent of the entire mitochondrial gene pool found there. Because of its old age and frequency throughout northern Eurasia, it is widely accepted that this lineage was carried by the first humans to settle these remote areas.
Radiating out from the Siberian homeland,


Russia


China


South Korea


Saami girl, Norway

GENETIC MARKERS

LLY22G (HAPLOGROUP N)

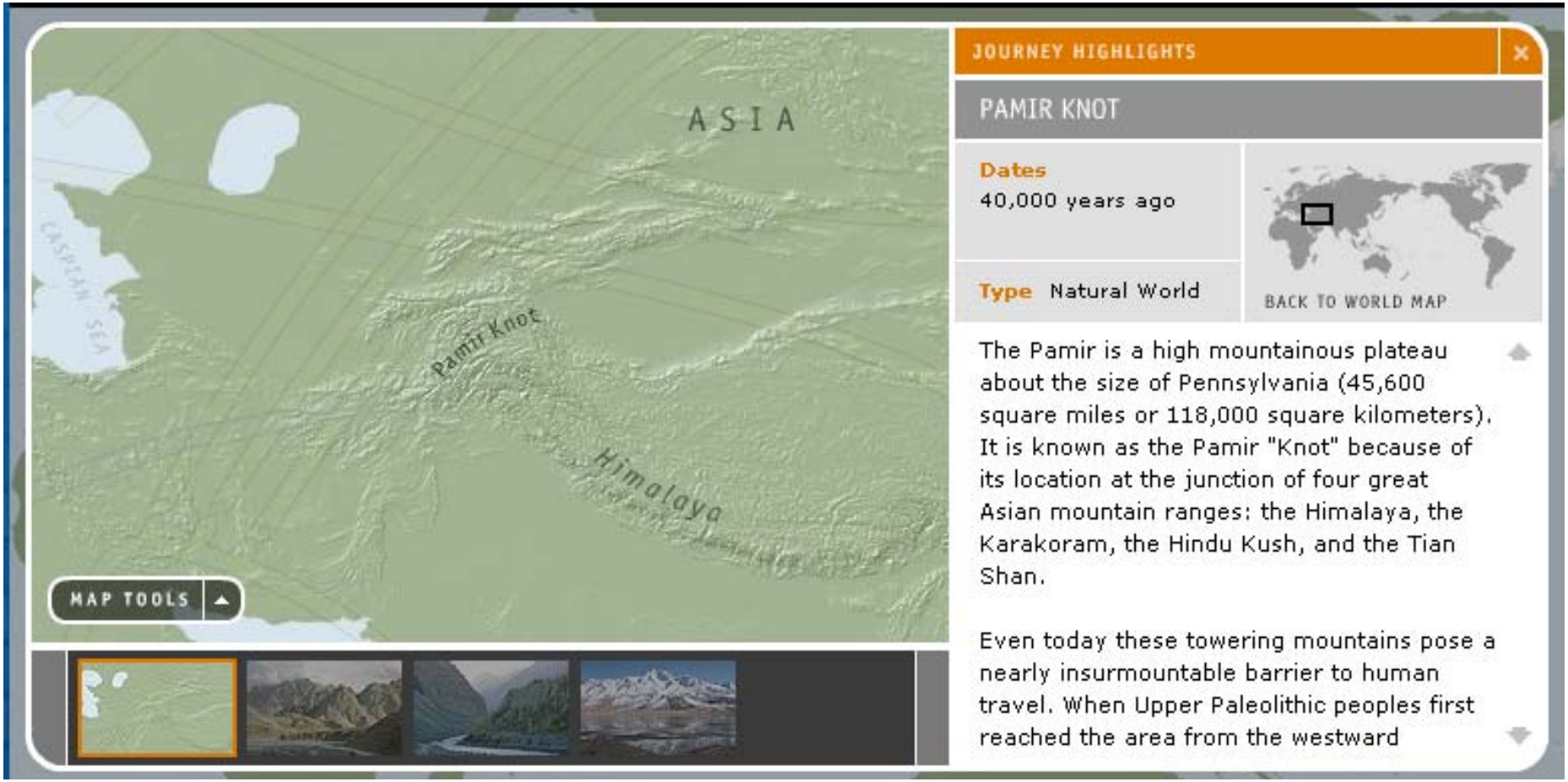
First Appeared
To be determined

Type Y-Chromosome

BACK TO WORLD MAP

One of the men in a group of Eurasian Clan peoples who traveled north through the Pamir Knot region gave rise to the *LLY22G* marker, which defines haplogroup *N*. He was probably born in Siberia within the last 10,000 years.

Today his descendants effectively trace a migration of Uralic-speaking peoples during the last several thousand years. This lineage has dispersed throughout the generations, and is now found in southern parts of Scandinavia as well as northeastern Eurasia.


ASIA
CASPIAN SEA
Pamir Knot
Himalaya
MAP TOOLS
JOURNEY HIGHLIGHTS
PAMIR KNOT
Dates
40,000 years ago
Type Natural World
BACK TO WORLD MAP
The Pamir is a high mountainous plateau about the size of Pennsylvania (45,600 square miles or 118,000 square kilometers). It is known as the Pamir "Knot" because of its location at the junction of four great Asian mountain ranges: the Himalaya, the Karakoram, the Hindu Kush, and the Tian Shan.
Even today these towering mountains pose a nearly insurmountable barrier to human travel. When Upper Paleolithic peoples first reached the area from the westward


Bishkek
Uzbekistan
Toshkent
Kyrgyzstan
Dushanbe
Tajikistan
Kabol
Afghanistan
Rawalpindi
Islamabad
Chiniot
Lahore
Okara
Pakistan
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