same soils and environments but different plants and animals
Andes east and west slopes

similar climate but different organisms in Australia comparing with S. America and Africa

But, there are other cases where similar looking but genetically different plants in the same region.

eg:
succulents in Asia and Africa
cacti from North and South America

Why?

Transplantation seems to work
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animals with pouch

marsupials (Australia)
placental mammals (rest of the world)

Why different types of animals (placental mammals / marsupials) act so like?
(s/c plants)

how did marsupials and placental mammals end up in different places?

continents shifting (earliest marsupial fossils found in N. America not Australia)

CONVERGENT EVOLUTION: species that live in similar environments will experience similar selection pressures, so they may evolve similar adaptations.

other patterns need explaining

Glossopteris (a plant)
Why are some plant fossils found on all continents, how did they get?
some Darwin's ideas:
-transport by bird
-floating seeds

-land bridges (untrue)

evidence from islands

islands missing some species, but the ones they have tend to be comprised of many species, and these species seem to fulfill very diverse ecologically riches.

many oceanic islands are missing freshwater fish.....
but continents and their islands are not...

oceanic and continent islands : know the difference

The same is true of Hawaiian Island:
oceanic islands creatures have common features
and are close to the ones on their nearest continents

Why are some animals missing off islands?
why do islands have lots of ecologically diverse forms of animals?
why do island animals and plants resemble those of close mainland?

it is elementary...
the inhabitants of oceanic islands descended from earlier species that colonised the islands, usually from nearby continents, in rare events of long-distance dispersal. open niches, and a lack of predators on islands lead to 'adaptive radiations', like we see in the finches.

adaptive radiations: begin with a single ancestor, splits into different morphological and physiological traits with which they can exploit a range of divergent environments.

these finches from one type of ancestor
isolation, chance, different climates, natural forces (food availability and type) ->different types of finches.

Robinson Crusoe Effect - time and chance determine what might get marooned.

[Evolution by Natural Selection from Common Ancestor + chance = speciation]

the cabbage family

artificial selection
Bristle number
Canis lupus familiaris

difference between artificial selection and natural selection

evidence: natural selection operates in nature?

Kaufman's (gruesome) Experiment:
-created large enclosures with light and dark soil
-into them he released light and dark mice
-...

how do we know that the predators were being selective based on coat colour?

what do we need for natural selection to act?
1.variation
2.heritability
3.selection must act to affect an individual's probability to leave offspring.

we know that the oldfield mice vary in coat color
where does this variation come from?
Mutations - accidental changes in the sequences of DNA

you see that coat color is heritable

evolution by selection is then a combination of randomness and lawfulness. the occurrence of mutations that generate an array of genetic variants, both good and bad; and then the lawful process of natural selection that orders this variation, keeping the good and winnowing the bad.

Richard Dawkins definition of natural selection is "the non-random survival of random variants"

Darwin: natural selection acted extremely slowly.

Wrong. even in our lifetime, even in some experiments.

Tales of evolution from the common gut bacteria (Richard Lenski, MSU)

-selection has made the bacteria better adapted to a feast-famine regime: the bacteria now grow 70% quicker than when he started his experiment.

(by Barry Hall, U of Rochester)

Bacteria with no gene to break-down lactose

initially the bacteria didn't grow but then it suddenly started to.

a mutation had occurred that allowed the bacteria to break it down (if only poorly)

3 things are required for NS to work (create an adaptation)!!!