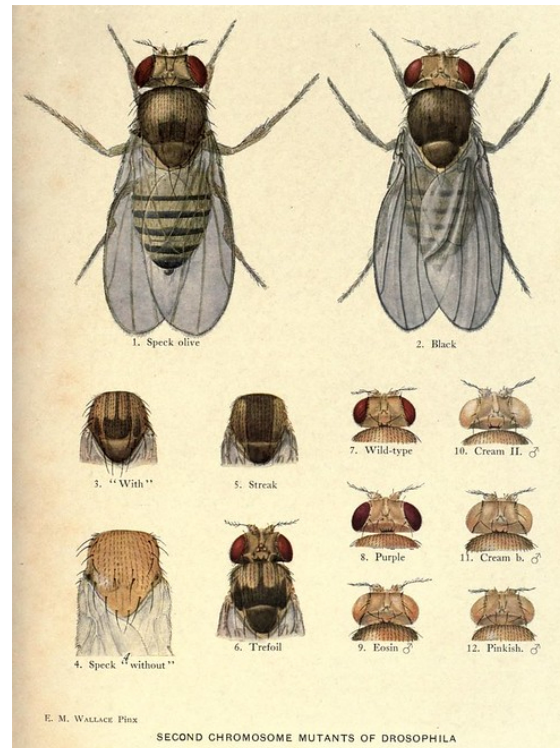


Coop: Chapter 1

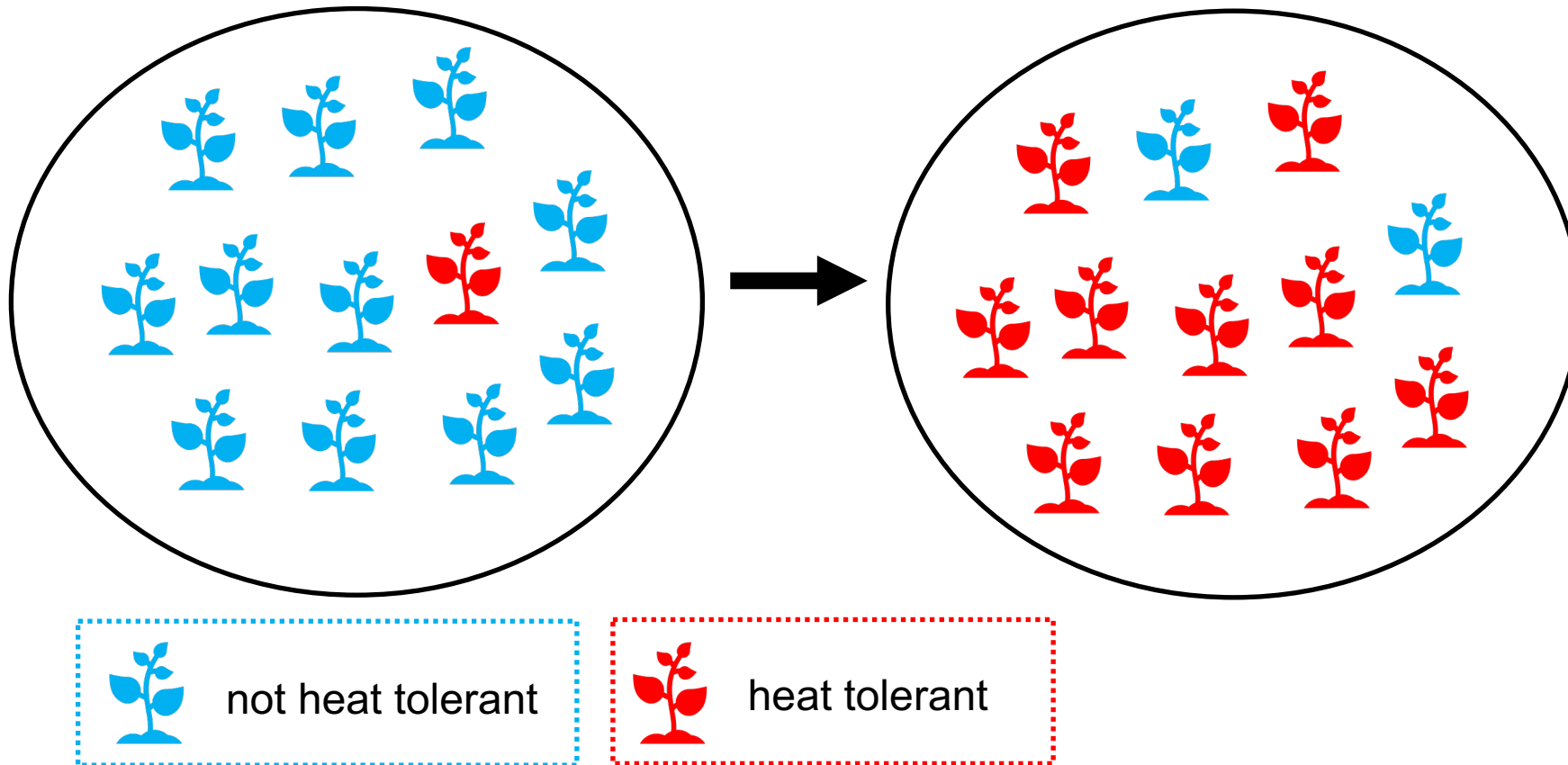
Introduction

Figure 2.1: *Drosophila melanogaster* holds a special place in the history of genetics and population genetics. From Morgan's fly room discovering the principals of genetics to Dobzhansky's early work on natural genetic variation.



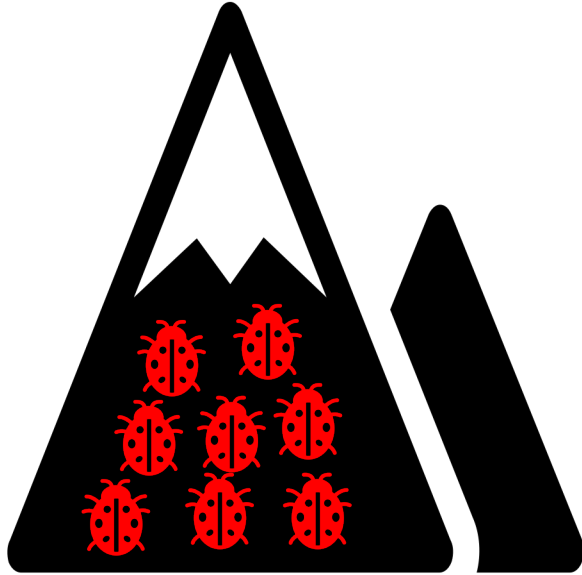
What is Evolution?

“Evolution is the change over time in the genetic composition of a population”



What is a Population?

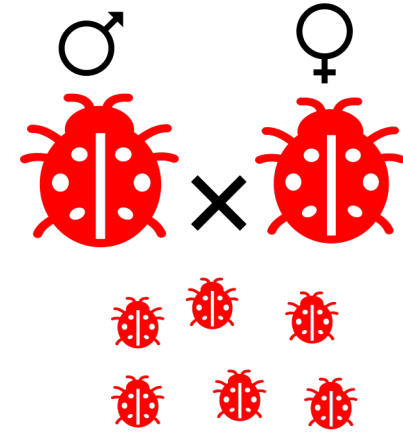
A group of individuals...



in the same place

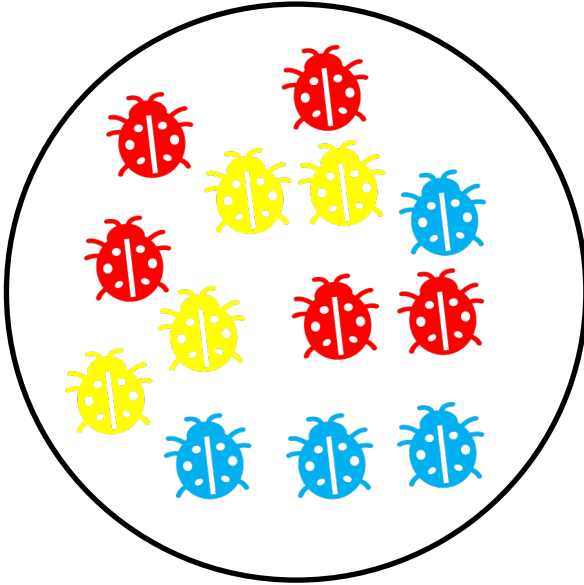


at the same time

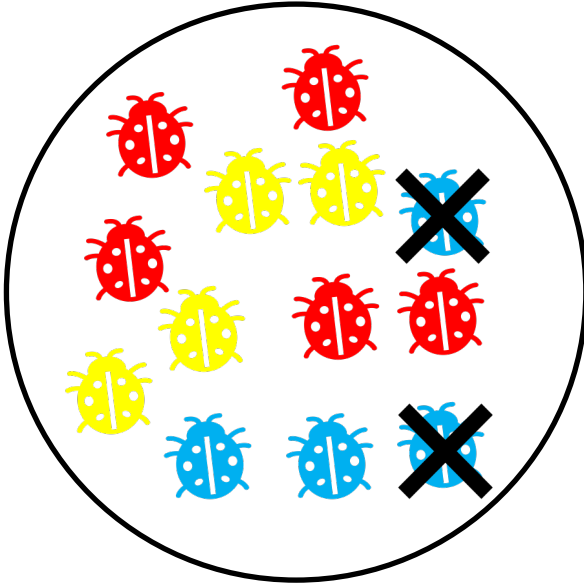


capable of interbreeding

How do populations change?

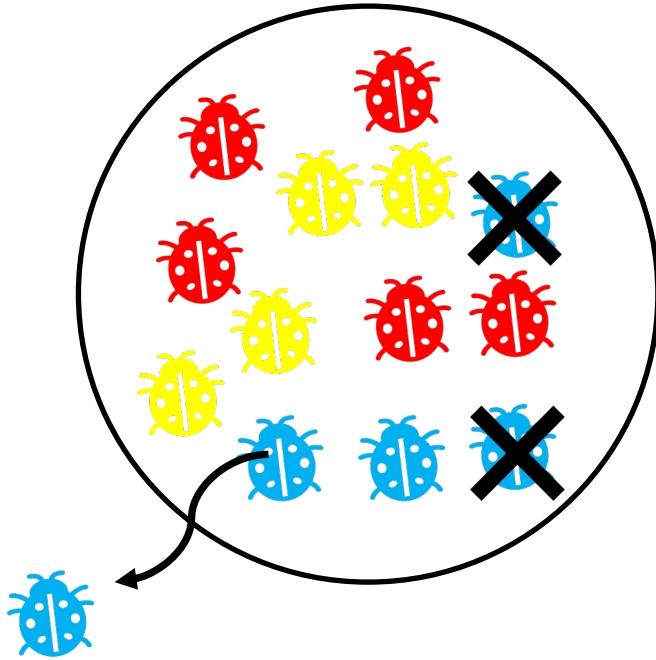


How do populations change?



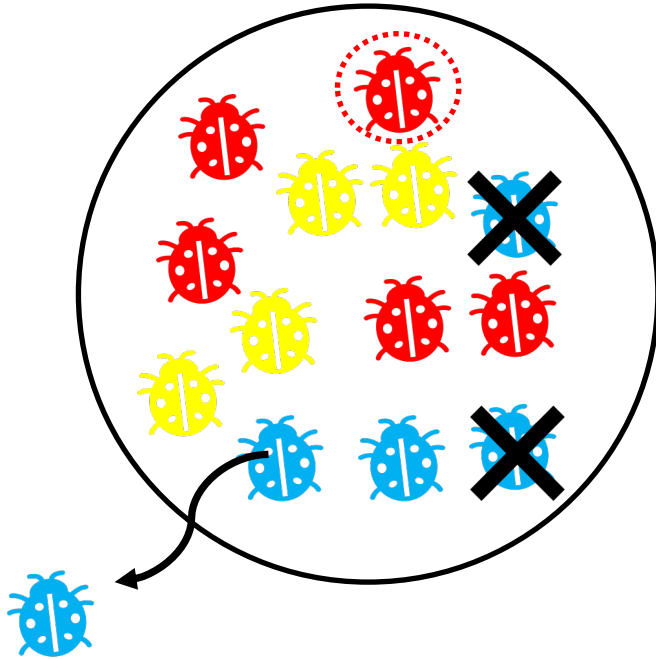
- Death before reproduction

How do populations change?



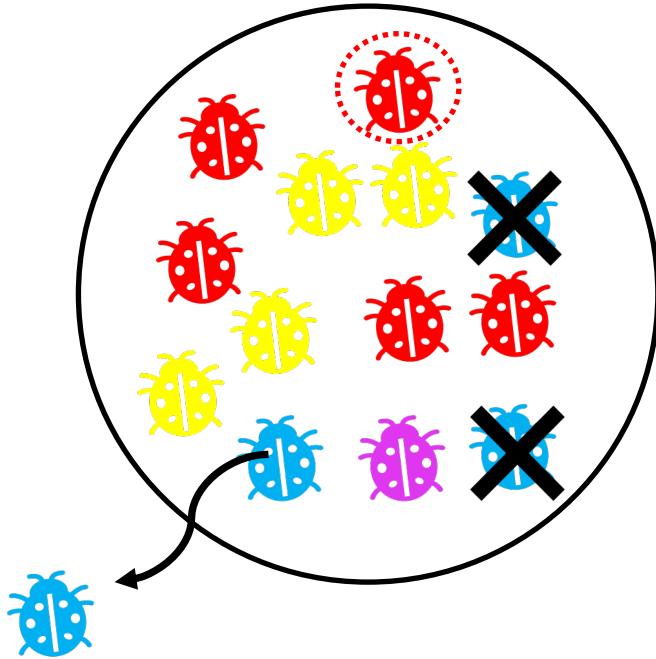
- Death before reproduction
- Migration

How do populations change?



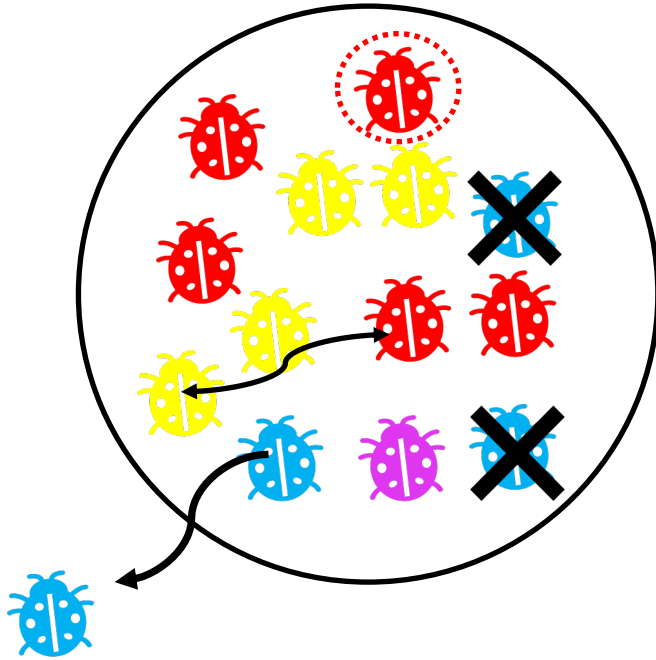
- Death before reproduction
- Migration
- Variation in the number of offspring

How do populations change?



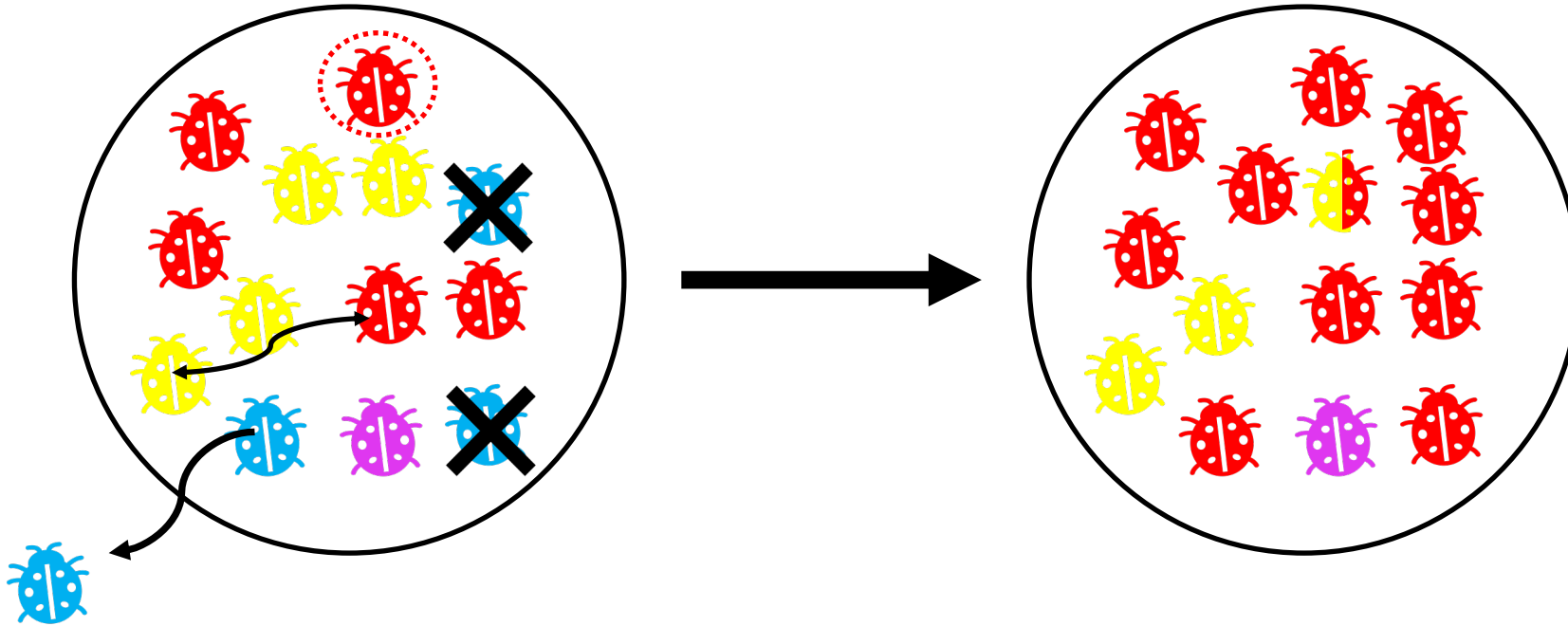
- Death before reproduction
- Migration
- Variation in the number of offspring
- Mutation

How do populations change?



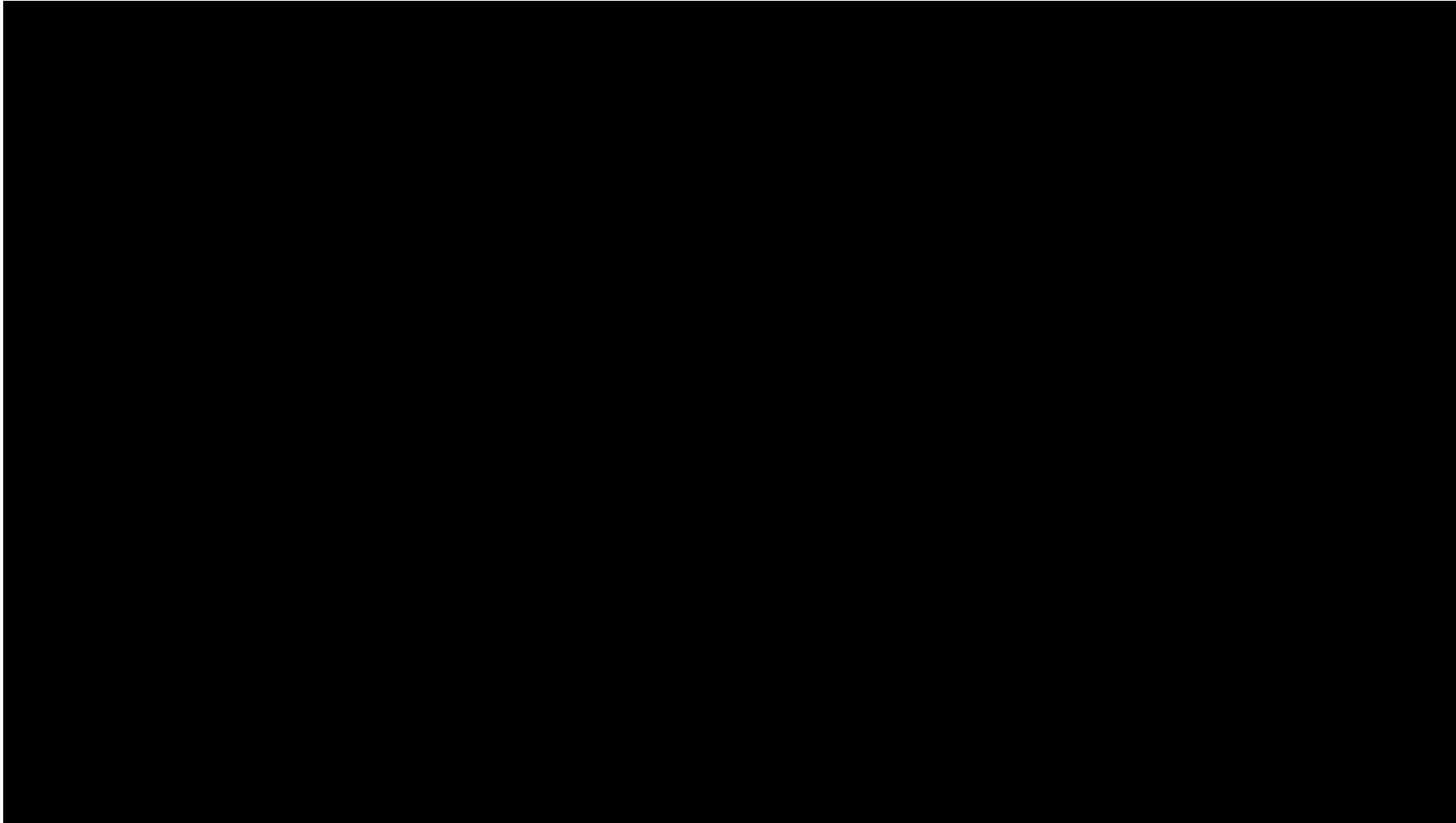
- Death before reproduction
- Migration
- Variation in the number of offspring
- Mutation
- Recombination

How do populations change?

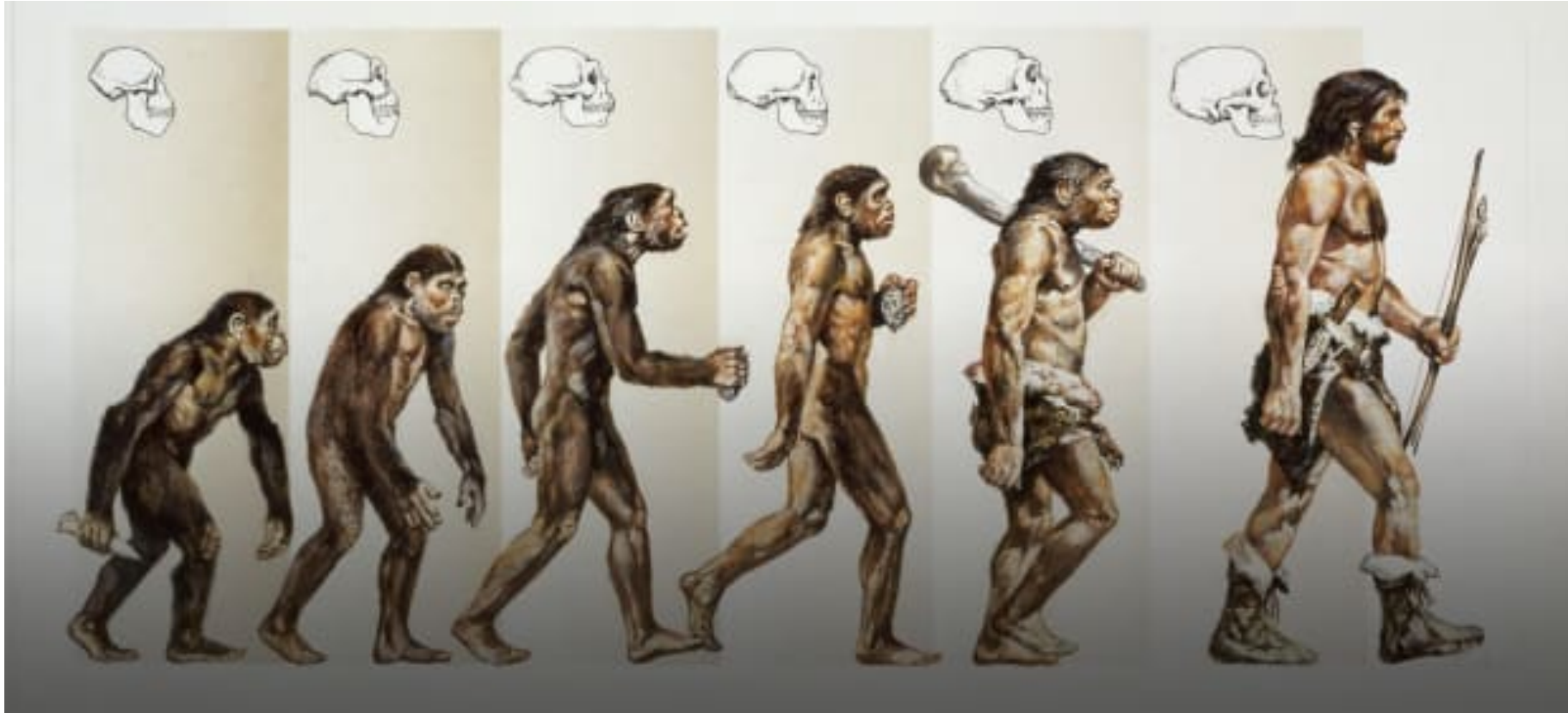


Gradual Change (Microevolution)

MegaPlate Bacteria Evolution



Change over deep time (Macroevolution)



DEA Picture Library/De Agostini/Getty Images

The product of all this change

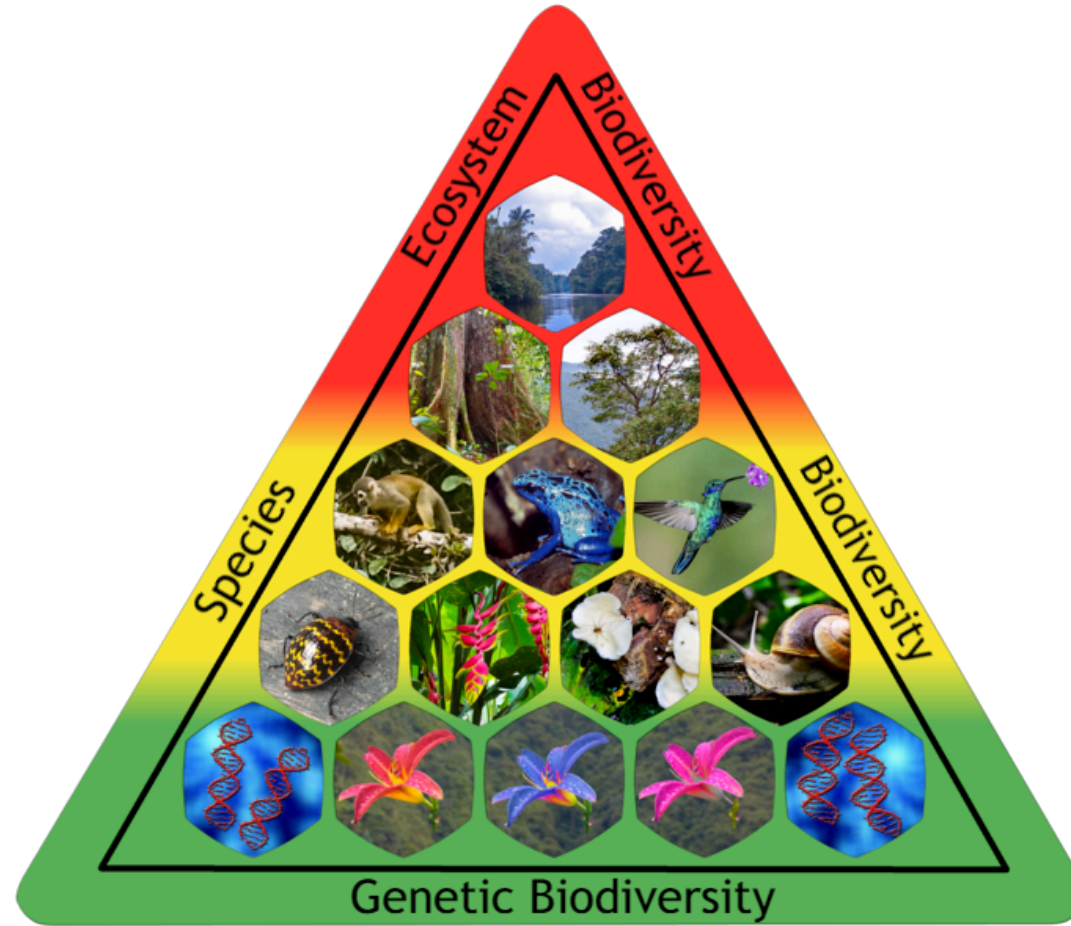
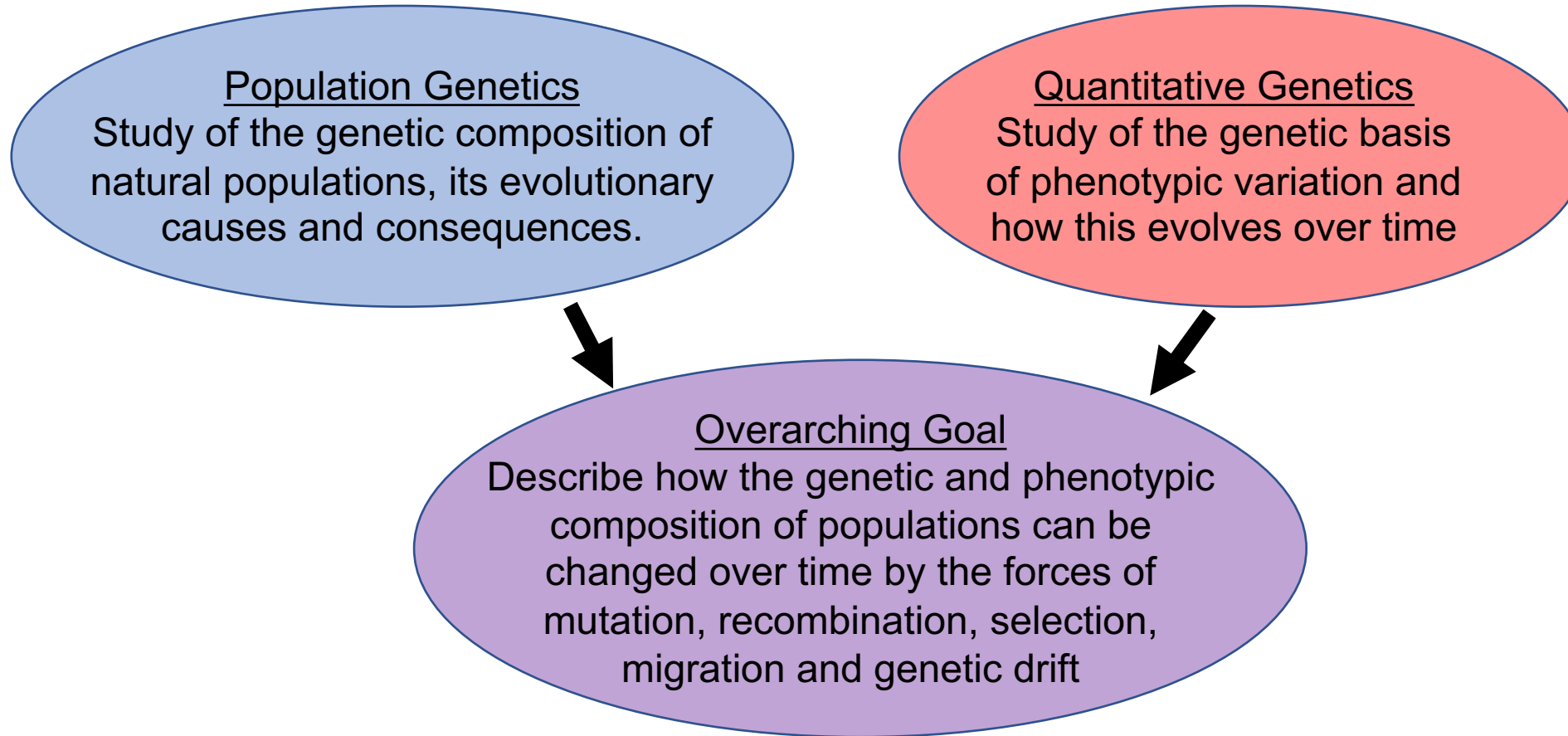


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Our focus within Evolution



The use of models

$$p^2 + 2pq + q^2 = 1$$

p^2 = dominant homozygous frequency (AA)

$2pq$ = heterozygous frequency (Aa)

q^2 = recessive homozygous frequency (aa)

Assumptions:

- Random Mating
- No inbreeding
- No assortative mating
- No population structure
- No sex differences in allele frequencies

- Pop/Quant Genetics use simple models with fairly unrealistic assumptions based on biology
- Often accurate, though, for understanding evolutionary patterns
- Applied in diverse fields from medicine to conservation biology

The Modern Synthesis

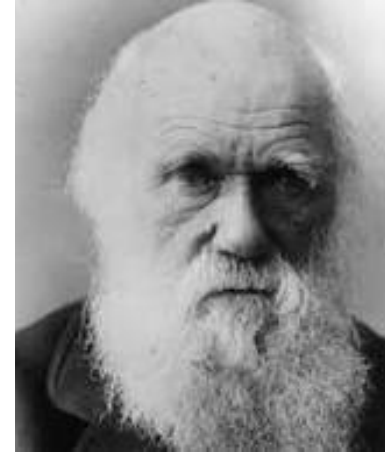


Mendel (1850's and 1860's):

- Heredity
- Particulate Inheritance (genes)
- Independent assortment
- Segregation

Darwin (1880's and 1890's):

- Evolution by natural selection
- The origin of species



The Modern Synthesis (early 20th Century):

- Reconciling the work of Mendel and Darwin
- Principles and mathematical models underlying evolution of populations
- Evolution of biodiversity can be explained by gradual accumulation of changes within and among populations

Speciation



Biodiversity



Paleontology



Genomics



Phylogenetics



Ecology



Developmental Biology



Our study of population and quantitative genetics over the course of this semester will help you develop a foundation for understanding the processes of evolutionary change. However, there are many other areas that contribute to a full understanding of Evolution...this is just part of the story!