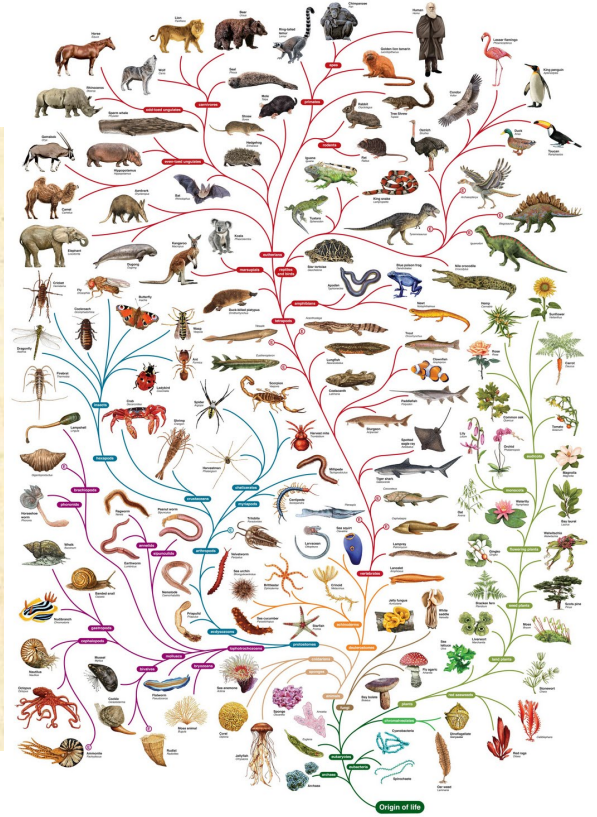
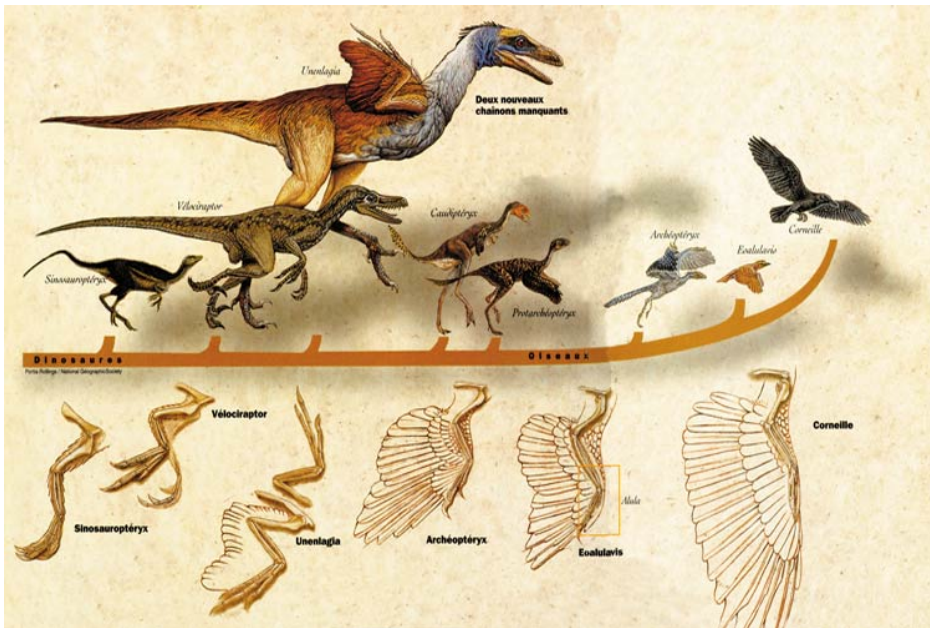


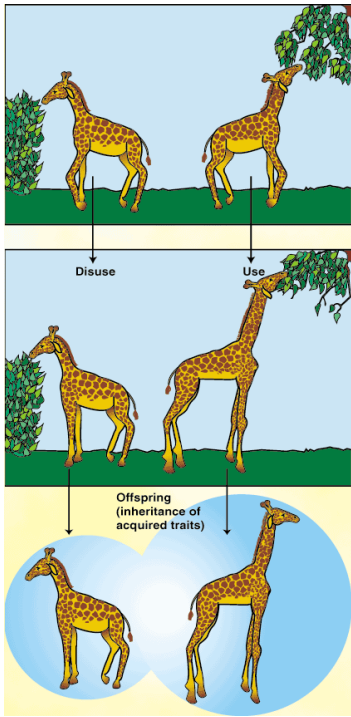
EVOLUTION AND NATURAL SELECTION



HISTORY

- Before evolution, the prevailing theory was **creationism**- the idea that all life was created by a deity (God) in a static (unchanging) form.
 - This idea was based on a 6000 year old earth. This was eventually shown to be way too young by geologists.
 - Scientists started thinking organisms changed over time.
 - Jean-Baptiste Lamarck- 1809, presented the idea that organisms change over time and can inherit changes.
-

LAMARCKIAN EVOLUTION



- People knew that children inherit their parents' traits...kids look like their parents.
- Lamarck said that Animals evolve due to adaptations being passed down from parents.
- Parents acquired adaptations by changing in their lifetime
- **GIRAFFE EXAMPLE:** stretches its neck to reach higher leaves. This extends vertebrae in neck, and the giraffe now has a longer neck.
- Passes this trait on to offspring

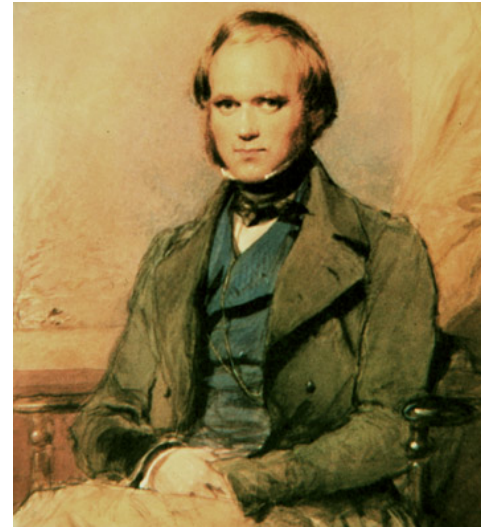
LAMARCKIAN EVOLUTION



- Lamarck was proven wrong easily.
- If your dad has a leg cut off, does that mean his kids will be born with 1 leg? If he's muscular, are you?
- He was right about one thing: organisms do change, **just not in one lifetime.**

CHARLES DARWIN

- ✿ Darwin sailed on the HMS Beagle for a 5-year round the world trip at the age of 22.
- ✿ Darwin was a **naturalist**-a person who studies the natural world.
- ✿ Initially questioned whether the natural world was perfect, as creationism said. He wondered, “Why is there so much waste in nature?”



Control yourselves, Lad

EVOLUTION- CHARLES DARWIN

✿ **Perceived waste-** thousands of pollen grains are made, but only a few end up making new flowers. Hundreds of eggs are laid by insects, but only a few survive to adulthood.



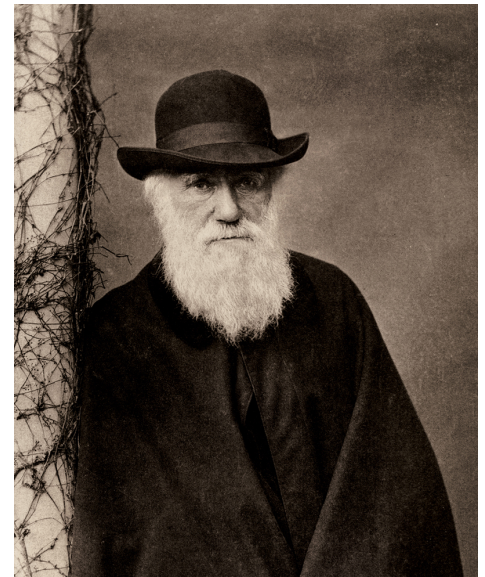
WHAT A LOOKER!

THE BEAGLE'S VOYAGE



EVOLUTION- CHARLES DARWIN

✿ In the Galapagos, Darwin observed many diverse organisms and fossils

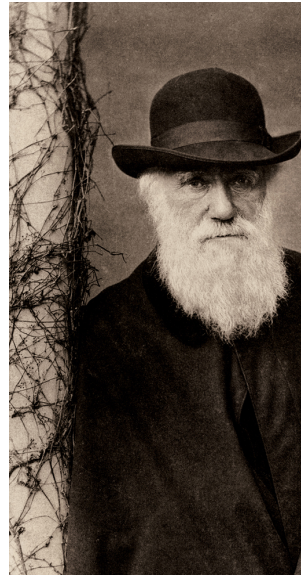


Look into his eyes...

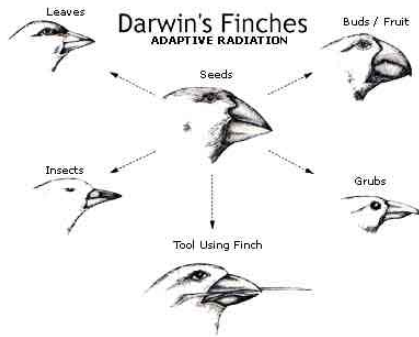


EVOLUTION- CHARLES DARWIN

- On each island were finches that were very similar, must be closely related.
- Each island had its own kind of finch.
- Each type of finch had distinct characteristics. Beaks were major difference

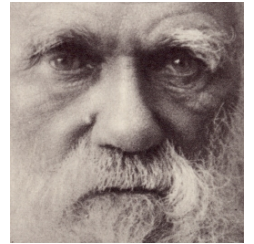


Epic Beard



EVOLUTION- CHARLES DARWIN

- ✿ Returned home, with lots of information.
- ✿ Why did the finches change their beaks from one island to the other?
- ✿ Different foods on different islands.
- ✿ Used writings by Malthus (an economist) which said that population growth is suppressed by limiting factors (not enough food, water, disease)



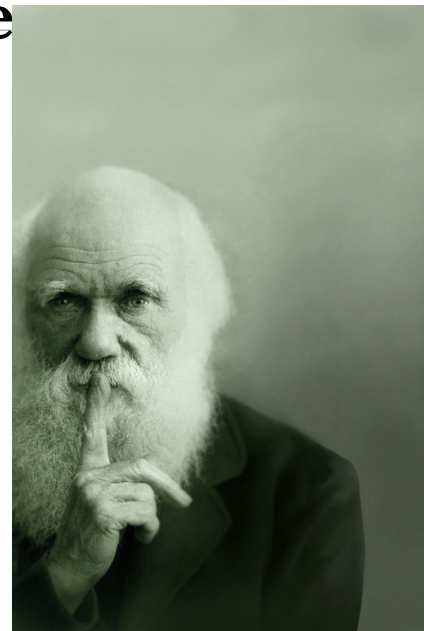
He has a sensitive side, too.

EVOLUTION

✿ Darwin developed his theory of **The origin of species by natural selection.**

✿ **Origin of species**-organisms are descended from a common ancestor.

✿ Darwin **never** used the term evolution. He said “descent with **modification**”. Why do we care about this terminology?



**“Shhhh.
Don’t speak.”**

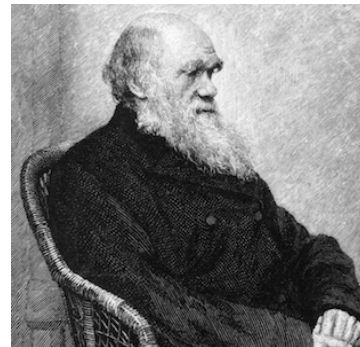
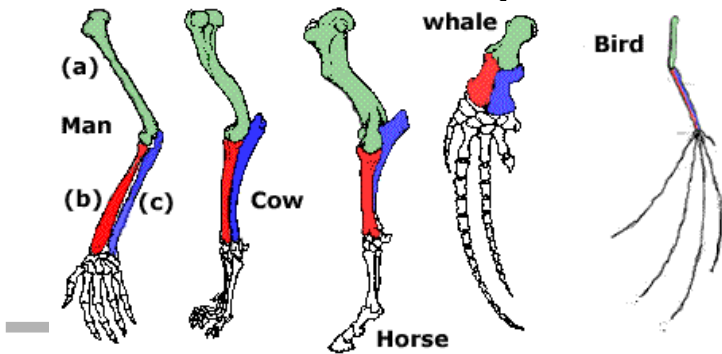
DARWIN'S TIMELINE

- Sailing on the HMS Beagle from 1831-1836
 - Developed the mechanism for evolution as Natural Selection by December 1838
 - Published Origin of the Species on November 24, 1859
 - February 19, 1872, Darwin releases the 6th edition of his work, including a section to address many “objections” made by other scientists about his theory.
-

EVOLUTION- EVIDENCE

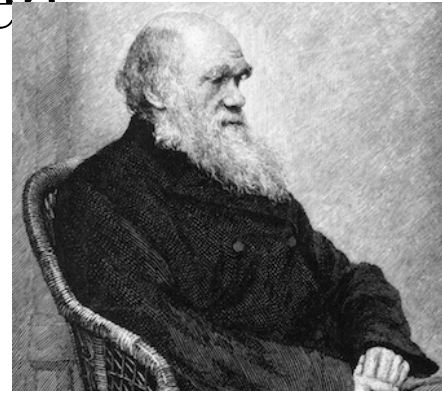
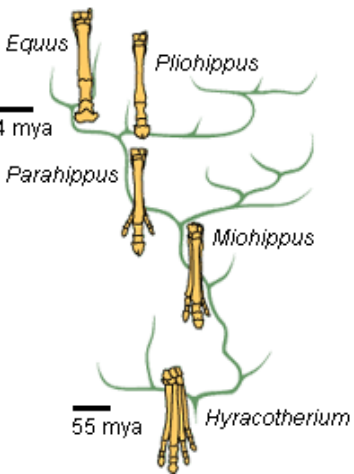
✿ Evidence for Descent with Modification:

✿ Homologous Structures: Structures that share a similar structure due to shared ancestry.

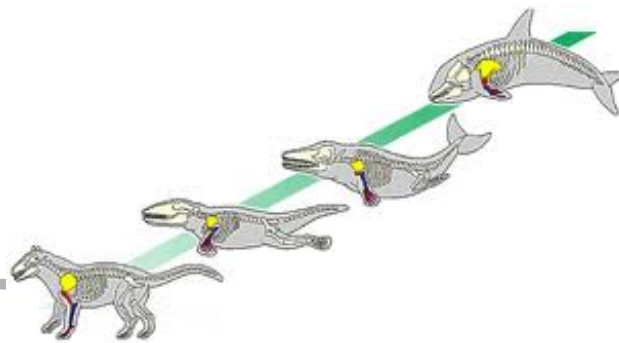


Guess I'll just sit here and look pre

✿ Transitional Forms- fossils that show intermediate stages between ancestral forms and later descendants



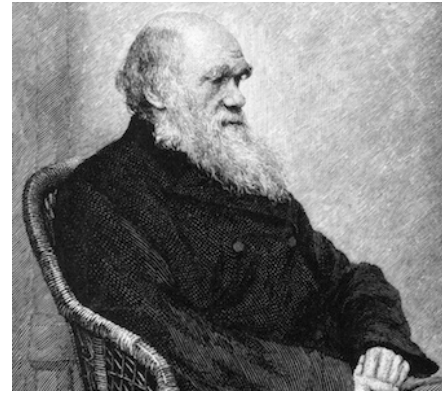
Guess I'll just sit here and look pret



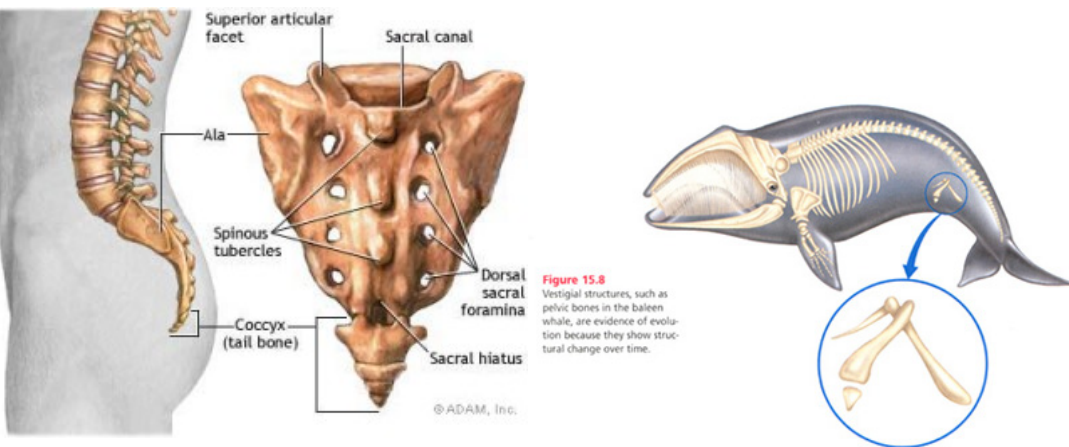
EVOLUTION- EVIDENCE

✿ Vestigial Structures-

structures that have lost most or all of their ancestral purpose.



Control yourself Ladies.



EVOLUTION- EVIDENCE

✿ Biggest evidence of all:

✿ All living things have DNA, and the same type of DNA.

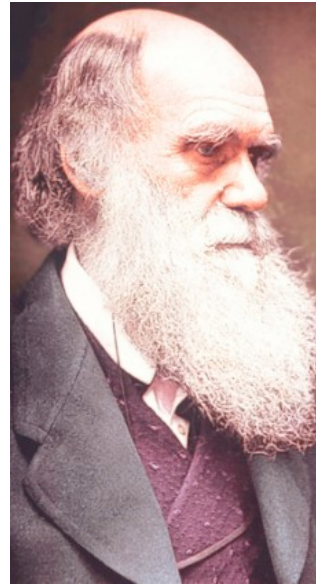
✿ WHY: the original ancestor of all species had DNA. It's a **homologous** structure.



EVOLUTION- NATURAL SELECTION

✿ **Natural Selection-** This is what Darwin proposed as the driving force behind evolution.

✿ “INDIVIDUALS THAT ARE BETTER ADAPTED TO THEIR ENVIRONMENT ARE MORE LIKELY TO SURVIVE AND REPRODUCE THAN MEMBERS OF THE SAME SPECIES.”



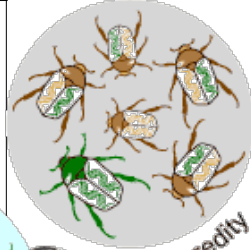
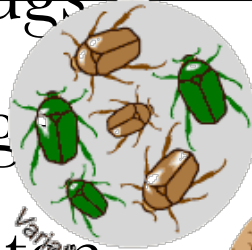
Even better in COLOR.

5 POINTS OF NATURAL SELECTION

- ✿ 1. Populations have variation
- ✿ 2. Some variations are favorable
- ✿ 3. More offspring are produced than will survive
- ✿ 4. Organisms compete, and those with more favorable traits will survive.
- ✿ 5. Populations change over time.

EXAMPLE:

- ✿ 1. Green and Brown Bugs
- ✿ 2. Brown are camouflaged
- ✿ 3. Some bugs will be eaten
- ✿ 4. Bugs hide, and fewer brown ones are eaten
- ✿ 5. More brown ones reproduce



EXAMPLE: DARWIN'S FINCHES.

- ✿ 1. 3 beak types (thick, medium, thin)
 - ✿ 2. Thick ones crack nuts easier, thin ones catch insects better, medium eat seeds and fruit faster
 - ✿ 3. A drought comes and takes out all fruit and seeds.
 - ✿ 4. Birds with thick beaks and thin beaks can crack nuts and insects more easily. Medium have less food, and some die.
 - ✿ 5. Birds reproduce, and more thick and thin beaks are present in the next generation.
-

EXAMPLE:

- ✿ Kids, this is why we try to educate you.
- ✿ Don't be “selected” against..



NATURAL SELECTION
Yes, it does work.

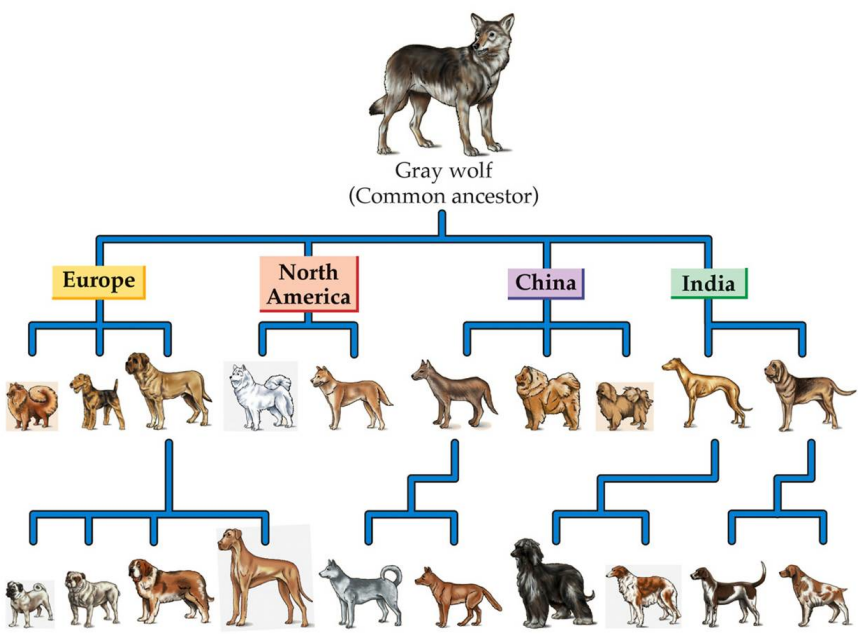
ANOTHER TYPE OF SELECTION: SEXUAL SELECTION



- Some organisms don't get picked based on their fitness for the environment
 - They are picked based on securing more mates through performance in mating rituals, flamboyant displays, dances, body features, fighting, ect.
 - Male-male competition, female choice
-

ARTIFICIAL SELECTION :
DOMESTICATION

HUMANS
BREED
ORGANISMS
FOR SPECIFIC
TRAITS THAT
ARE DESIRABLE.



DISCOVER BIOLOGY, Second Edition, Chapter 21 Box © 2002 Sinauer Associates, Inc., and W. W. Norton and Company



IMPORTANT POINTS ABOUT DESCENT WITH MODIFICATION BY NATURAL SELECTION

- THE ENVIRONMENT DETERMINES SUCCESS.
 - IF THE ENVIRONMENT CHANGES, A GOOD TRAIT CAN BECOME A BAD ONE, AND VICEVERSA.
 - THE SUCCESS OF A SPECIES IS OFTEN TIED TO DIVERSITY.
 - MORE DIVERSITY IN A POPULATION=SUCCESS
 - LESS DIVERSITY IN A POPULATION=EXTINCTION
-

COMMON QUESTIONS

- IF WE HAVE DESCENT WITH MODIFICATION, WHERE DOES ALL THIS VARIETY COME FROM? SHOULDN'T THINGS GET LESS COMPLEX OVER TIME?
 - WHAT CONTROLS WHETHER AN ORGANISM RECEIVES A FAVORABLE TRAIT OR AN UNFAVORABLE ONE?
 - WHY DON'T SOME ORGANISMS JUST EVOLVE INSTEAD OF GOING EXTINCT?
 - DOES EVOLUTION DISPROVE GOD?
 - DOES EVOLUTION AFFECT US? CAN THE EVOLUTION OF ONE ORGANISM AFFECT ANOTHER?
 - IF THEY LOOK SIMILAR, ARE THEY EVOLVED FROM EACH OTHER?
 - Does evolution mean becoming more advanced?
-