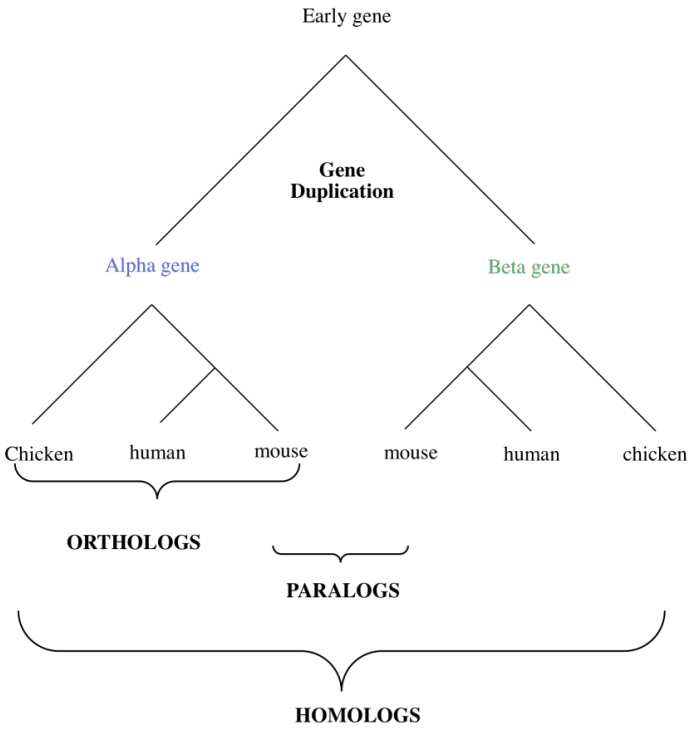
CONCEPT: COMPARATIVE GENOMICS

- **Comparative genomics** is the study of genomics from an evolutionary _____
  - □ **Homologs** are genes that have similar DNA sequences
    - **Orthologs** are genes inherited from a common ancestor
    - **Paralogs** are genes related by a gene duplication

EXAMPLE:



□ **Phylogeny** is the evolutionary history of a group of _____

- **Phylogenic inference** infers how genes came about

- **Parsimony** is a principle that says to choose the simplest explanation

EXAMPLE:

1. Generally, mammals do not lay eggs, but platypuses are mammals that lay eggs. Therefore, platypuses contain genes associated with egg yolks that other mammals do not have. Where did these genes come from?
    a. Yolk genes came from a common egg-laying ancestor and other mammals lost the yolk genes.
    b. Yolk genes evolved in platypuses independently of other egg-laying organisms

<u>Humans, Mice, and Chimps</u>

● Human genomes share similarities with other _____

□ Mice genomes are very similar to human genomes

- 99% of human genes have a homolog in mice

- They have 90% **synteny**, which is a conserved order of genes

□ Chimpanzee genomes are extraordinarily similar to human genomes

- 35 million single nucleotide difference between a human and chimp

- 3 million single nucleotide differences between two humans

- Duplications of chromosomal segments result in major difference