8.4 to 8.9 Evolution and Human Impacts

Natural Selection

It Still Works

Linear Evolution – a common misconception

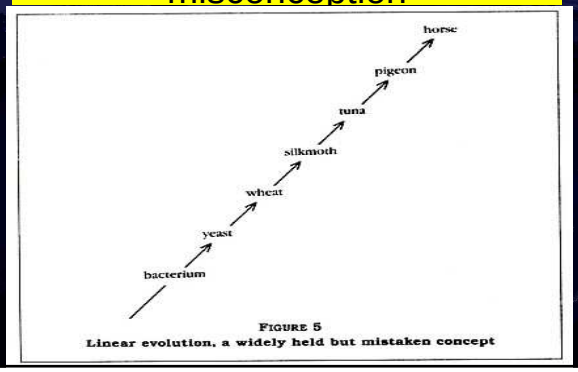
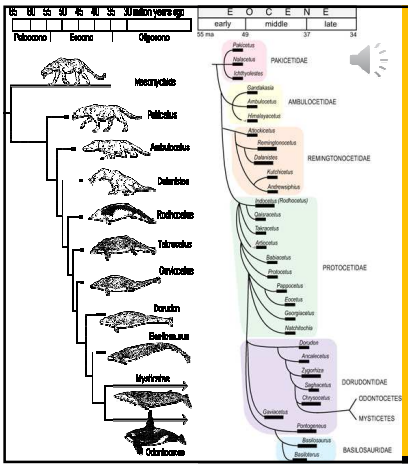


FIGURE 5
Linear evolution, a widely held but mistaken concept

Figure 8-11



Evolution:
genetic differences of successive populations – change over time

2.Macroevolution – long term, large-scale changes.
Ex: land mammals to whales.

Macroevolution

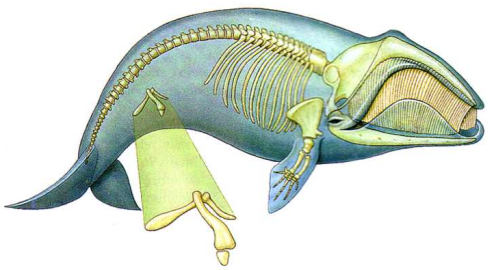
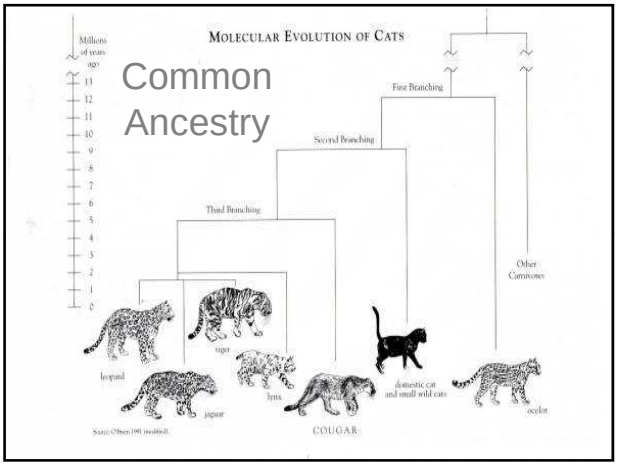
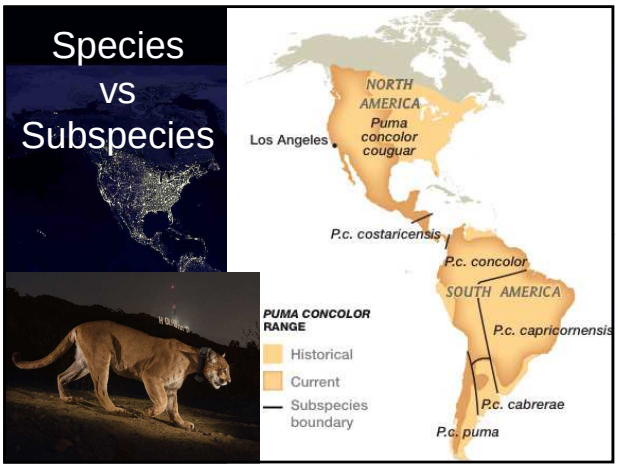


FIGURE 22.19
Vestigial structures. The skeleton of a whale reveals the presence of pelvic bones. These bones resemble those of other mammals, but are only weakly developed in the whale and have no apparent function.

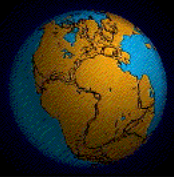


Species vs Subspecies



Major Sources of Change

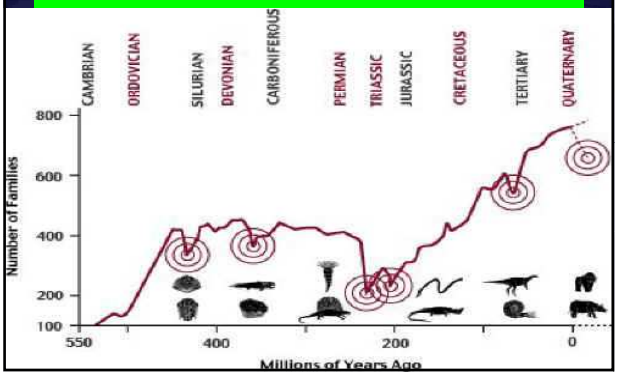
- Continental Drift
- Rapid/Gradual Climate Change
- Human influenced changes – ex. Loss of biodiversity from deforestation.



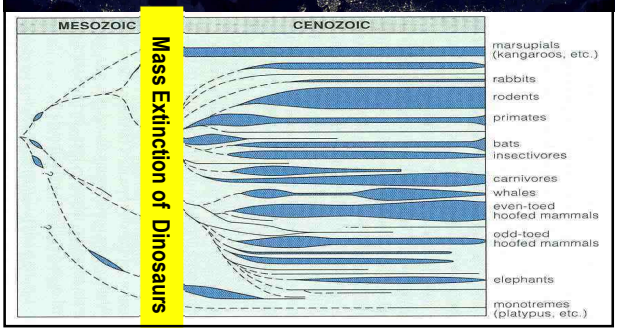
Extinction – the loss of a species

- Background extinction rate – the rate at which species go extinct under "typical" slowly changing local conditions.
- Mass Extinction - Due to a major event large numbers of species die out quickly.
  - 5 mass extinctions in Earth's history
  - We are the cause of the 6th

Mass Extinctions – 6



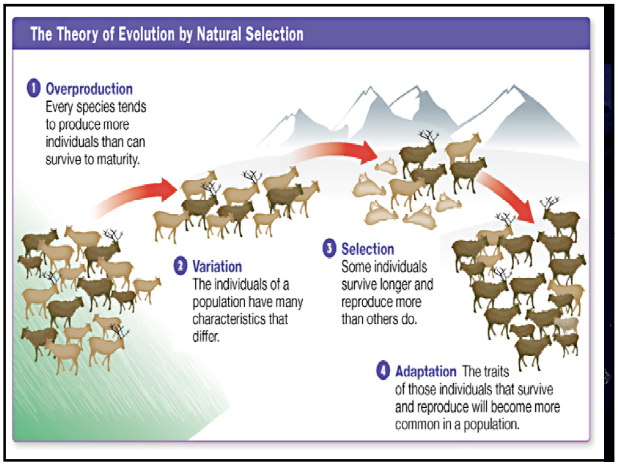
Adaptive Radiation – When dinosaurs went extinct they left a lot of empty niches. Mammals **adapted** to fill those niches.



Microevolution - small genetic changes in population that happen over a short time frame

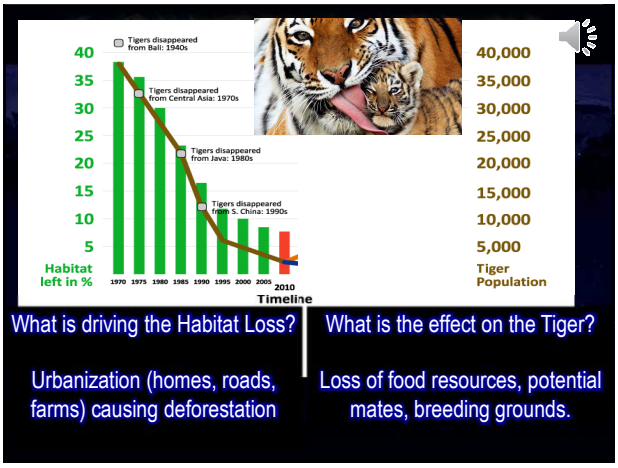
- Mutations can create genetic diversity. Can be harmless, lethal, beneficial, random / unpredictable and a rare source of new traits

How does this happen?



So. What does Survival of the Fittest Mean?

- The ability to SURVIVE AND REPRODUCE is the most fit.
- NOT (always)THE STRONGEST – could be smallest, largest, fastest, slowest, etc.



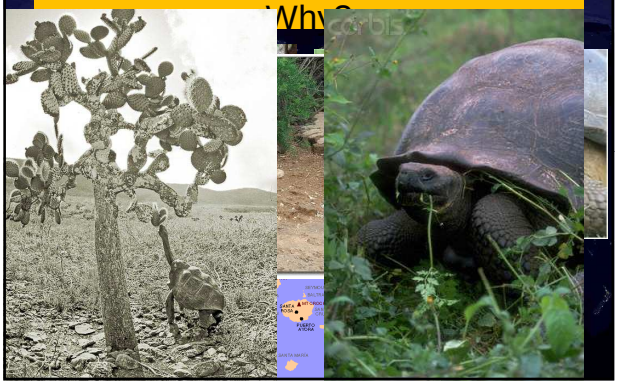
What is driving the Habitat Loss?

Urbanization (homes, roads, farms) causing deforestation

What is the effect on the Tiger?

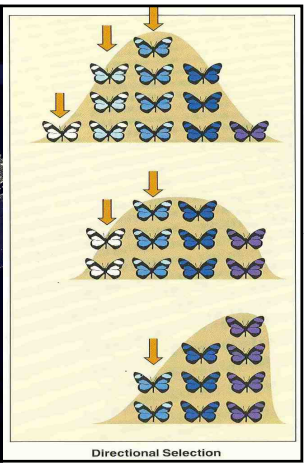
Loss of food resources, potential mates, breeding grounds.

Galapagos Tortoise – Different Islands different shell shapes?



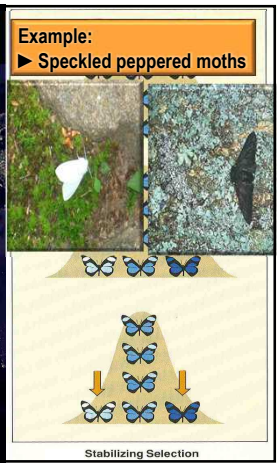
Types of Natural Selection

1. Directional Selection – a variation is beneficial and the gene pool shifts towards one extreme.

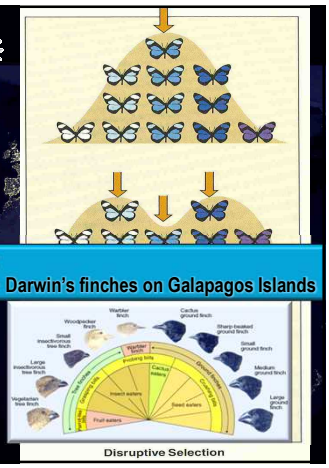


Stabilizing Selection

-the extremes are not well adapted and the average variations are favored.



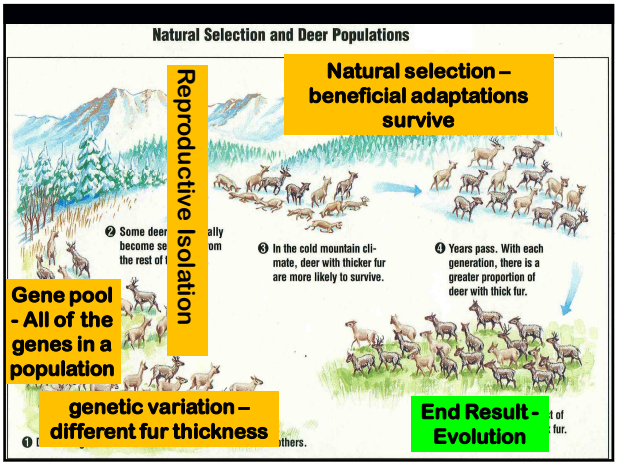
Disruptive Selection – both extremes are advantage and being average is not.

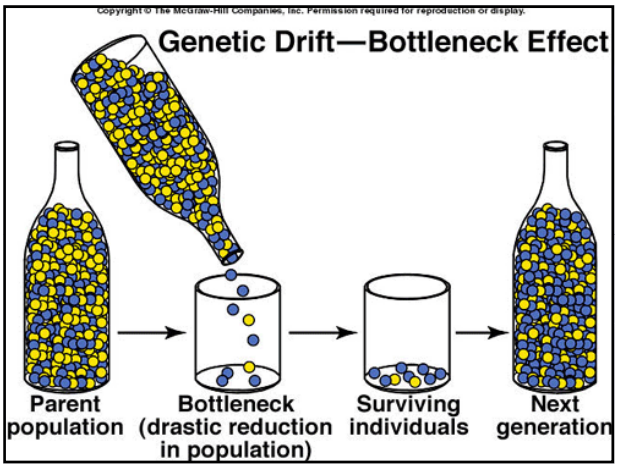


Example:
- Darwin's finches on Galapagos Islands

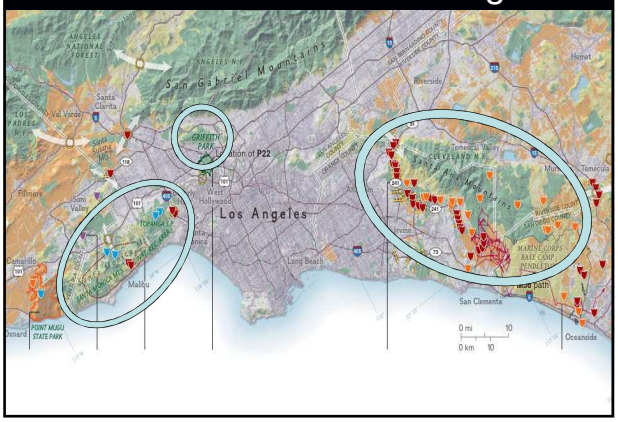
Coevolution

Mutualism

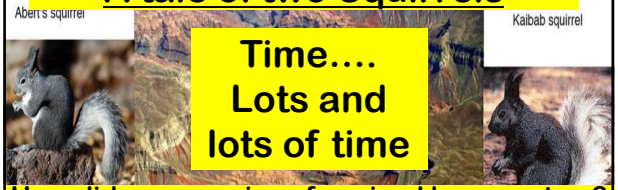




Genetic Bottleneck - Cougar



SPECIATION– one species becomes two
A tale of two Squirrels

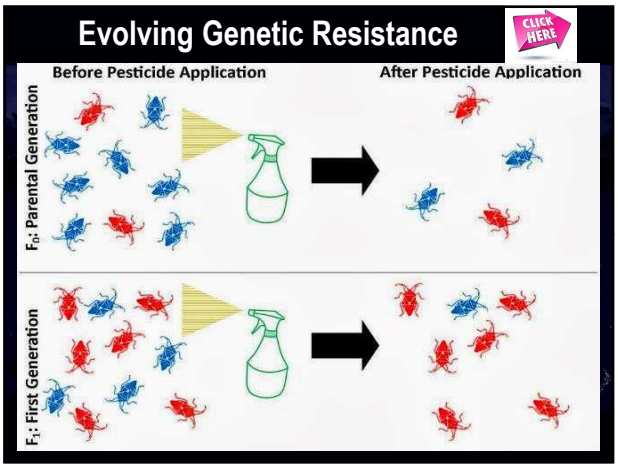


Time….
Lots and lots of time

How did one species of squirrel become two?

- **Geographic Isolation – Physical Separation by the Colorado River.**
- **Reproductive Isolation – one population can't breed with the other**

Evolving Genetic Resistance



A question about a pet tarantula.

- I got him about 5 months ago in June. He's most definitely a land tarantula and ever since I got him a home to live in (a terrarium with smooth sides) he has always been trying to climb on the walls but his feet just slip off the walls. On Tuesday I came home and all of his legs were on the wall but one was still holding him up from the ground. Today, Thursday, I got home from school and he was crawling on the top of the wall/ceiling and it seems as if his feet now have suction cup or sticky bottoms that allow him to crawl on the walls. Do you think it's possible that my tarantula could have adapted this much in less than 5 months? I was really curious and it couldn't wait until Monday.