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EXPLORE YOUR GENETIC ROOTS

WE ARE ALL HUMAN…

The science behind genetic-genealogy

David Ashworth PhD
Chief Executive

INTRODUCTION

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DNA WITHIN THE CELL

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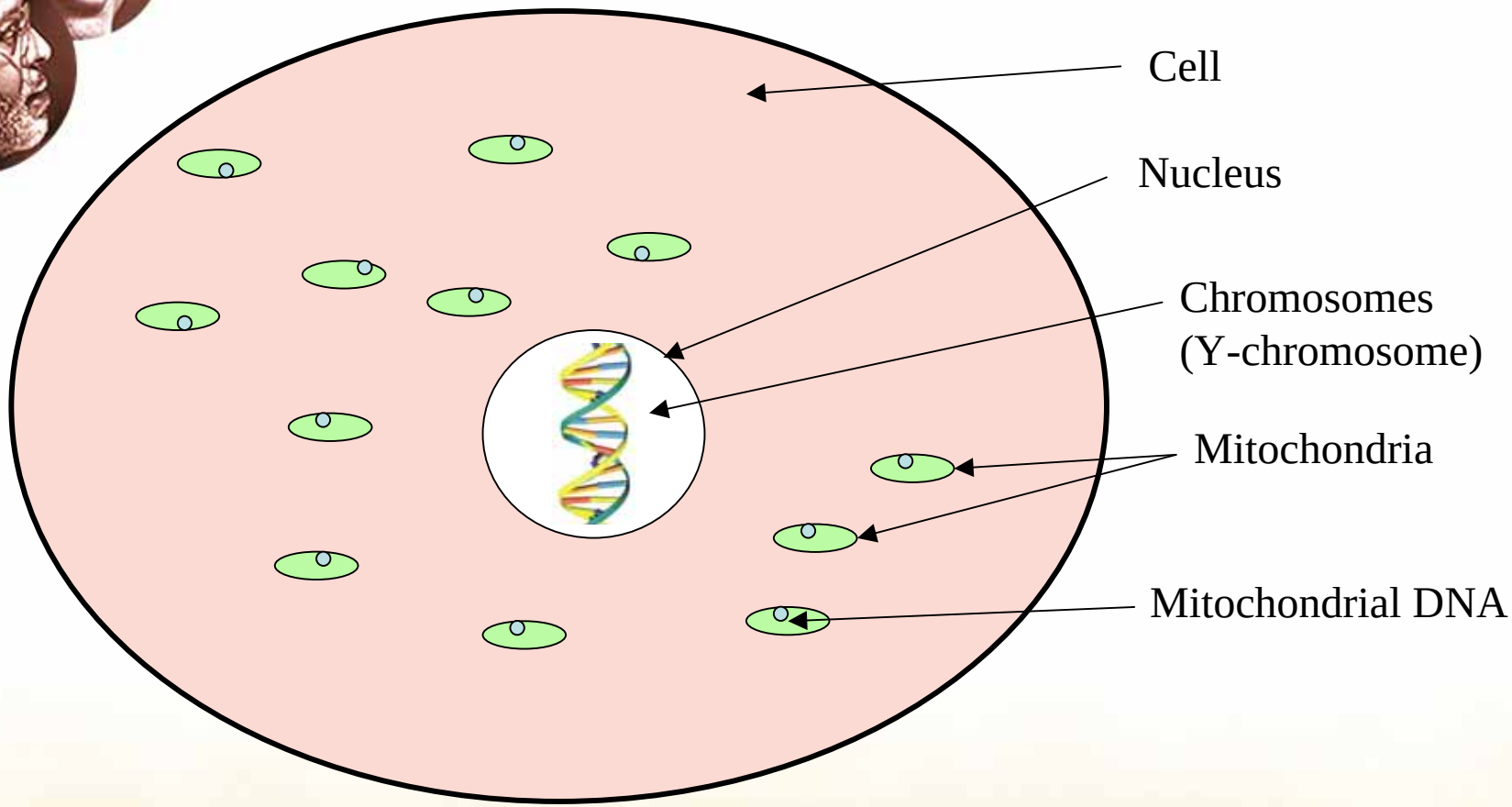

VISIBLE GENETICS

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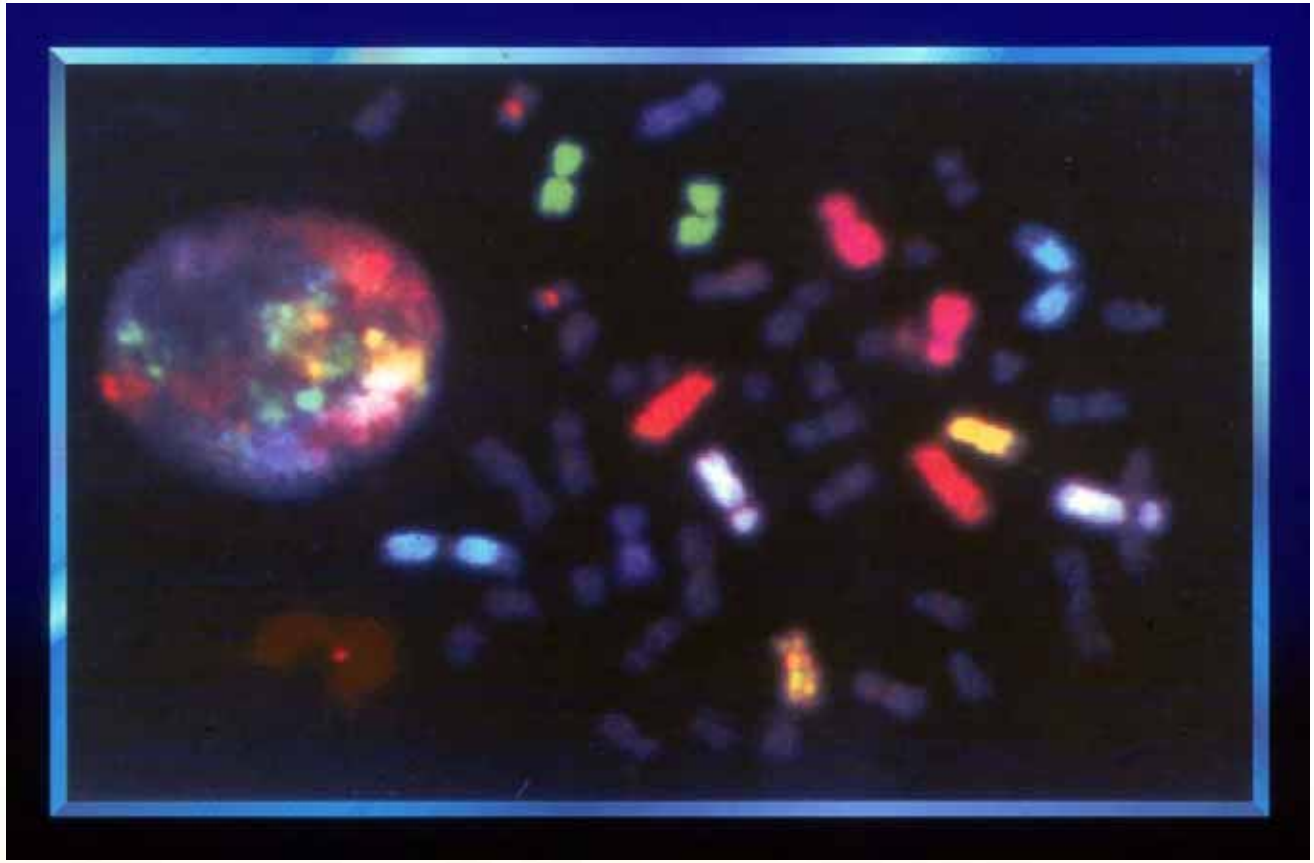

HUMAN FEMALE KARYOTYPE

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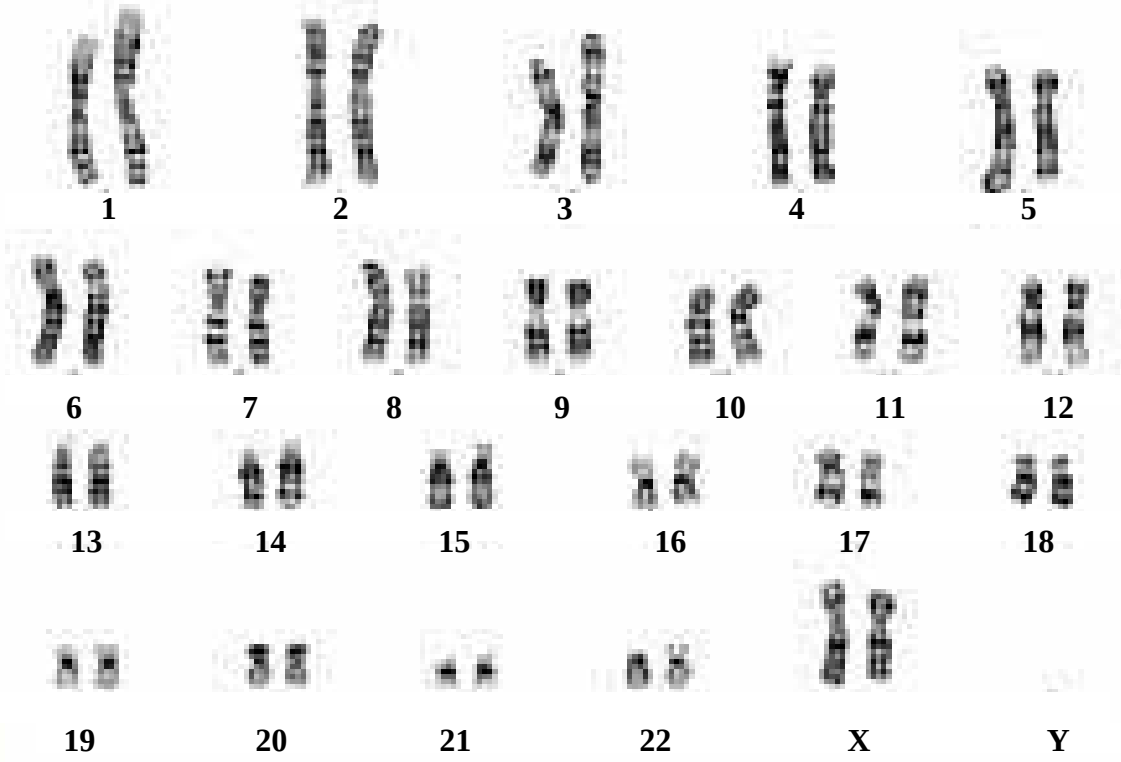

HUMAN MALE KARYOTYPE

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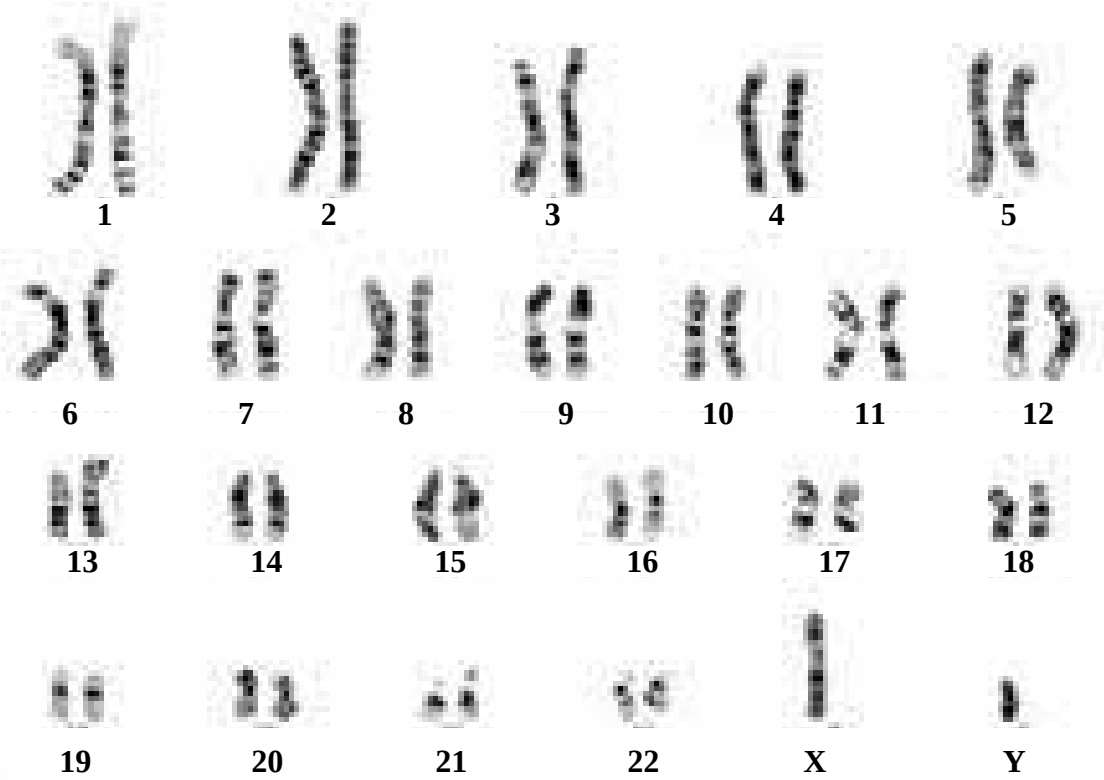

MITOCHONDRIAL CHROMOSOME

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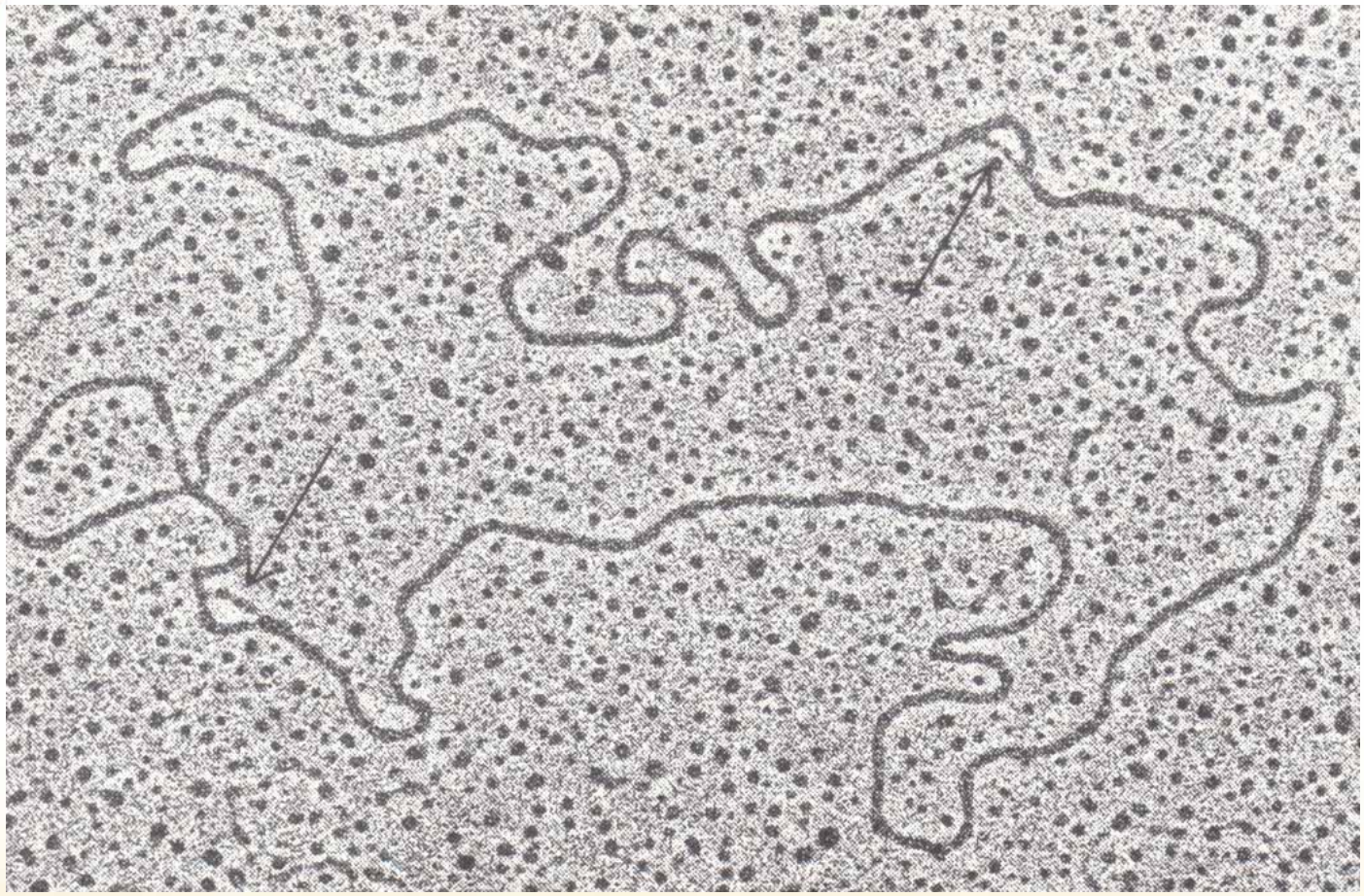

MATERNAL INHERITANCE

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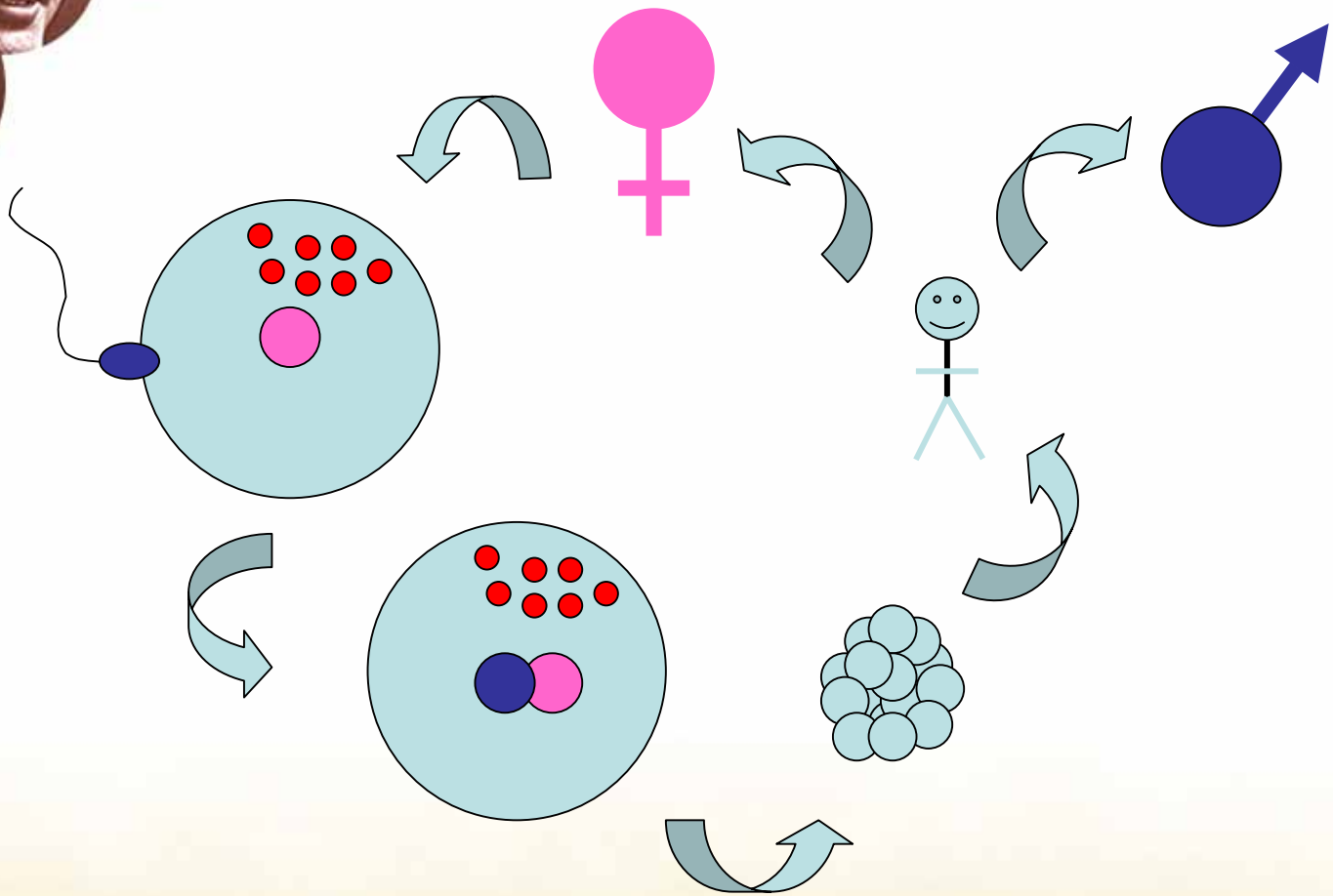

MATERNAL GENEALOGY

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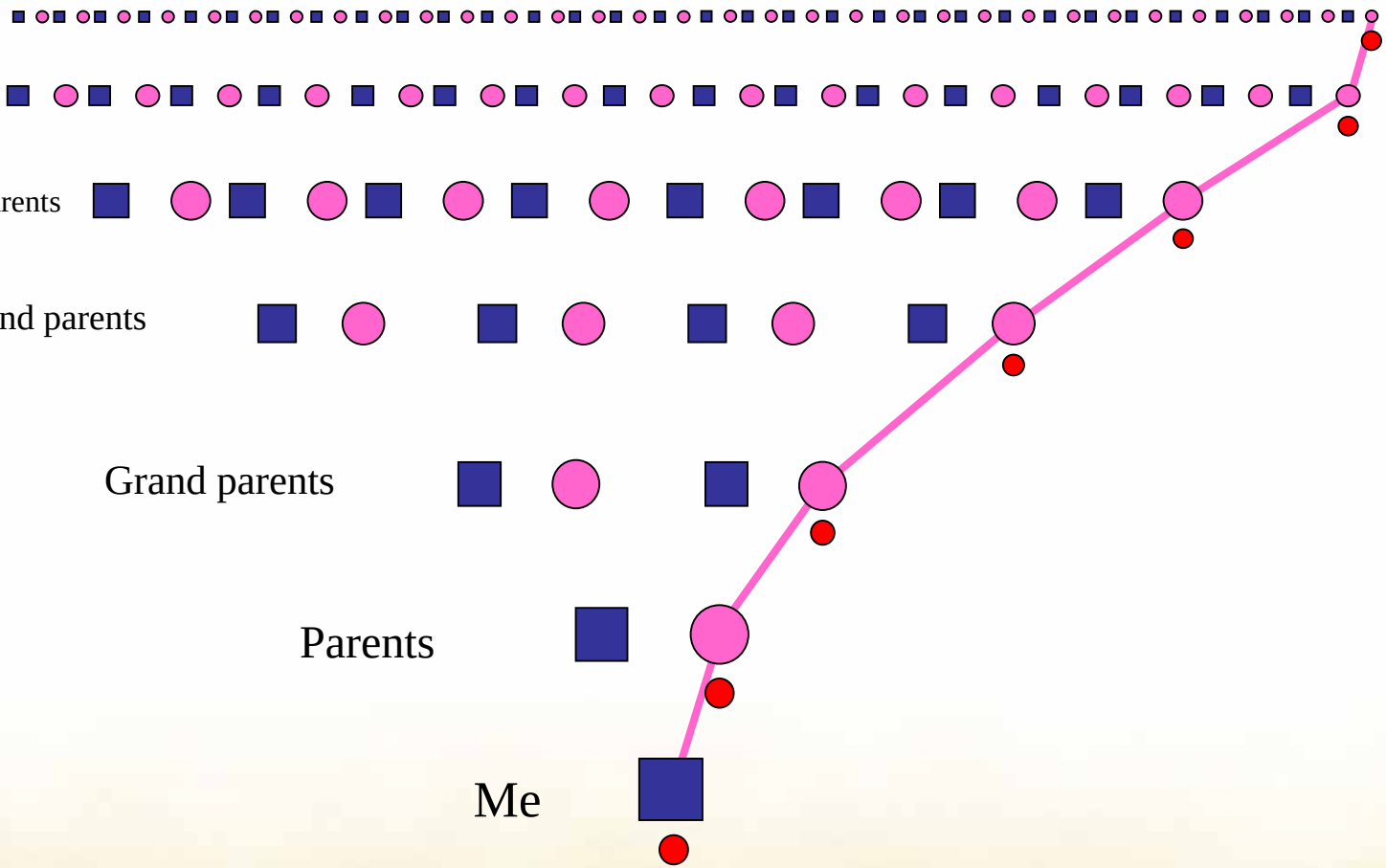

SAMPLING PROCEDURE

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MITOCHONDRIAL DNA

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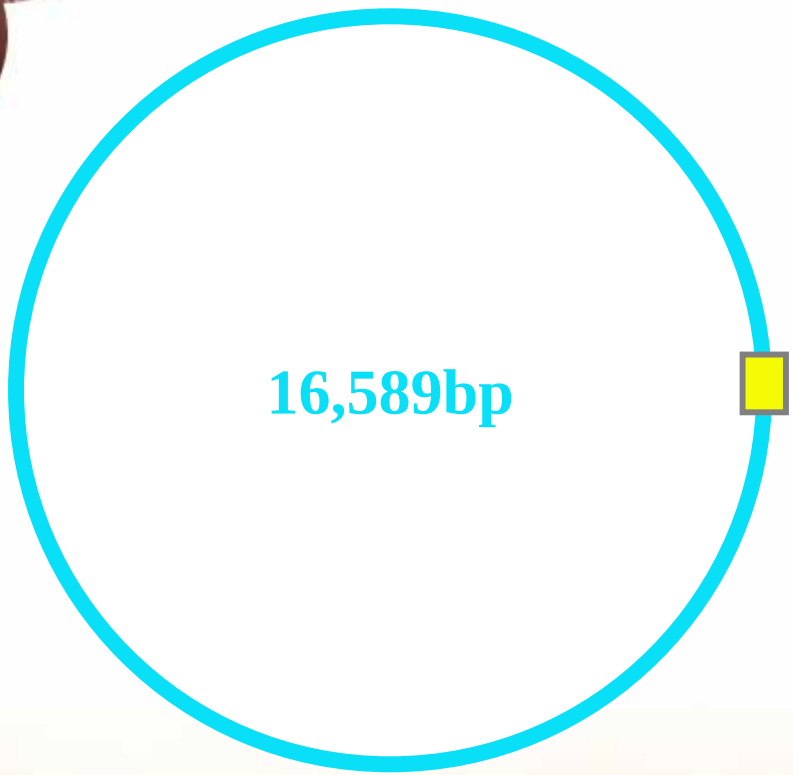

Control Region 500 bp

… AGCCA ... Ref

⇩

… AGTCA ...Test

CAMBRIDGE REFERENCE SEQUENCE (CRS)

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ACCACCCAAG TATTGACTCA CCCATCAACA ACCGCTATGT ATTTCGTACA
TTACTGCCAG CCACCATGAA TATTGTACGG TACCATAAAT ACTTGACCAC
CTGTAGTACA TAAAAACCCA ATCCACATCA AAACCCCCTC CCCATGCTTA
CAAGCAAGTA CAGCAATCAA CCCTCAACTA TCACACATCA ACTGCAACTC
CAAAGCCACC CCTCACCCAC TAGGATACCA ACAAACCTAC CCACCCTTAA
CAGTACATAG TACATAAAGC CATTTACCGT ACATAGCACA TTACAGTCAA
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SEQUENCE COMPARISON

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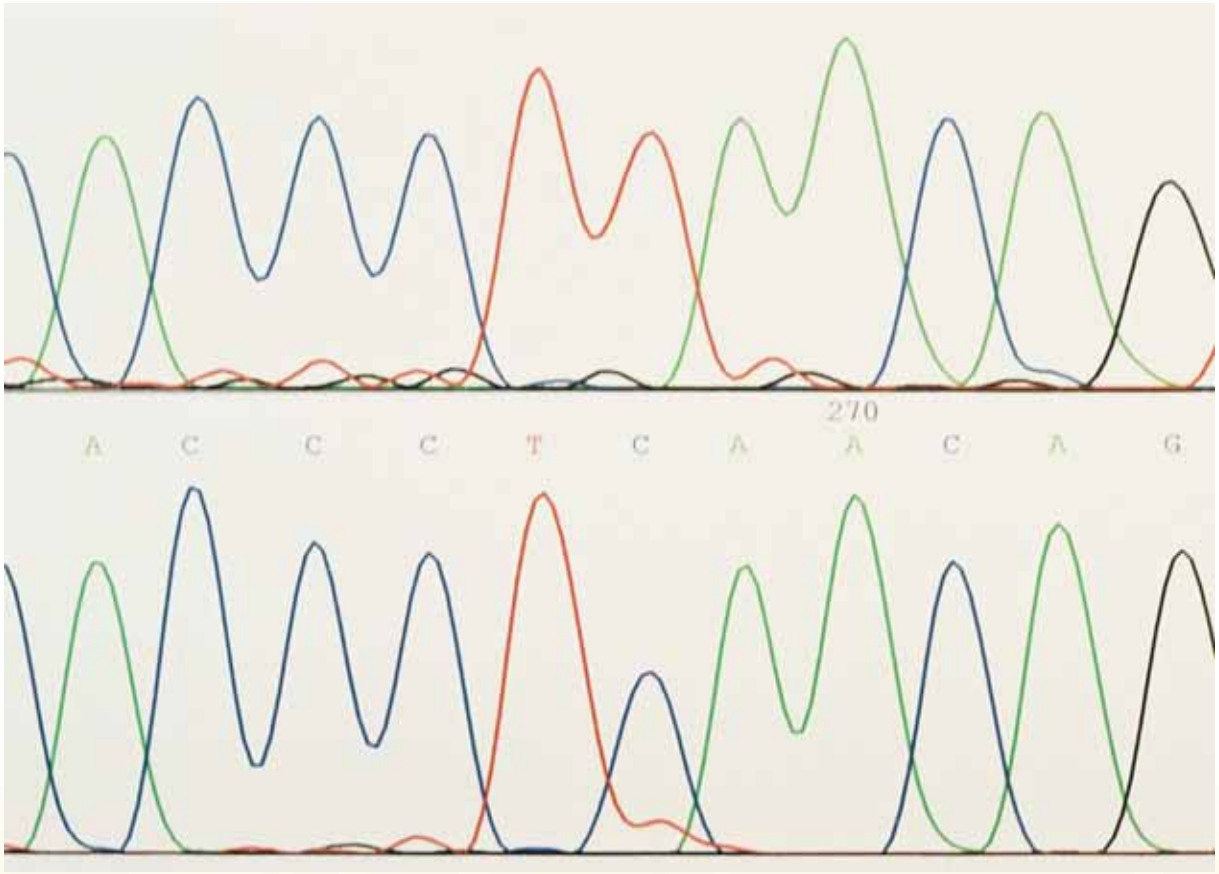

MAJOR EUROPEAN CLUSTERS

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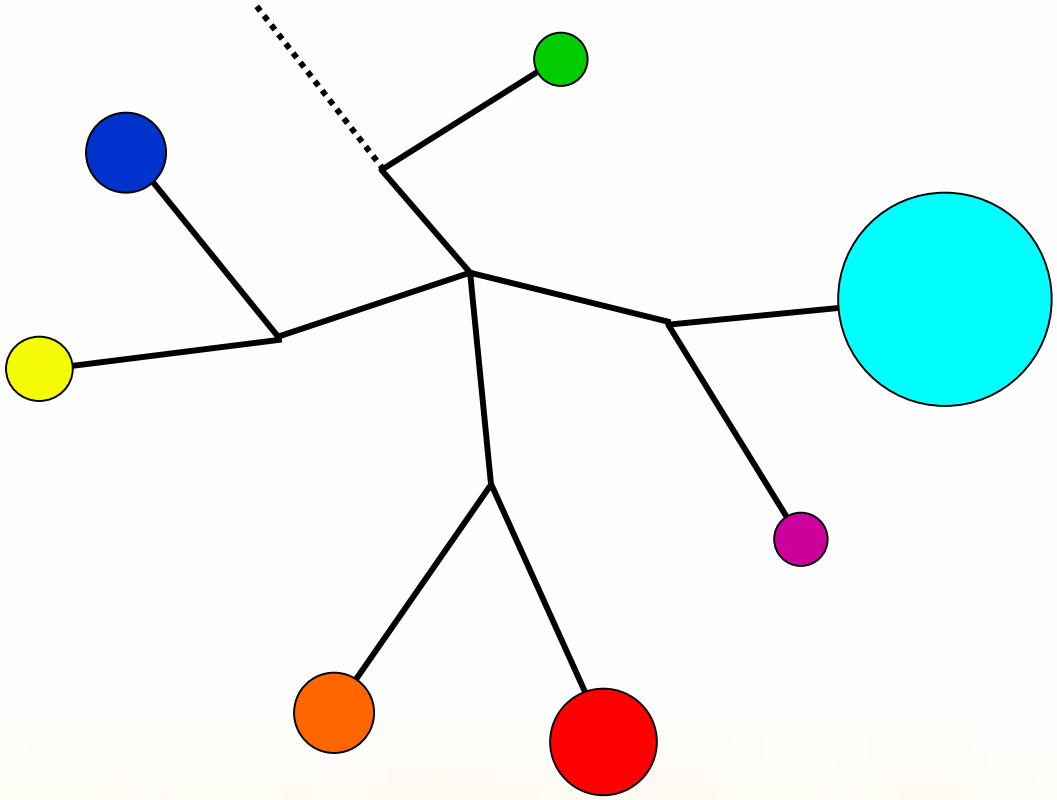

SEVEN WOMEN

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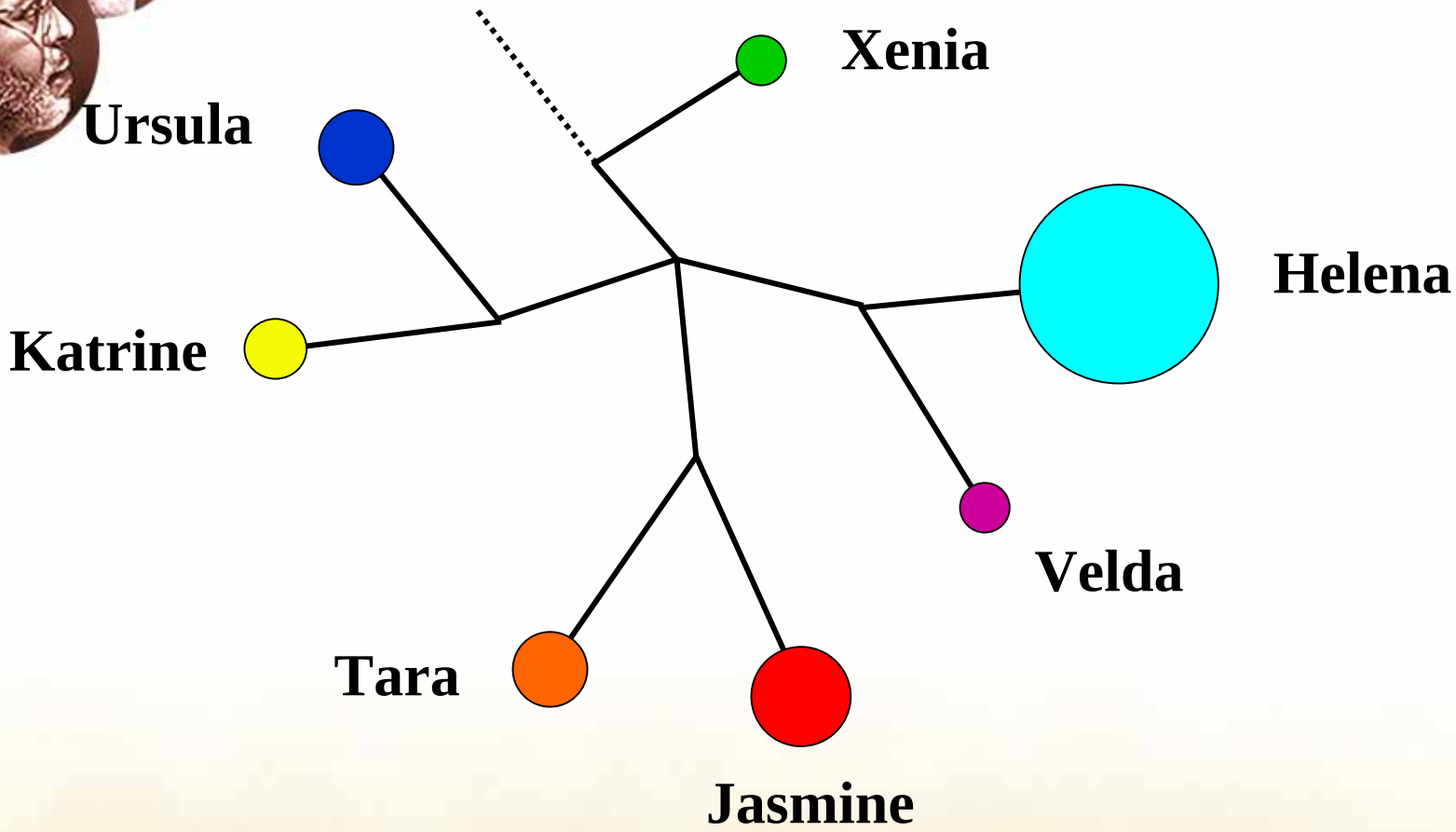

SEVEN SEQUENCES

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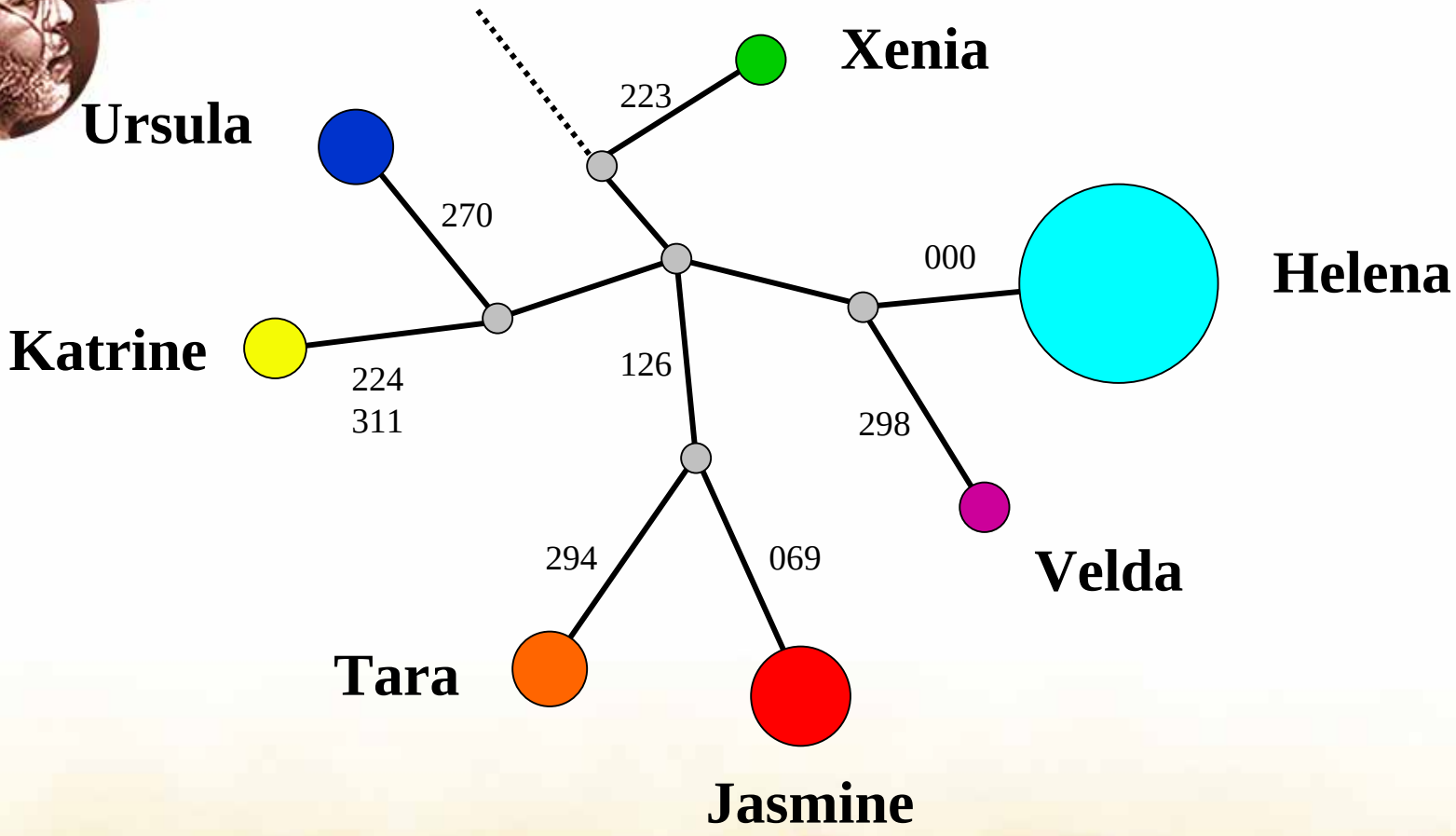

AGE OF THE SEVEN DAUGHTERS

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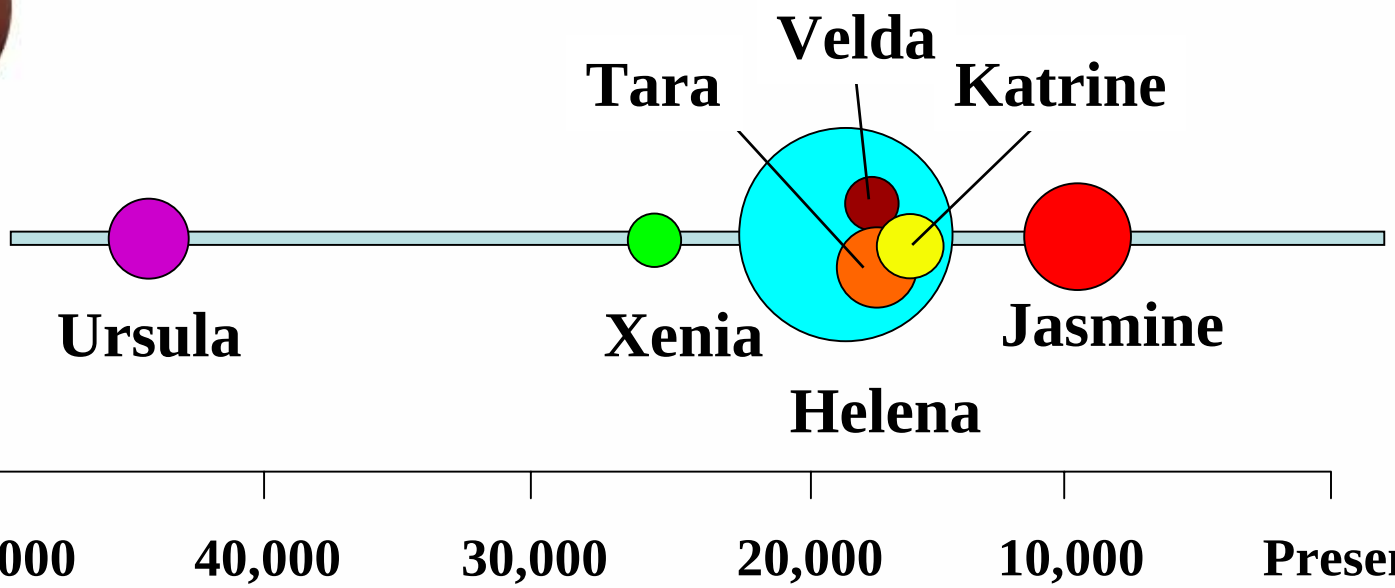

DAVID'S SEQUENCE

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CTGTAGTACA TAAAAACCCA ATCCACATCA AAACCCCCTC CCCATGCTTA
CAAGCAAGTA CAGCAATCAA CCCTCAACTA TCACACATCA ACTGCAACTC
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CAGTACATAG TACATAAAGC CATTTACCGT ACATAGCACA TTACAGTCAA
ATCCCTTCTC GTCCCCATGG ATGACCCCCC TCAGATAGGG GTCCCTTGAC

Descendant of *Helena* (051 162)

“OUT OF AFRICA” THEORY

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All “non-African” genetic groups appear to be descended from the “Lara” clan, one of three major clades that still exist today in Africa (L1, L2 and L3). This supports the African Eve theory, proposed in the late ’80s by biochemist Allan Wilson, Mark Stoneking and others, which states that all humans share a common African ancestor.

MIGRATION OF *Homo sapiens*

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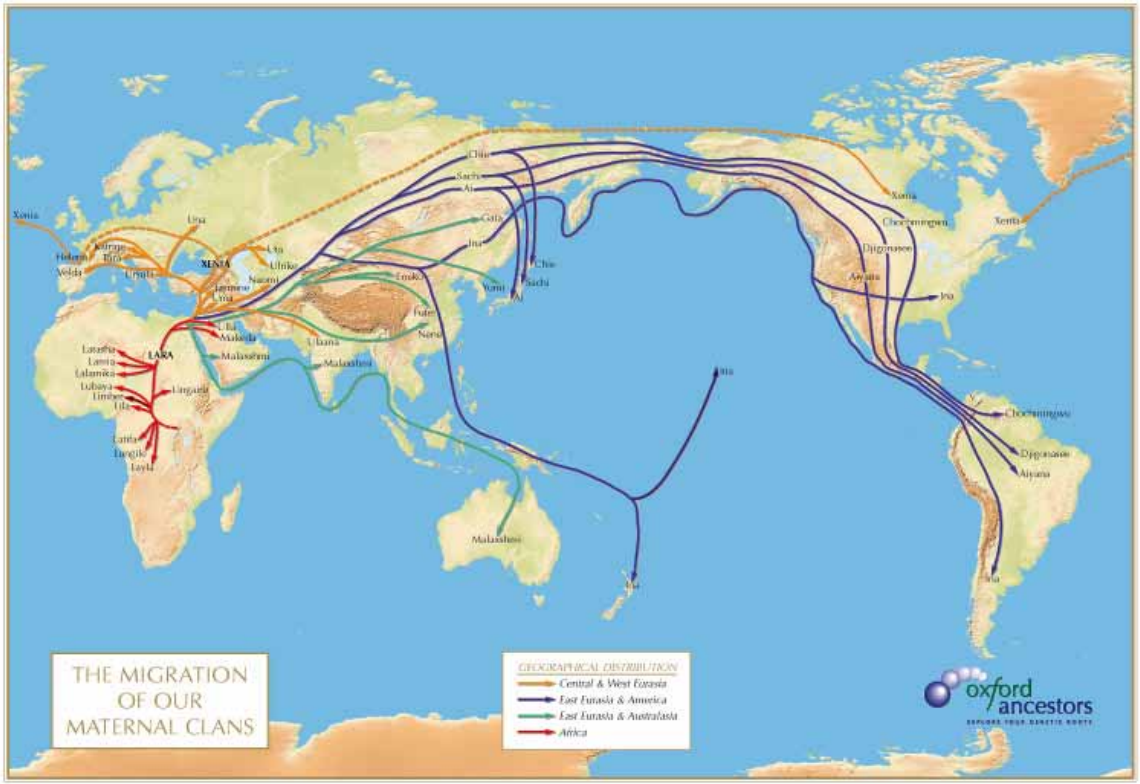

World relief map image © MAPS IN MINUTES™ 2003

PCR PRODUCT ANALYSIS

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PCR PRODUCT ANALYSIS

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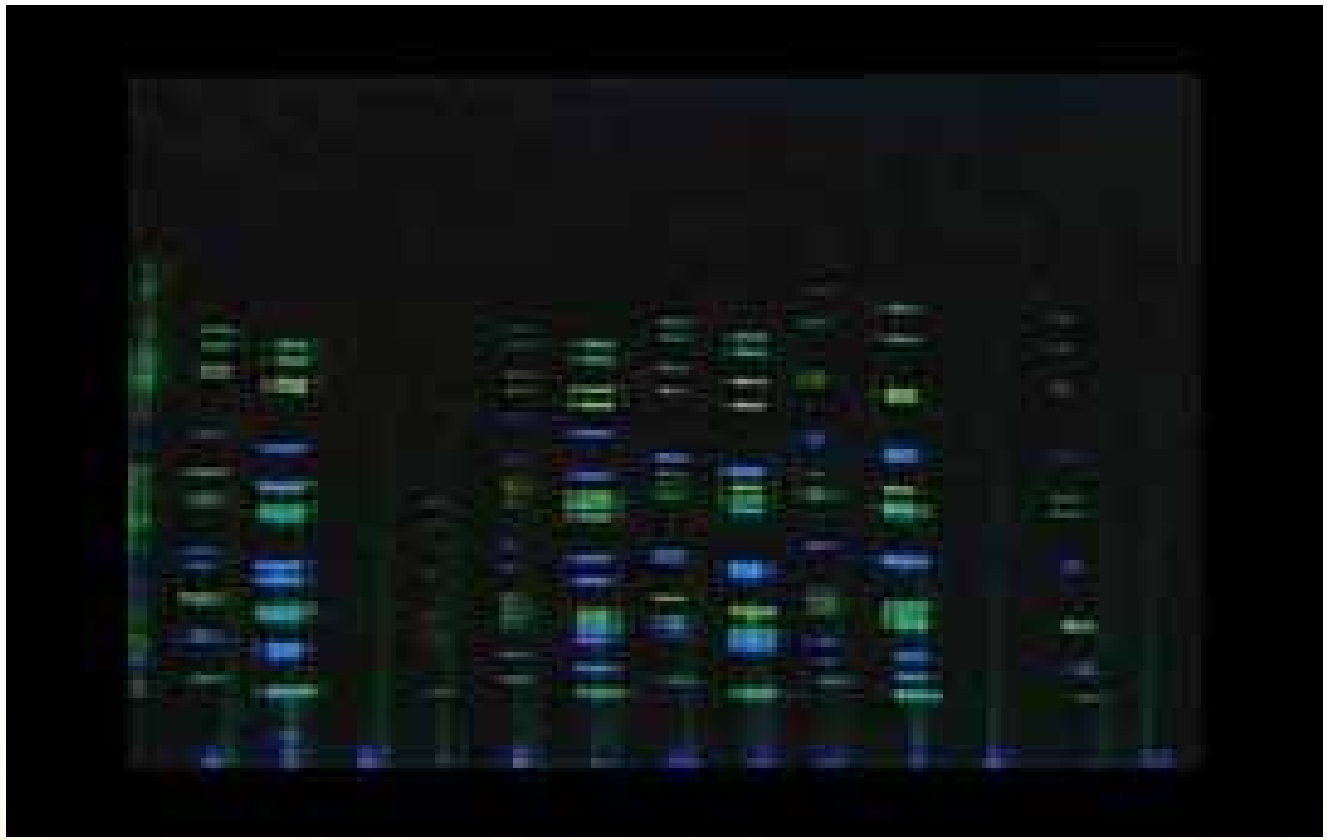

PCR PRODUCT ANALYSIS

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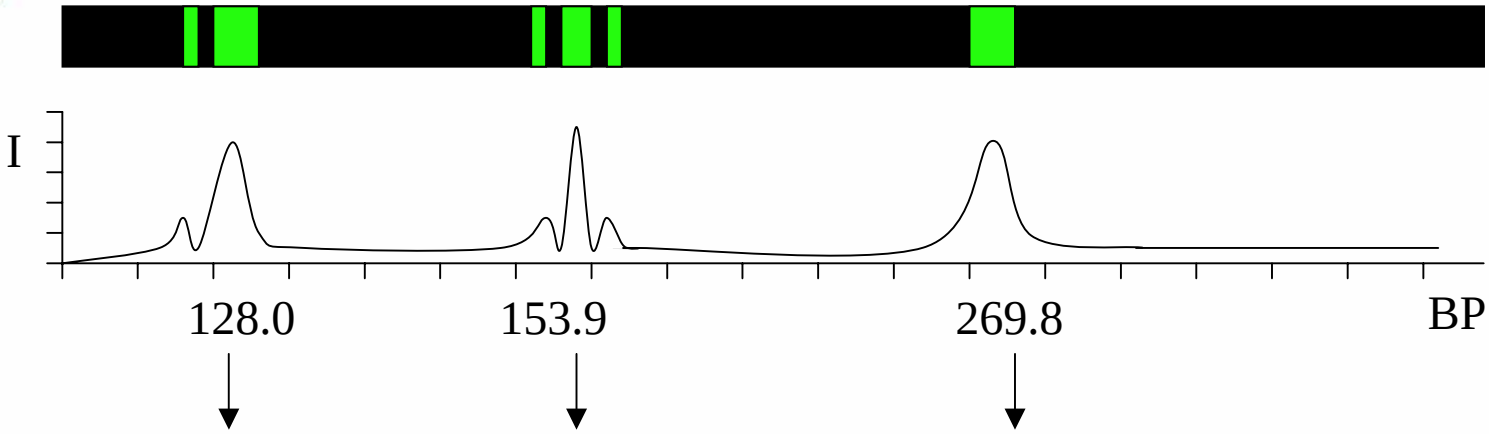

STR ALLELES

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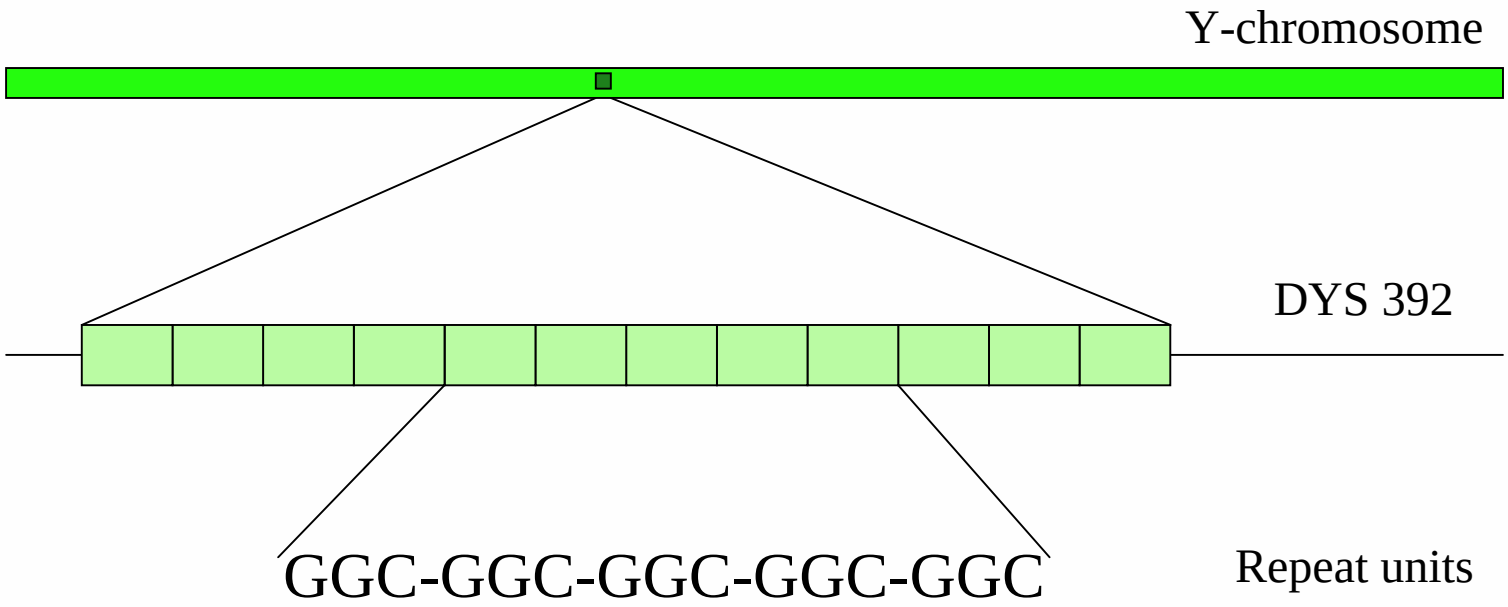

TABLE AND DATABASE

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	19	388	390	391	392	393	389i	389ii-i	425	426	Frequency	Group
1	14	12	24	11	13	13	10	16	12	12	8.56%	A
2	14	12	24	11	13	13	10	16	12	12		
3	14	12	24	11	13	13	10	16	12	12		
4	15	12	24	11	13	13	10	16	12	12	1.26%	
5	14	13	24	11	12	14	11	16	12	11	0.37%	B
6	14	13	24	11	12	14	11	16	12	11		
7	13	11	22	10	12	14	10	17	13	13	0.05%	C

DYSON SURNAME STUDY

Surname	19	388	390	391	392	393	389i	389ii-i	425	426
Dyson	14	14	23	10	11	13	9	16	12	11
Dyson	14	14	23	10	11	13	9	16	12	11
Dyson	14	14	23	10	11	13	9	16	12	11
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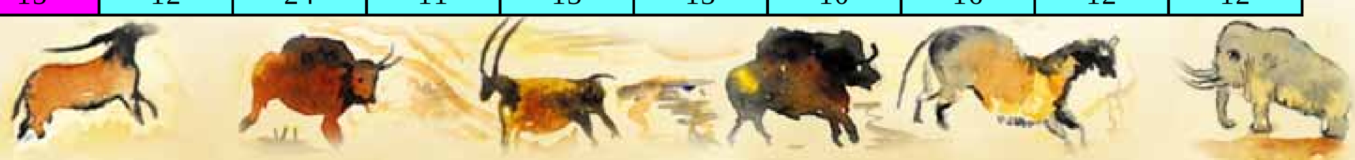

LOCKWOOD STUDY

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EXPLORE YOUR GENETIC ROOTS

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Lockwood	14	14	22	10	11	14	9	16	12	11
Lockwood	14	14	22	10	11	14	9	16	12	11
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Lockwood	16	13	23	10	12	13	10	16	12	11
Lockwood	16	13	23	10	12	13	10	16	12	11

US LOCKWOOD STUDY

Surname	19	388	390	391	392	393	389i	389ii-i	425	426
Lockwood	14	12	23	12	13	13	10	16	12	12
Lockwood	14	12	24	10	13	13	10	16	12	12
Lockwood	14	12	24	10	13	13	10	16	12	12
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Lockwood	14	14	22	10	11	14	9	16	12	11

CAVEAT

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- DNA analysis must only be used to test an existing genealogical hypothesis
- DNA analysis results provide supporting evidence *or otherwise* for that hypothesis
- Constructing a hypothesis (reconstructing a family tree) from DNA evidence is *unsafe*
- Early 1990s – “Prosecutor’s fallacy”
- All DNA evidence is *probabilistic*

PATERNAL GENEALOGY

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Somerled

Dugall | Ranald | Angus

MacDougall | Donald of Islay

Alastair | John, Lord of the Isles

MacAlastair | Macdonald

PATRILINE CERTIFICATE

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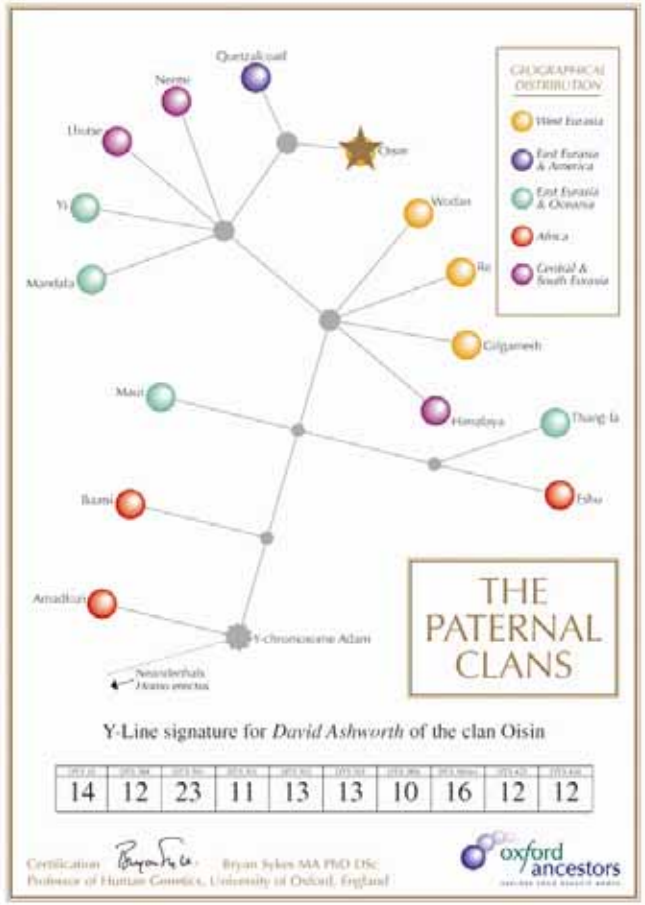

Y-Line signature for *David Ashworth* of the clan Oisin

14	12	23	11	13	13	10	16	12	12

Certification Bryan Sykes MA PhD DSc
Professor of Human Genetics, University of Oxford, England

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MIGRATION OF *Homo sapiens*

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THE WORLD POPULATION

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- **In 1600, the Earth's population was 600 million.**
- **That is about 13 generations between 1600 and 2004.**
- **Each of us has 4,096 10th great grandparents.**
- **At 1AD, the population was 300 million.**
- **That's 67 generations ago.**
- **If each of our 64th great grandparents were unique, each of us would have approximately 7.4×10^{19} ancestors at 1AD.**
- **2.5×10^{11} times the human population of the earth at that time!**

WE ARE ALL HUMAN

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