    a. Similar environmental pressures should cause similar adaptations (convergence)
3. In times of rapid environmental change, evolutionary change will occur rapidly
    a. If change is too rapid, species will go extinct

What Evolves?

Individuals cannot evolve

An individual is born and later dies

No evolutionary change occurs within lifetime

(only mutations in sperm and eggs can be inherited by offspring)

Only *populations of individuals* can evolve!

Individuals are replaced

Evolution occurs in populations (lineages) of individuals

Artificial - Human Selection

Selective Advantage measured by number of dark mice that survive for every 100 light mice that survive

Only 1% selective advantage = 101 dark for 100 light

How fast can natural selection occur?

Depends on:

Availability of beneficial variants

Depends on rates of population

Reproduction rates of population

Size of population

Selective advantage of particular variants

Determined by environment!

Sexual Selection

Darwin originated idea

*"The advantage which certain individuals have over other individuals of the same sex and species, in exclusive relation to reproduction."*

Sexual Selection

There is heritable variation among individuals of *same sex* of species

Some variants of males or females are more likely to *reproduce*

Males and females can evolve differently when each sex has different selection pressures

Fitness: Reproduction (after surviving long enough) is key

Features of sexual selection

Sexes look different

Sexual dimorphism (greek: two forms)

Unequal mating success

Typically, males are showier or larger

Mate choice occurs

Typically, females are choosy

Is a coin flip random?

Random means:

<u>Unpredictable</u>

Random is not:

Without cause, without purpose, without meaning

Random processes are still <u>caused</u>

They can be <u>explained in hindsight!</u>

Other Mechanisms of Evolutionary Change