

horse



donkey



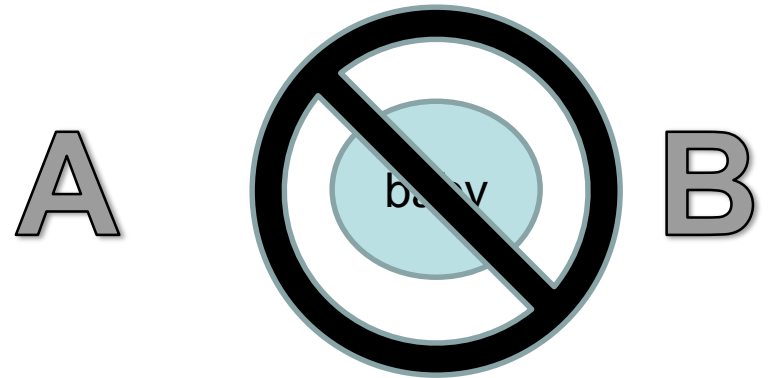
Speciation



mule

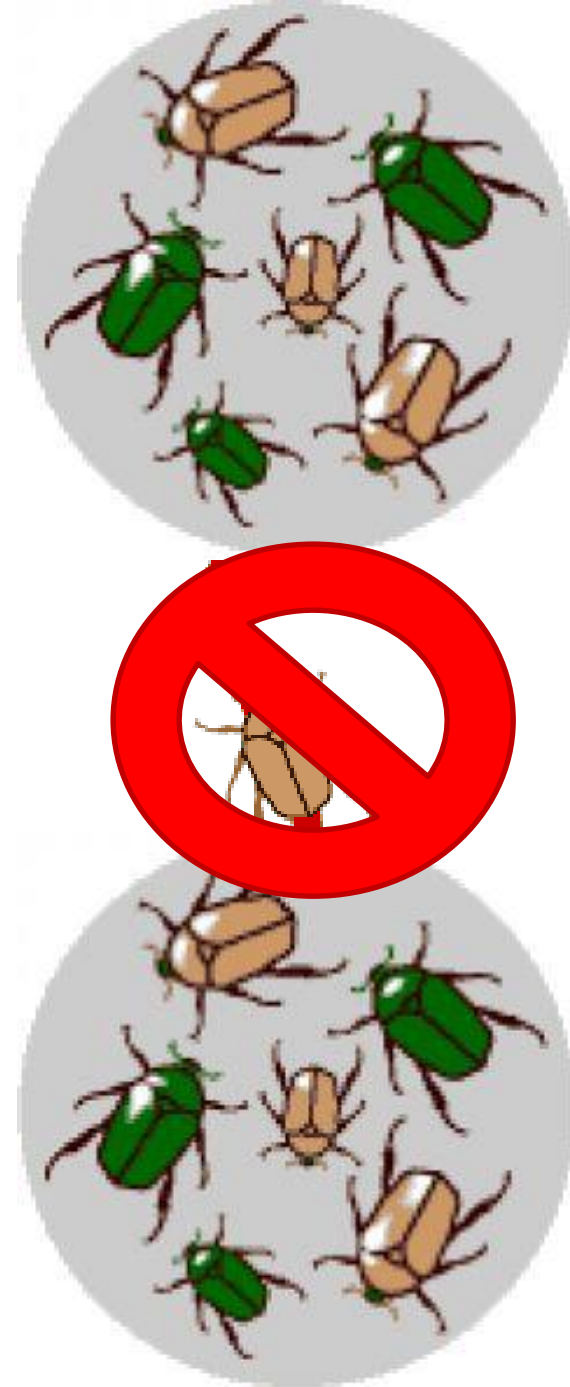
Speciation

- **Defined:** **evolution** of **new** species **from** an **existing** species
- **Species:** **group** of **organisms** that can **interbreed** and produce **fertile** offspring
- 5 factors that lead to **evolution**
 - Natural Selection
 - **Gene** flow
 - **Mutations**
 - **Sexual** selection
 - Genetic **drift**



Gene Flow (Migration)

- Defined: Movement of **alleles** from 1 **population** to **another**
 - **Increases** variations in a population
 - Keeps **differing** populations **similar**
- If gene **flow** is **prevented**
 - No **variations** (alleles) **exchanged**
 - Populations are **isolated**
 - Organisms **adapt** to their **own** environment
 - Can **lead** to **speciation**

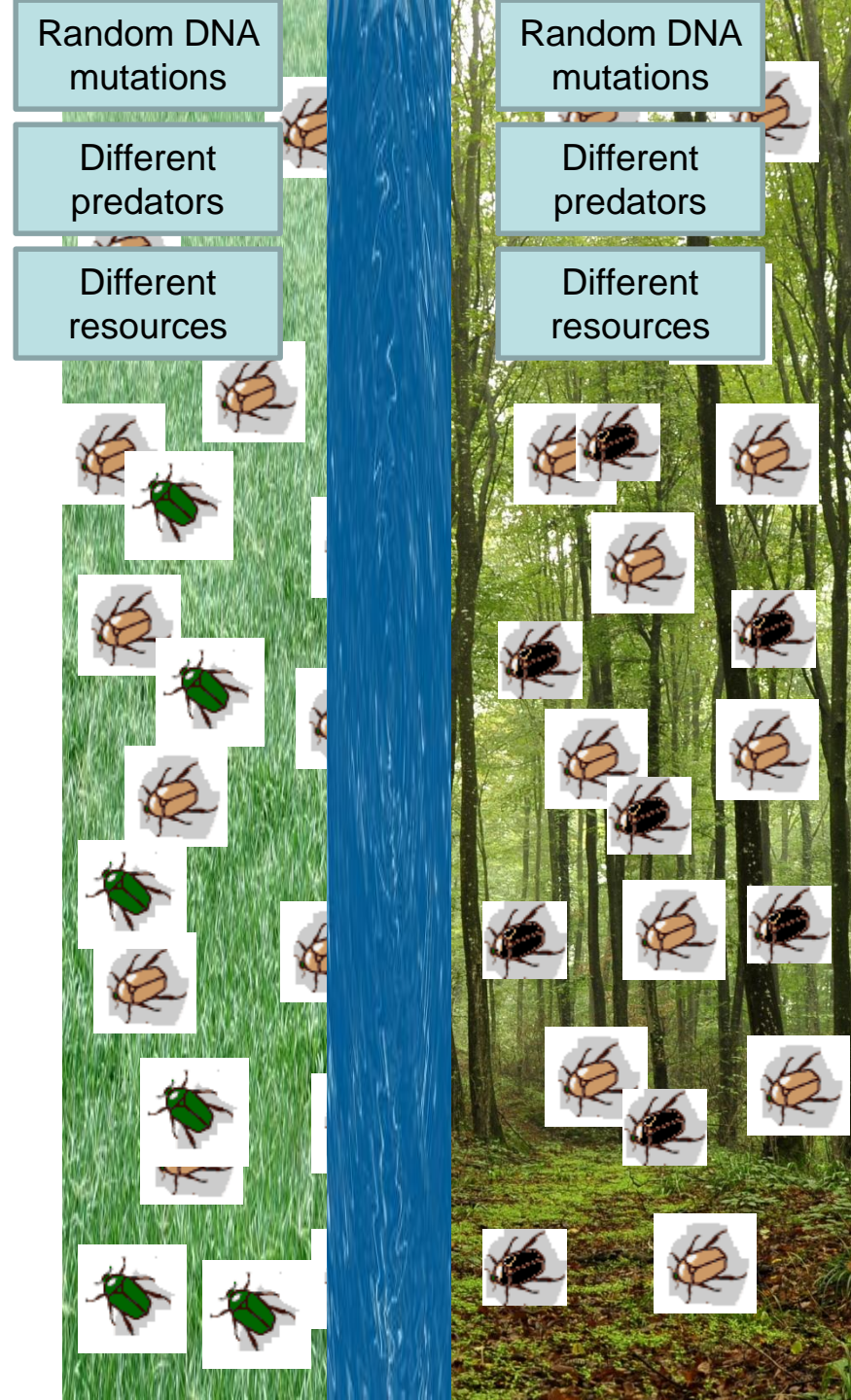


Reproductive Isolation

- When populations are **isolated** for a **long** time...gene flow **stops**
- When populations can **no** longer **mate** or **no** longer reproduce **fertile** offspring
- **Final** step in the **development** of a **new** species

1) Geographic Isolation:

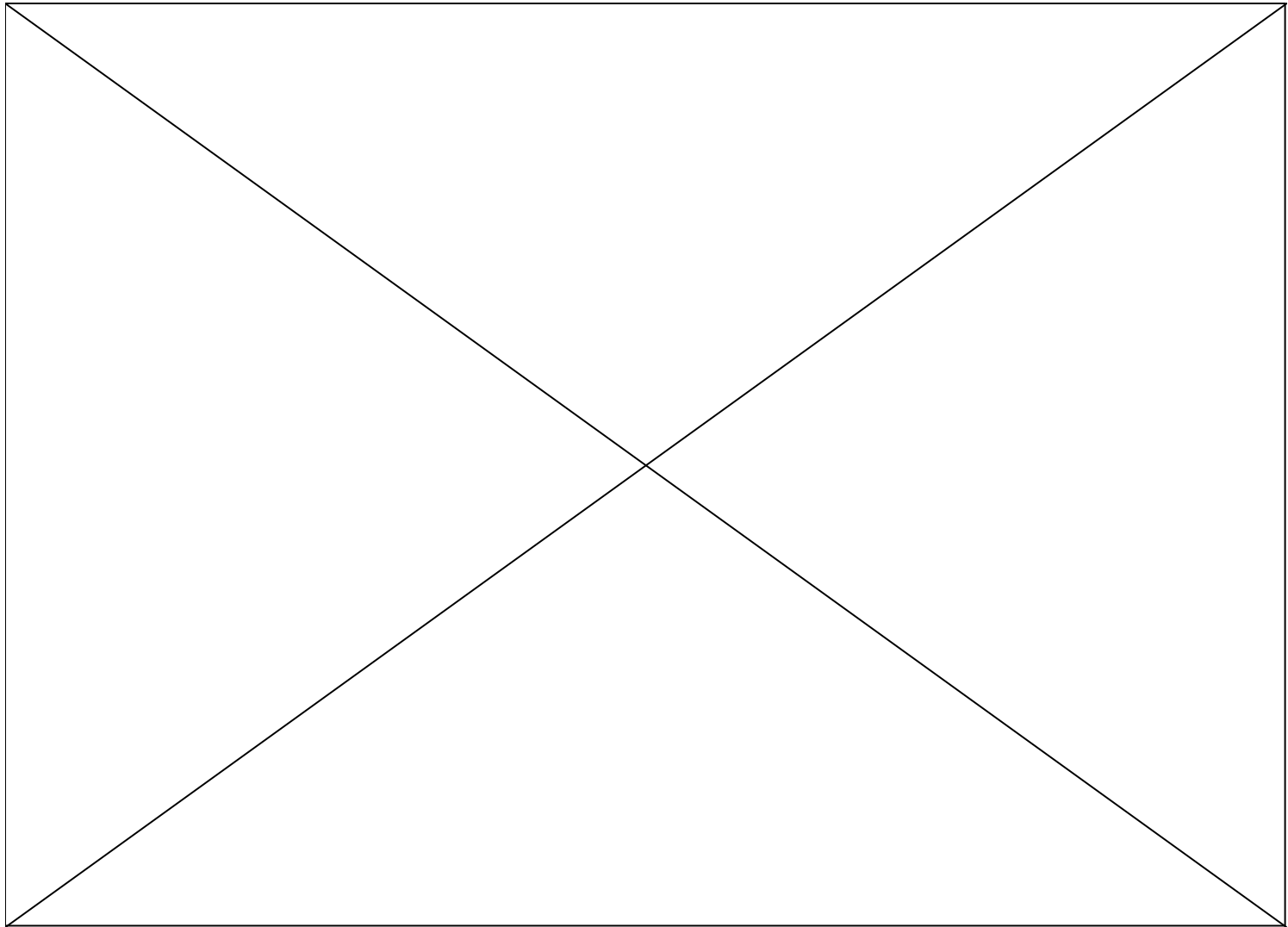
- Organisms **isolated** by geographic **barrier**



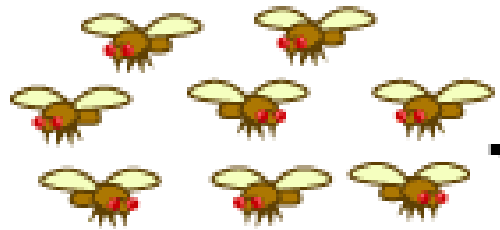
Kaibab Squirrel (Grand Canyon)



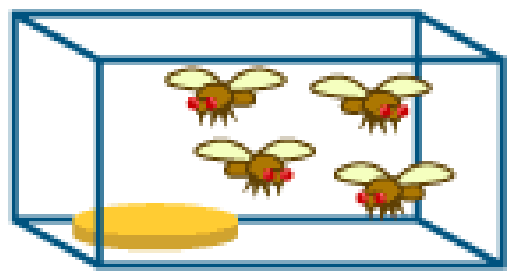
California Salamanders: Evolution in Action



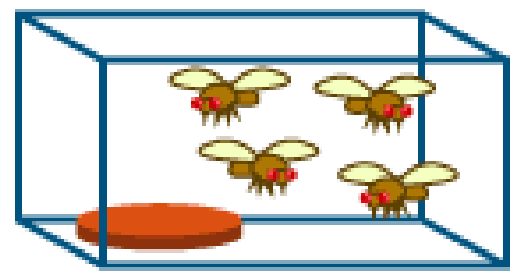
Famous fruit fly experiment



Fruit flies of the same species were placed into two separate cages



maltose food



starch food

Once isolated, the 2 groups were fed different types of food

Although isolated, the flies continued to live and reproduce for many generations

When brought back together most separated during reproduction.

Reproductive Isolation

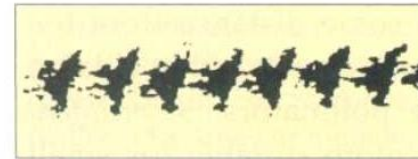
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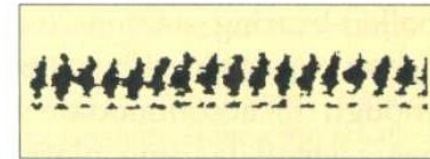
If the mating calls do not attract each other, will they reproduce?

1) Geographic Isolation:

- Organisms isolated by geographic barrier



a *Hyla versicolor*



b *H. chrysoscelis*

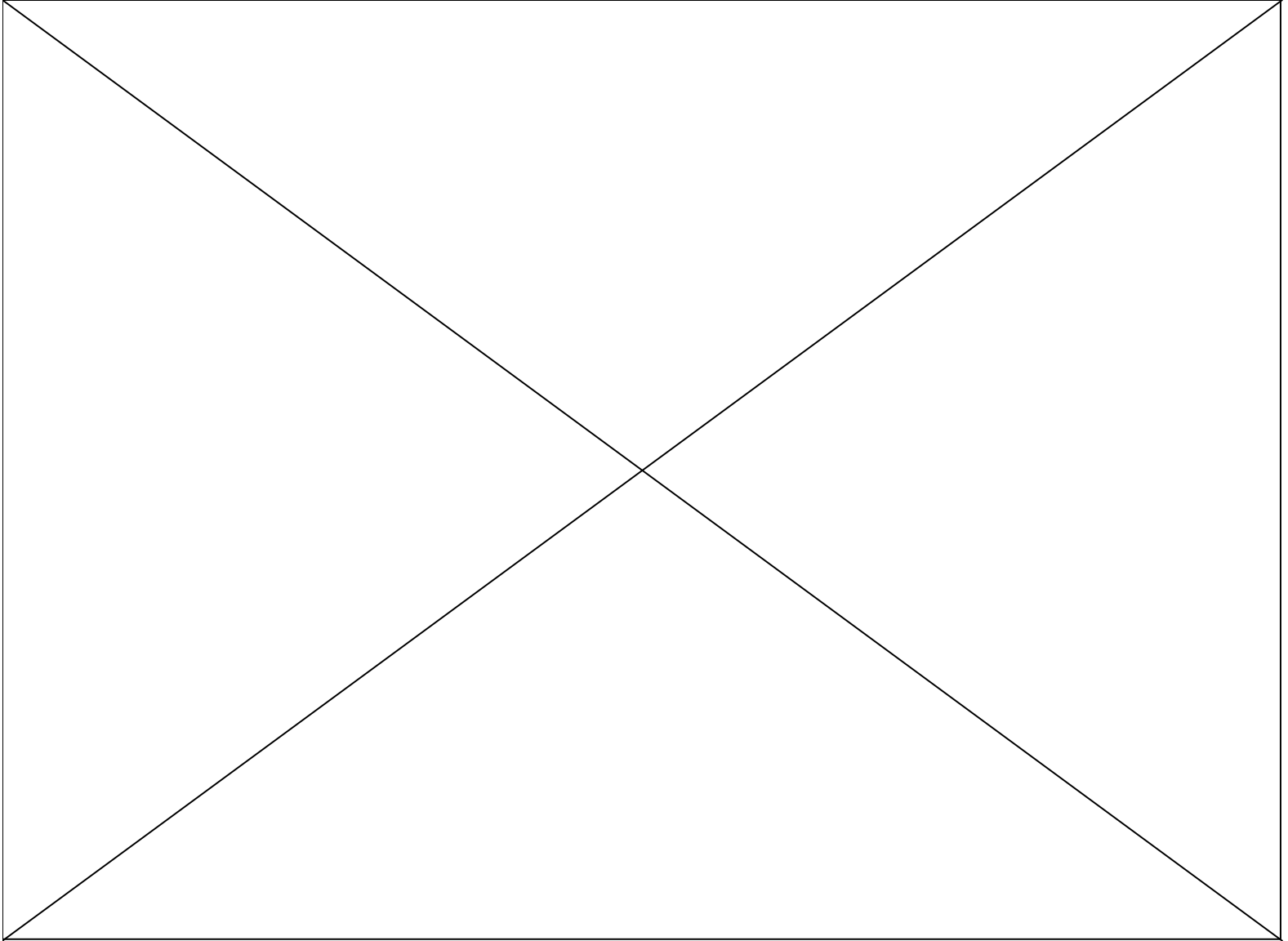
Is gene flow stopped?

2) Behavioral Isolation

- Organisms **isolated** by **differing** mating **rituals**



Birds of Paradise



Reproductive Isolation

- When populations are isolated for a long time...gene flow stops
- When populations can no longer mate or no longer reproduce fertile offspring
- Final step in the development of a new species

1) Geographic Isolation:

- Organisms isolated by geographic barrier

2) Behavioral Isolation

- Organisms isolated by differing mating rituals

3) Temporal Isolation

- Organisms **isolated** by differing **times** of **reproduction**



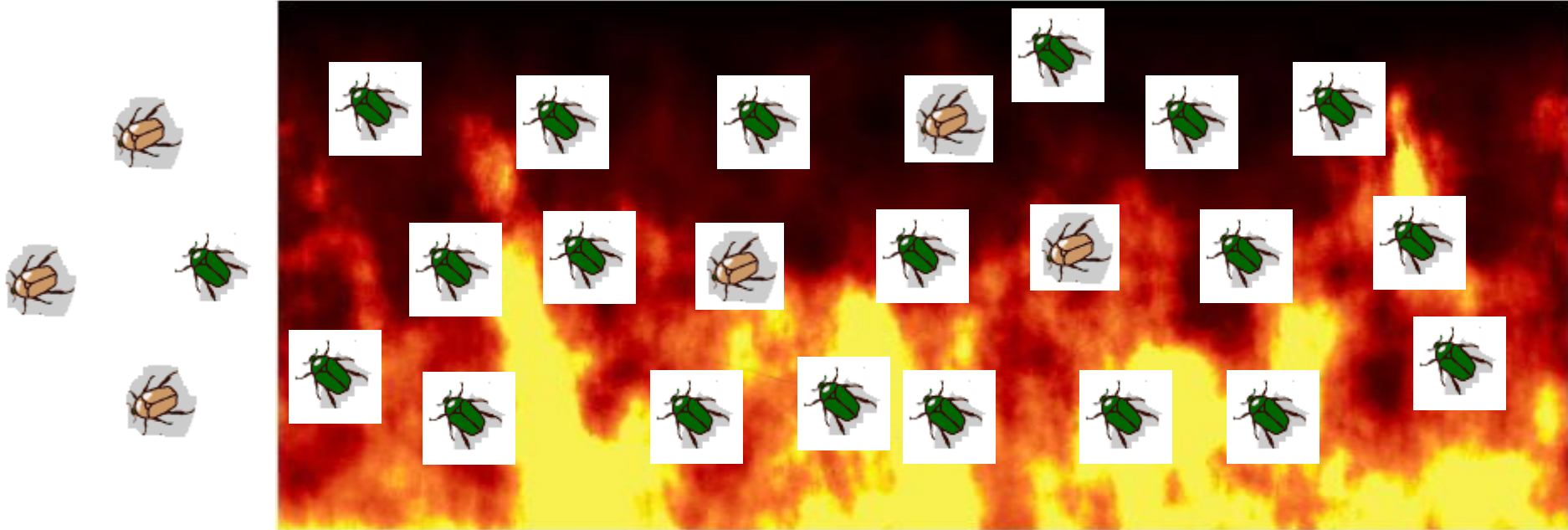
If one group mates during the spring...

Is gene flow stopped?

And the other mates during the fall...



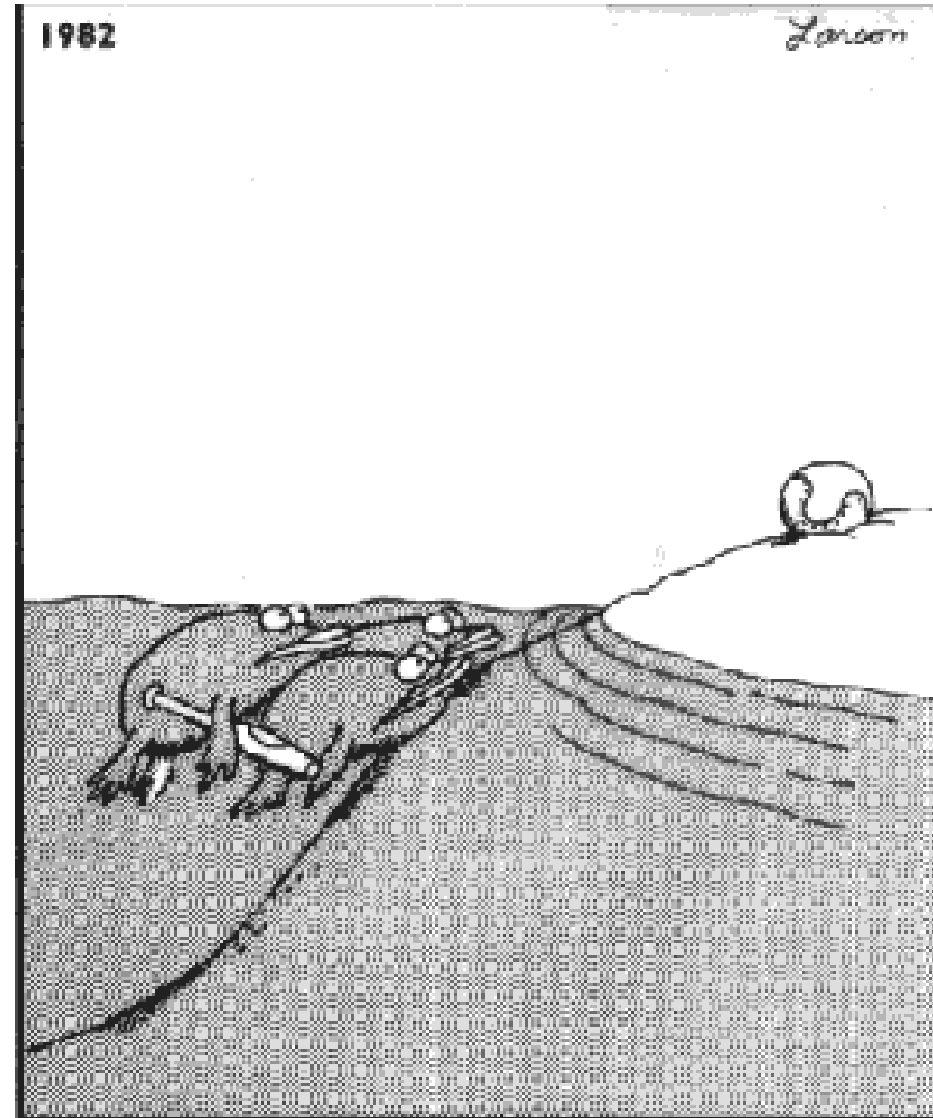
Genetic Drift



- **Defined:** Changes in allele frequencies **due to chance**
 - NOT natural selection
- Bottleneck effect
 - More likely in smaller populations
 - Results in a loss of genetic variation (alleles)
 - Example: Natural disaster
 - Pre-forest fire: Green is best adapted (blend better)
 - Post-forest fire: Brown more likely to reproduce
 - Survival UNRELATED to adaptations

Review

- What is speciation?
- What leads to speciation?
- What is gene flow?
- What happens if gene flow is prevented?
- How are temporal, behavioral, and geographic isolation different?
- How are temporal, behavioral, and geographic isolation similar?
- What are the 5 factors that lead to evolution?



Great moments in evolution