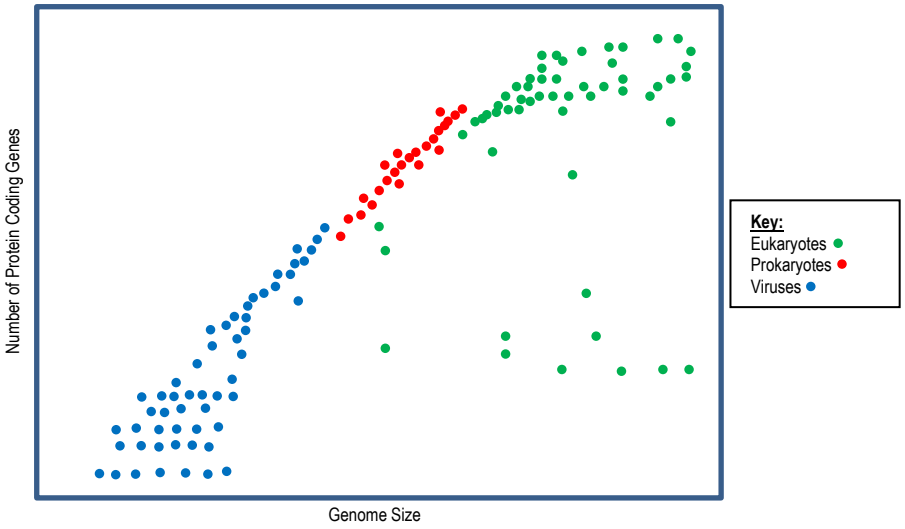
CONCEPT: GENOMES

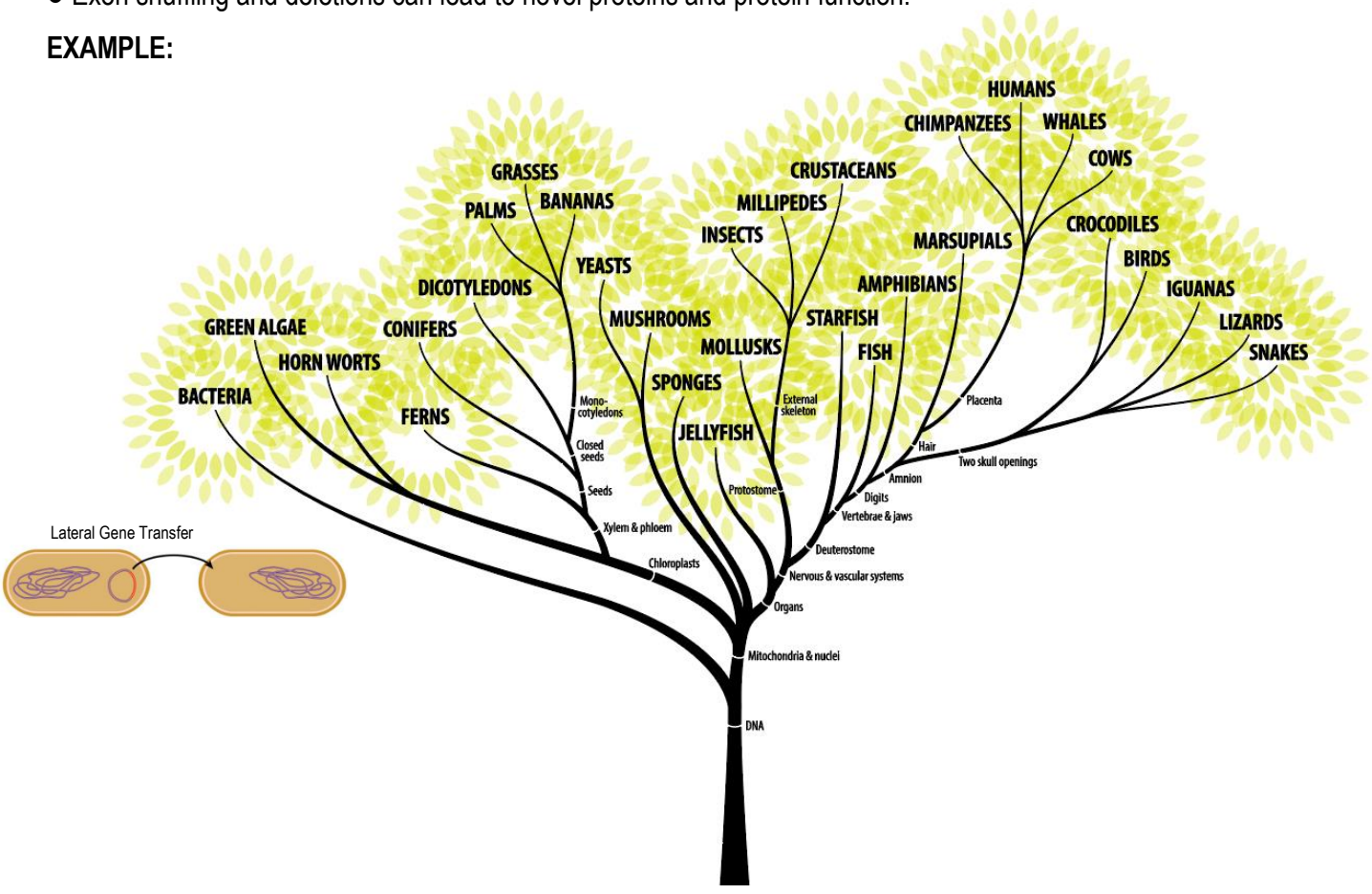
- Prokaryotic genome – uninterrupted coding sequences, little space between genes, few regulatory sequences
- Eukaryotic genome – huge amounts of ncDNA, many repeated sequences, larger and more genes than prokaryotes

EXAMPLE:



- ***Lateral gene transfer*** – gene transfer between organisms in a form other than reproduction
- Synteny – conserved arrangements of segments of DNA in related genomes, helps determine evolutionary relationships
- Chromosome duplication can sometimes lead to the evolution of genes, however it is usually deleterious
- Exon shuffling and deletions can lead to novel proteins and protein function.

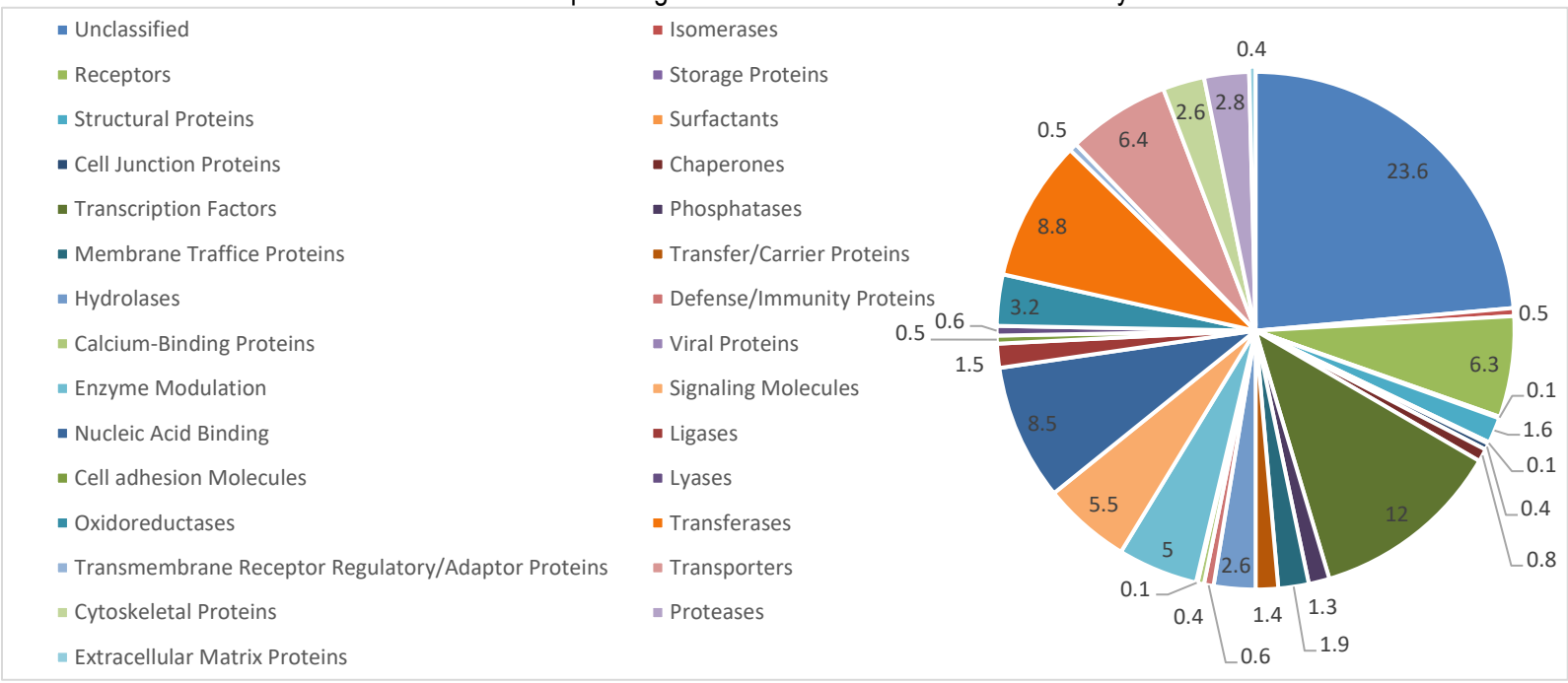
EXAMPLE:



CONCEPT: GENOMES

There are a few types of protein encoding genes:

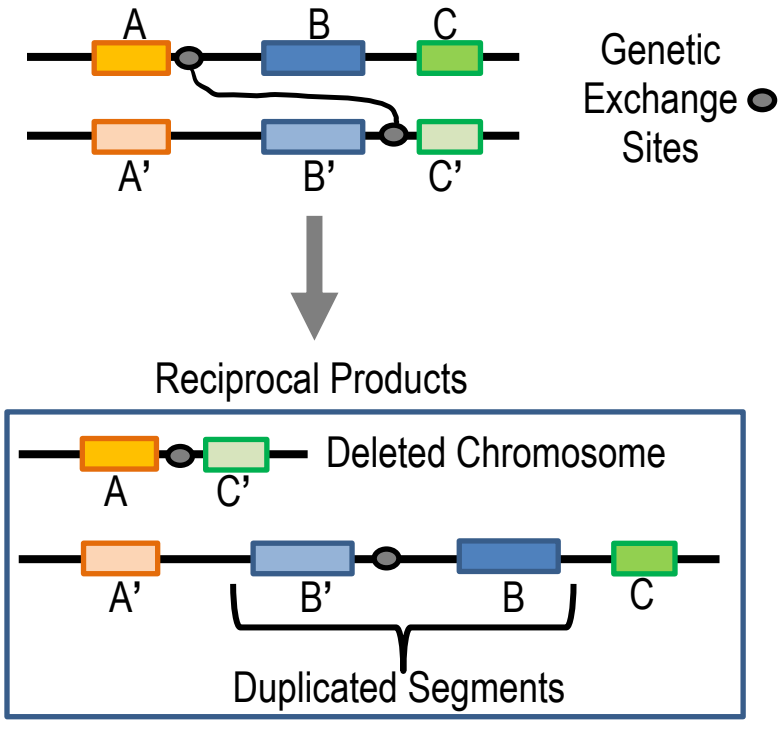
- Single copy genes – a single copy of a unique gene in the genome
- Tandem clusters – clusters of identical copies of genes that are transcribed simultaneously



EXAMPLE:

- Gene duplication – an extra copy of a gene is added to the chromosome, can be due to unequal cross over
  - □ ***Unequal crossover*** – misalignment of chromatids during crossing over

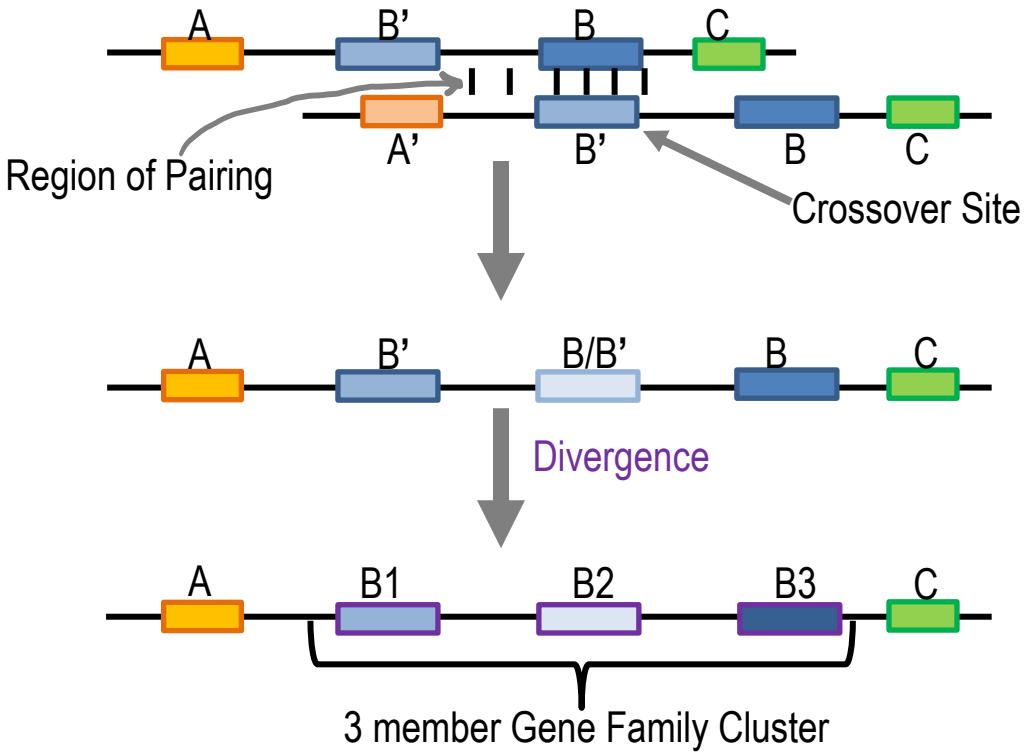
EXAMPLE:



CONCEPT: GENOMES

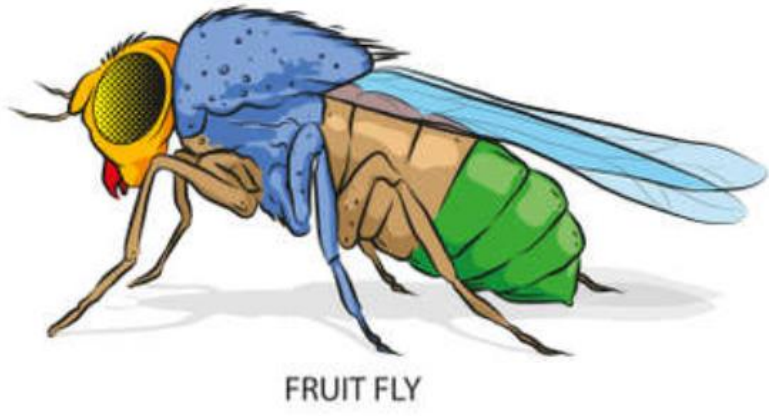
- Multigene families – a set of several similar genes formed through gene duplication
- Gene clusters – genes near each other on the chromosome that are part of the same family

EXAMPLE:



- The Hox genes are a highly conserved gene family that determines the body plan of an embryo

EXAMPLE:



CONCEPT: GENOMES

Noncoding DNA elements include:

● Constitutive heterochromatin – structural DNA that always remains condensed

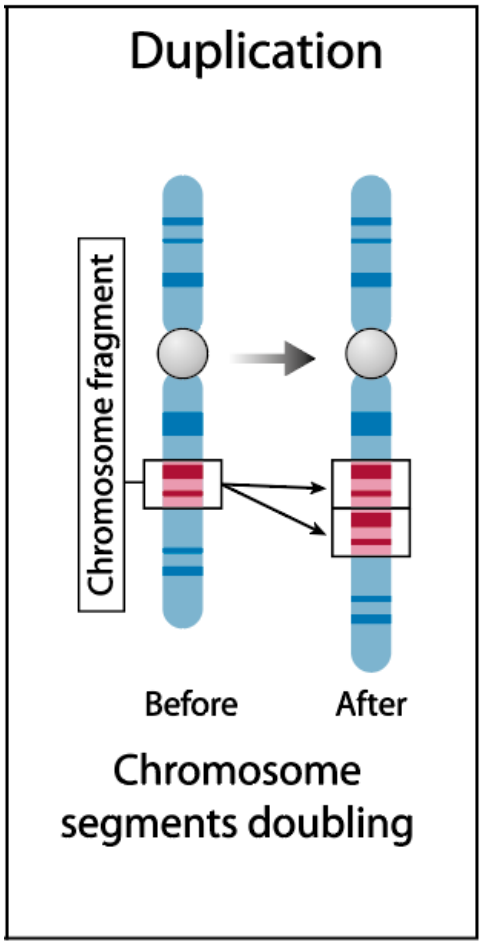
EXAMPLE:

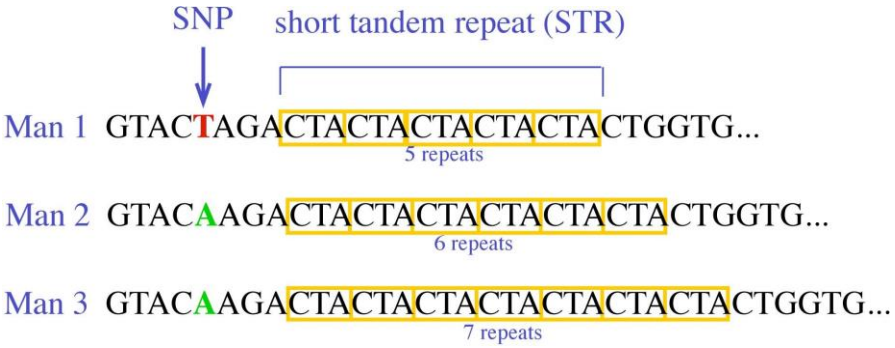
● Segmental duplications – segments of DNA that share sequence and occur in multiple places within the genome

● ***Short tandem repeats*** (microsatellites) – short repeated sequences of DNA that vary between alleles and individuals

□ Repeated sequences are susceptible to unequal crossing over, producing more repeats

EXAMPLE:



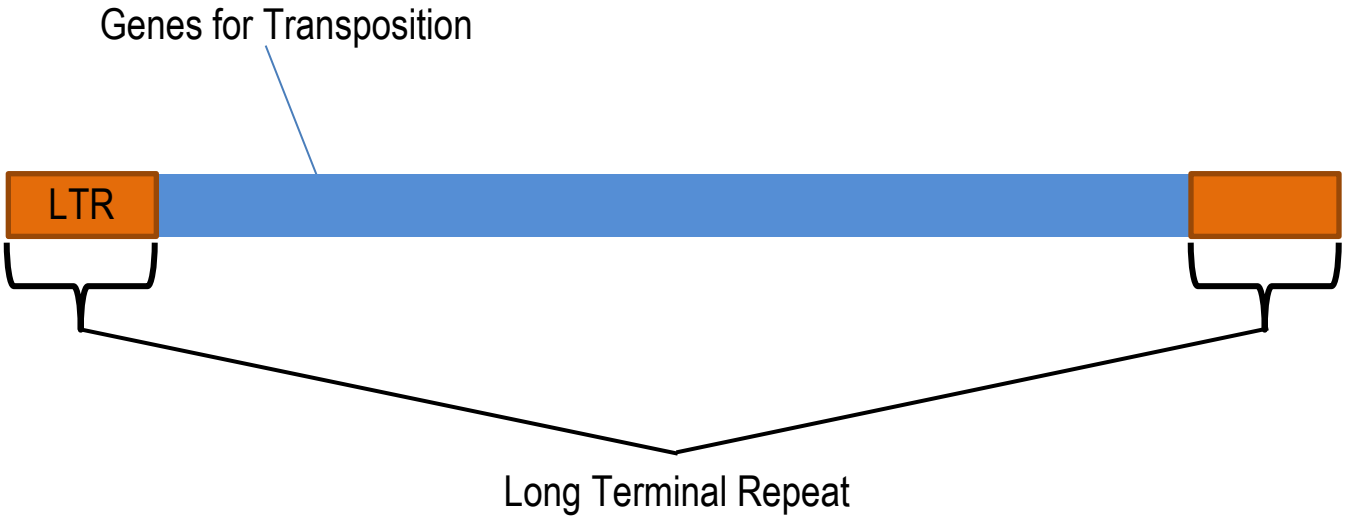


CONCEPT: GENOMES

Transposable elements – segments of DNA that behave in a similar manner to viruses, inserting their DNA in a genome

- Transposons – transposable elements that use a DNA intermediate
- Retrotransposons – transposable elements that use an RNA intermediate
    - □ Long interspersed nuclear element (LINE) – a transposable element that has a reverse transcriptase

EXAMPLE:



- ***Pseudogenes*** – inactive genes that have lost their functionality, possibly from mutation
- ***MicroRNA*** – involved in RNA interference, makes up a portion of ncDNA
- There is ncDNA within genes, such as introns

EXAMPLE: