

# Introduction to Genetics

Packet #1

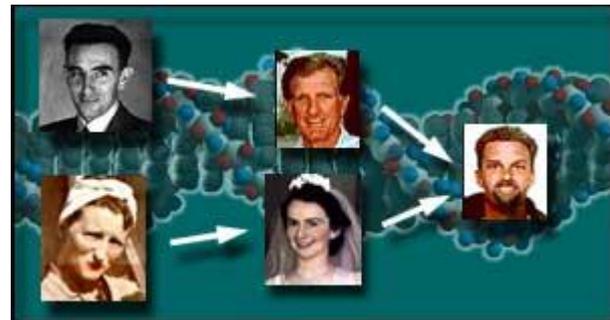
# Genetics

- \* Genetics
  - \* The study of inherited **traits** and their variation.
  - \* Should not be confused with genealogy.
  - \* Genetics is a life science.
    - \* Biological science



# Heredity

- \* Heredity
  - \* The transmission of traits between generations
  - \* How similar offspring are to their parents



# Genetics & Heredity Connection

- \* Genetics is the study of how traits are transmitted.
- \* Genetics is the scientific study of heredity.



# Traits

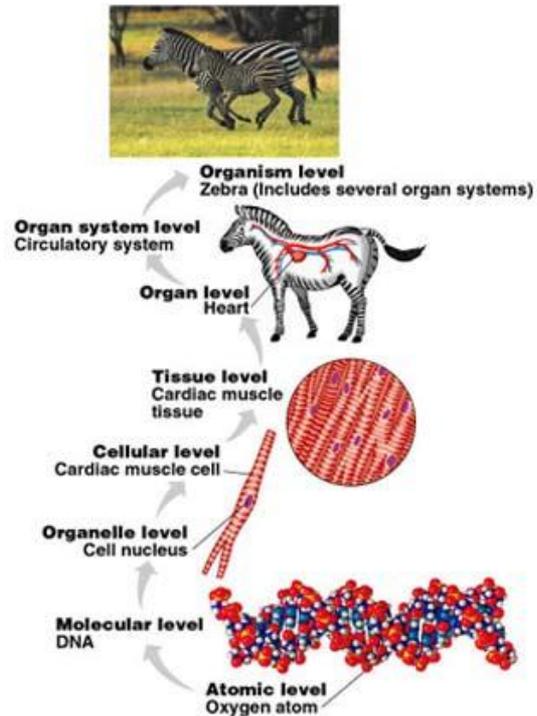
- \* Traits are observable properties of organisms.
- \* Traits can be physical or even biochemical.
  - \* Freckles
  - \* Red hair
  - \* Blue eyes
  - \* Talents
    - \* Ability to run fast
  - \* Humor

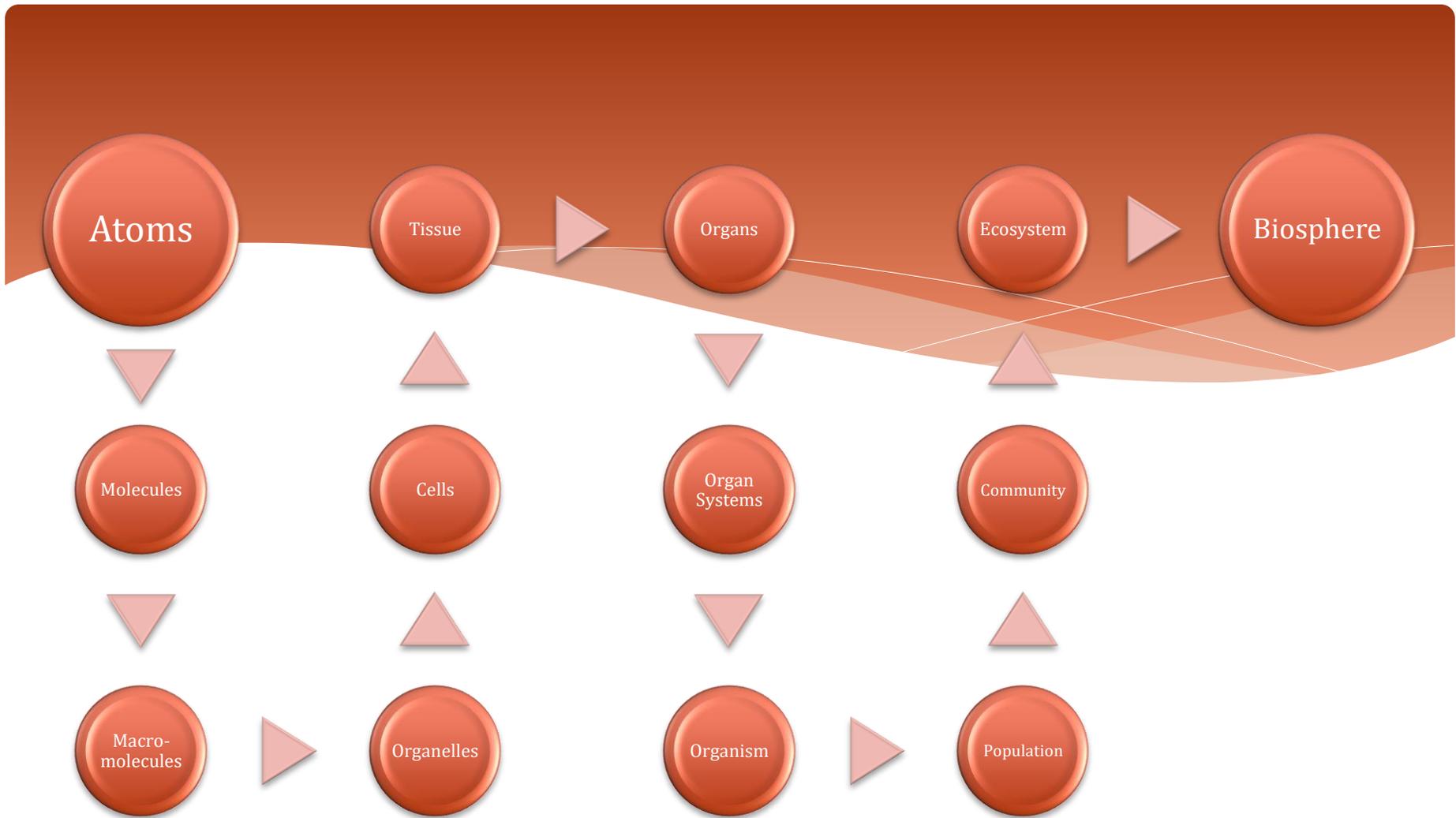


# Genetics and the Link to the Hierarchy of Biology

# Hierarchy

- \* The living world is a hierarchy where each level of biological structure, builds on the level below it.





# The Connection – Genetics & the Hierarchy

- \* Genetics considers the transmission of information at several levels of the hierarchy.
  - \* Molecular
  - \* Macromolecular
  - \* Cellular
  - \* Tissue
  - \* Organs/Organism
  - \* Families\*
  - \* Populations



# How do Scientists Study Genes?

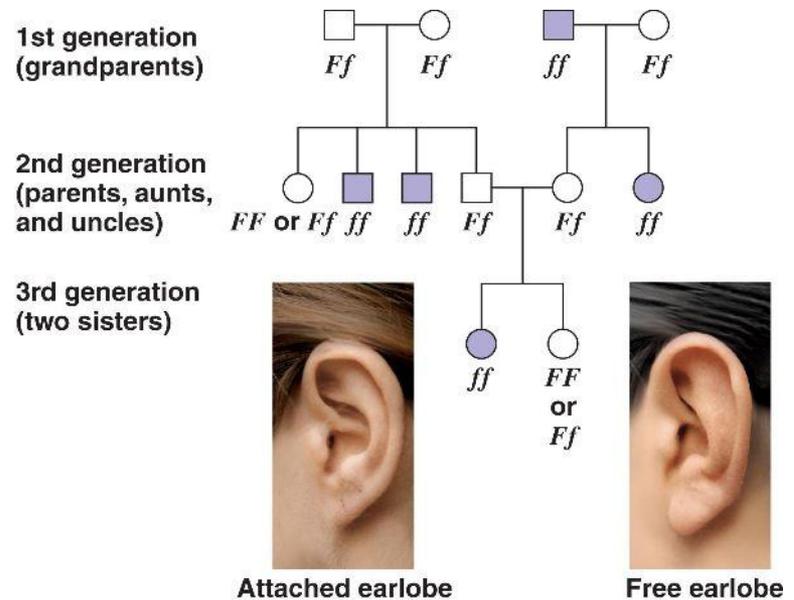
# Transmission Genetics

- \* **The study of how genes, and traits, are passed on from one generation to the next.**
  - \* Height
  - \* Flower color
- \* The most basic form of genetic study.



# Pedigree Analysis

- \* A branch of transmission genetics.
- \* The study of inheritance of traits in humans.
- \* The study and construction of family trees and transmission of genetic traits within the families.



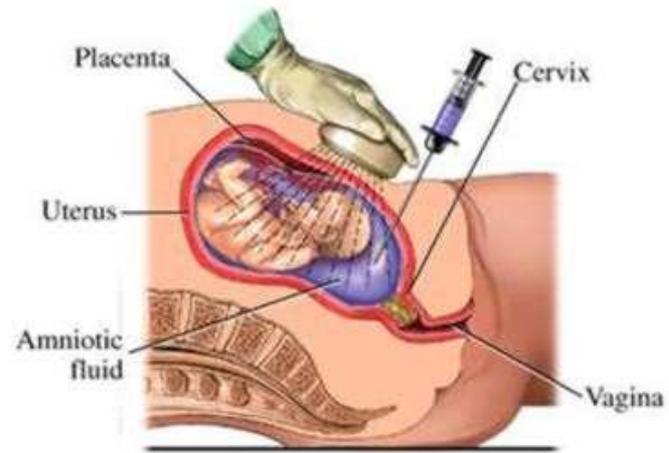
# Cytogenetics

- \* Branch of genetics that studies the organization and arrangement of **genes, on the chromosome, the structure of the chromosome and the number of chromosomes** that are available within a species.



# Molecular Genetics

- \* The study of genetic events at the **molecular level**.
- \* Involves the use of recombinant DNA technology to identify, isolate and produce millions of copies of genes.
- \* Used in the diagnosis of genetic disorders
  - \* Gene therapy



# Genomics

- \* In the field of genomics, scientists are trying to determine: -
  - \* The organization of an entire genome
  - \* How are genes changing over time?
  - \* The function of genes from an entire genome
  - \* How are genes influenced and how do they interact with each other?
  - \* How are genes influenced by environmental factors?

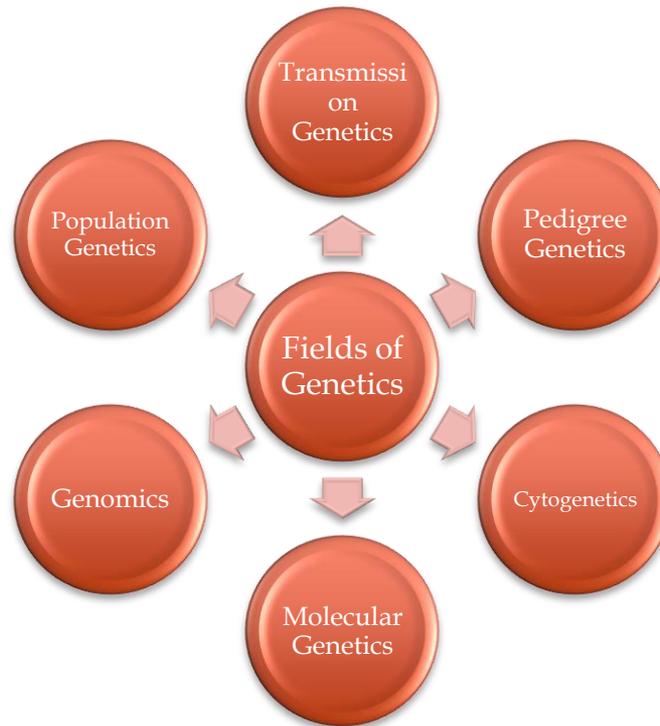


# Population Genetics

- \* **The study of the distribution of genes within a population's gene pool.**
- \* Population genetics shows how much variation there is within a population and how migration, population size and natural selection affects the variation.



# Fields of Genetics / Studying Genetics



# Review