

# Diversity of Organisms

## TAXONOMY

The science of identifying, naming and grouping organisms.



## "BINOMIAL SYSTEM OF CLASSIFICATION"

Two Name



American grizzly bear ⇒ *Ursus americanus*

Genus Species

Polar bear ⇒ *Ursus maritimus*



## RULES

- Genus name is capitalized, species is not.

- When typing use *italics*, when handwriting underline.

**TIP!**

GENus = GENeral  
SPECies = SPECific

**GENUS:** This part indicates a group of species that are very closely related and share a common ancestor.

**SPECIES:** Group of organisms which can interbreed and produce fertile offspring.

## GENERAL



Domain 3

Kingdom 6

Phylum MANY...

Class ...

Order ...

Family ...

Genus ...

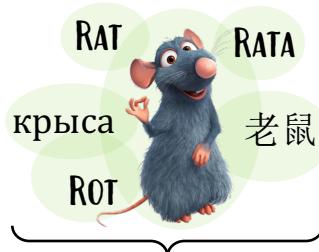
Species ...

@TeachMe-Official

## SPECIFIC

## HOW TO REMEMBER??

DEAR KEVIN PLEASE, COME OVER FOR GREAT SOUP



## BINOMIAL SYSTEM WHY???

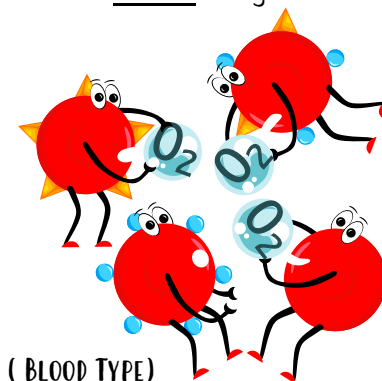
The names can be universally understood.

Stability, cannot just change names without valid reason.

Each organism has a unique name and cannot be confused with another.

## DISCONTINUOUS VARIATION

(When variation can be placed in distinct categories)



( BLOOD TYPE)

## CONTINUOUS VARIATION

(When variation has a wide range of possibilities)



( HEIGHT, EYE COLOR)

# Diversity of Organisms

## BIOLOGICAL SPECIES CONCEPT

To be classified as the same species, two organisms must be able to breed together and produce fertile offspring



## SPECIATION

The process by which a population is separated into two groups that can no longer reproduce together

## PROBLEMS?

- Asexually Reproducing Organisms.

- Hybrids are NOT always infertile.

- Extinct Species.

(By using the fossil record we cannot tell whether organism were able to interbreed to produce fertile offspring). For example; woolly mammoth.

- Organisms made up of DNA from multiple organisms.



## CHROMOSOME DIVERSITY

### KARYOTYPE

"The number and appearance of chromosomes present in a nucleus"

Used for { Gender  
Prenatal diagnosis

### KARYOGRAM

"A picture of the chromosomes from an organism, arranged in a standard format"

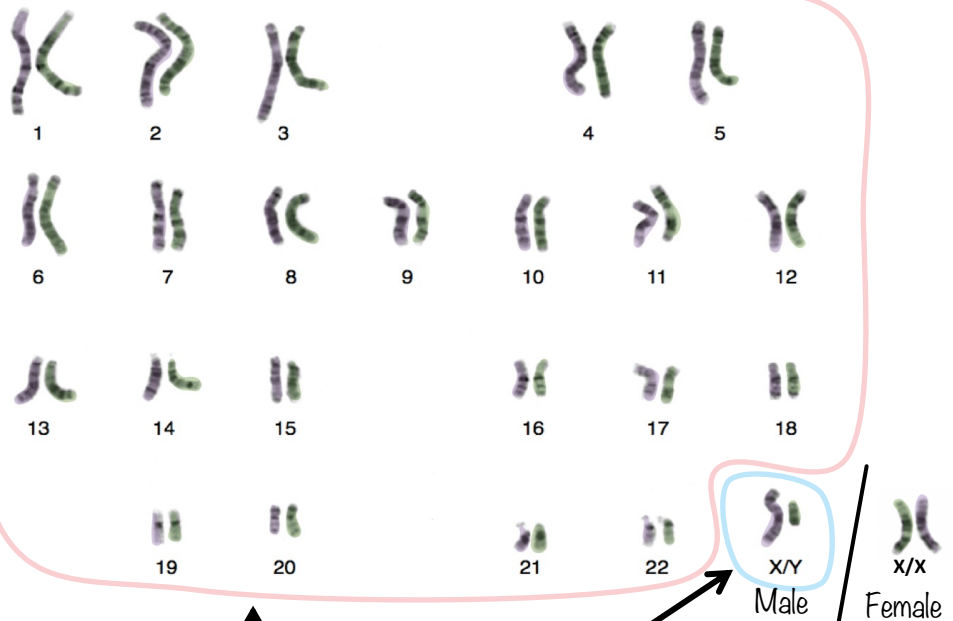
Different species

=

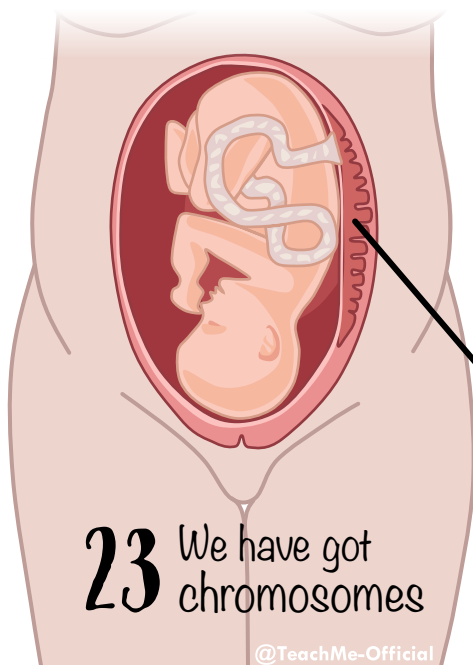
Different number of chromosomes

### AUTOSOMES

Most cells in the body are **DIPLOID** (2N) except gametes (sex cells) which are **HAPLOID** (N)

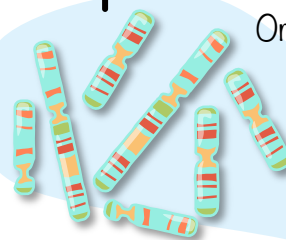


### SEX CHROMOSOMES



**23** We have got chromosomes

Take sample from:  
Amniotic fluid of the foetus.  
Blood sample.  
Chronic Villus sampling.



Organized according to size & Stained

With computer software



Cells grown in culture

# Diversity of Organisms



HUMAN  
2



CHIMPANZEE  
12

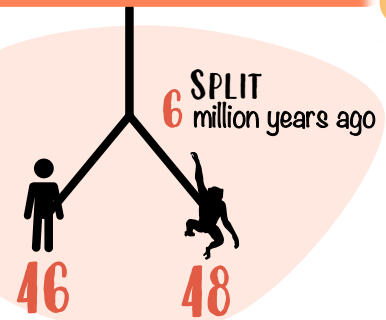
## EVOLUTION OF HUMAN CHROMOSOME 2

### 2 Hypotheses

I. A complete chromosome disappeared.

II. Two chromosomes of an earlier common ancestor fused.

Chromosome 2 arises from the fusion of chromosome 12 and 13. Similar length when overlapped.



TELOMERE DNA

SATELLITE DNA

Telomere DNA found in location other than at the end of the chromosome

Satellite DNA found in location other than centromere of the chromosome

Banding pattern matches Chimpanzee chromosome

Acrocentric (centromere near one of the poles)

"FUSION"

MetaCentric (centromere in the middle)



CHIMPANZEE  
13

KEY

CHROMOSOME 12 GENES CHIMPANZEE

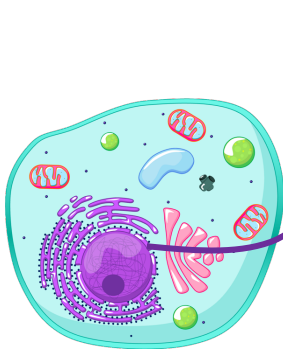
CHROMOSOME 13 GENES CHIMPANZEE

CENTROMERE SATELLITE DNA

TELOMERE TELOMERE DNA

## THE HUMAN GENOME

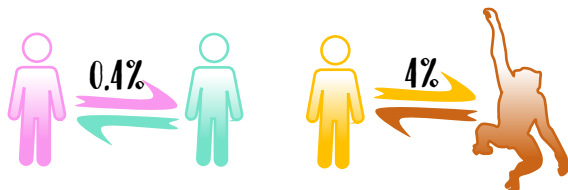
A catalogue (collection) of all the bases it possesses



CHROMOSOME

### SLIGHT DIFFERENCES:

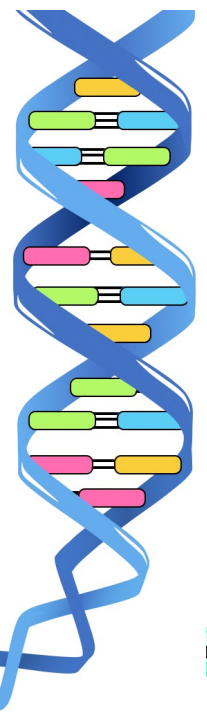
Single Nucleotide Polymorphisms (SNP's)



Different humans have the same genome size. Same genes (different version or alleles). Slight differences in base sequences.

NUCLEOSOME

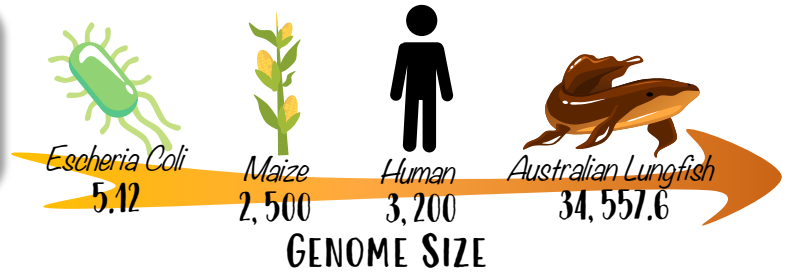
HISTONE



# Diversity of Organisms

## HUMAN GENOME PROJECT

A project that aimed to find the base sequence (order) of our genome. The order of our ACTG. Estimate is 22,000 genes and 3,200,000,000 bases.



DECADE ( BEFORE ) → HOURS ( NOW )



For Personalized Medicine

Between different organisms the genome size may differ. Some organisms have genes for certain things that other organisms do not.

## MORE COMPLEX $\neq$ LARGER GENOME

Depends on definition of complex? Lung fish can survive in severe conditions. Humans can send a spaceship to mars.

"Another way to assess the similarities and differences between organisms is through their **DNA & PROTEINS**"

This image shows a single sheet of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.