

## **2 components of diversification:**

- 1.) change within a lineage**
- 2.) splitting of lineages (speciation)**

## **What mechanisms keep separate populations from diverging?**

- 1.) migration**
- 2.) similar selective pressures**

## **What mechanisms cause populations to diverge?**

- 1.) genetic drift**
- 2.) different selective pressures**

## **Important definitions:**

- **Species: a group of natural populations that is evolutionarily independent from other such groups.**
  
- **Speciation: splitting of a single ancestor lineage into two (or more) evolutionarily independent descendent lineages.**

**•Question 1: some southern populations of *Ensatina eschscholtzii* are reproductively isolated. Why are these populations still considered part of the same species?**

**•Question 2: What can *Ensatina eschscholtzii* tell us about the process of speciation? What would have to happen in order for reproductively isolated populations of this species to be considered different species?**

**•Question 3: What evolutionary processes are likely responsible for reproductive isolation between populations of *Ensatina eschscholtzii*?**

## Reproductive isolation between skink species

- ***Plestiodon skiltonianus* (small body size) and *P. gilberti* (large body size) show prezygotic isolation. Small skinks and large skinks cannot reproduce because they cannot properly align their cloacae.**
- **This is an example of Mechanical Sexual Isolation. It appears that Natural Selection selected for large body size in *P. gilberti* for the benefit of water retention. This species lives in an arid environment.**

# Reproductive isolation between skink species

**definition:**

**Parallel speciation- same isolating barrier evolves multiple times.**

**Large body size evolved three separate times. So, some *P. gilberti* individuals are more closely related to *P. skiltonianus* than they are to some other members of their own species!**

**Prezygotic isolation: isolating factor that occurs before fertilization.**

**Processes responsible: sexual selection, natural selection.**

**Postzygotic isolation: isolating factor occurs after fertilization.**

**Processes responsible: genetic drift or byproduct of natural selection (never the target of selection).**

**Allopatric speciation: occurs when reproductive barriers evolve while populations are separated by geographical barriers.**

### **Dobzhansky-Muller Model**

**Original genotype:  $A_1 A_1 B_1 B_1$**

**Populations become geographically separated and new alleles evolve: population 1:  $A_1 A_2 B_1 B_1$ ; population 2:  $A_1 A_1 B_1 B_2$**

**New alleles become fixed in populations:**

**population 1:  $A_2 A_2 B_1 B_1$ ; population 2:  $A_1 A_1 B_2 B_2$**

**Populations come back in contact:**

**$A_2 A_2 B_1 B_1 \times A_1 A_1 B_2 B_2 = A_1 A_2 B_1 B_2$  (hybrid)**

**If  $A_2$  and  $B_2$  have negative interactions causing hybrid death or sterility, then the two separate populations are independently evolving lineages and can be considered different species.**