Ch 22.2 Notes

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Vocab (22.2)

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Adaptations: Inherited characteristics of organisms that enhance their survival and reproduction in specific environments.  
Natural Selection: A process in which individuals that have certain inherited traits tend to survive and reproduce at higher rates than do other individuals because of those traits.

Artificial Selection: Humans modifying other species over many generations by selecting and breeding individuals that possess desired traits

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Notes (22.2)

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Charles Darwin

Very interested in nature, but dad didn’t think he’d make it as a naturalist

Nature/Hunting > Studying

Med school= horrifying

Study at Cambridge to join the clergy!

* Meet botany professor- introduced to captain

Tagged along on HMS Beagle voyage to map coastlines

* Went to keep captain company

What was known

Scientists had discussed that species could change over time

No one knew HOW or WHY

Darwin’s theory of evolution proposed HOW modern organisms evolved from their ancestors

Observations

Darwin started looking at beetles

* How they got food
* Protected themselves
* Reproduced
* Where they lived

They all seemed to be really well suited to their environment

Species vary over time

Darwin collected fossils

* At the time, scientists knew what they were and had the start of a fossil record
* DIDN’T know how to interpret fossils (what information can be gleaned)

His observations

* Fossil record had species that were extinct but really similar to current species
  + Giant armadillo fossil

Putting it all together

Bunch of specimen of birds, he thought they were all different

* ALL finches, just from different islands
* Same for tortoises and iguanas
* (most famous for finches though)

Evolution by Natural Selection

Describes a NATURAL process that worked kind of like ARTIFICIAL selection

* Supported by evidence from Malthus and Lamarck

Malthus= competition

* Too many organisms compete for same resources, some will win and some will lose (die)
* DARWIN SAID:
  + individuals with certain variations are better suited for their environment (faster= can catch more prey/avoid being caught)
  + HERITABLE characteristic that increases ability to survive/reproduce= **adaptation**

Lamarck= connection between organism and environment

* DARWIN SAID= differences in adaptations affect an individual’s fitness
  + FITNESS= how well an organism can survive and reproduce in its environment

Survival of the fittest

* Not just staying alive
* Staying alive AND reproducing AND passing adaptations on to next generation

Darwin’s mechanism for evolution= Natural Selection

Organisms that happen to have certain variations that are best suited to environment survive and leave more offspring

The ENVIRONMENT is what dictates what variations survive best

From generation to generation, the organisms that survive are the ones that are better adapted, population shifts to reflect the adaptation

What happens if the environment changes?

People criticized Lamarck, so Darwin was worried about that

* Wanted as much data as possible

20 years later, Alfred Russel Wallace published an essay about evolution

* ALMOST IDENTICAL TO DARWIN’S IDEAS but not much data

Darwin published his book *On the Origin of Species* the next year (had data and observations)

Common Ancestry

Well adapted species survive over time

**Descent with modification**

* Living species are descendants (with changes over time) from common ancestors
* Changing conditions can cause one species to split into two or more
* Fossil record adds evidence
  + See slow changes over time= like how Hutton and Lyell described slow changes

Evolutionary tree shows how organisms are related and their common ancestors

Artificial selection

Darwin talked to farmers

* Certain plants/animals were more desirable than others
  + Bigger fruit, more milk etc
* Farmers picked those to breed
  + The offspring would have the same characteristics

Picking the more desirable organisms to reproduce= artificial selection

Inherited variation and selection of traits could provide what’s needed to drive evolution

Key features of natural selection

Individuals with certain heritable traits survive and reproduce at a higher rate than others do because of those traits

Over time, natural selection can increase the frequency of adaptations that are favorable in a given environment

If the environment changes, natural selection may result in adaptation to the new conditions

* May result in new species

INDIVIDUALS DO NOT EVOLVE

Evolution based on variations, if all identical, no evolution by natural selection can occur