Darwin and Natural Selection
One of the most famous books of science.
Darwin’s home, Down House, in England
Darwin’s study at his home Down House
Voyage of HMS Beagle, 1831-1836
Charles Darwin in 1837, age 28, after voyage of the Beagle
Charles Darwin, age 60
Darwin in 1879, age 70.
Darwin’s grave in Westminster Abbey

CHARLES ROBERT DARWIN
BORN 12 FEBRUARY 1809
DIED 19 APRIL 1882
The Voyage of the Beagle

Voyage of HMS Beagle, 1831-1836
The Galapagos Islands. Darwin visited in October 1835
Yours truly in the Galapagos Islands, 1996, Fernandina Volcano
Biologists are still studying natural selection in the Galapagos Islands.
Extinct volcano where the Grants studied "The Beak of the Finch"
Darwin’s finches: 13 different species evolved from a single ancestor from South America.
A page from Darwin’s notebook with a phylogenetic tree showing adaptive radiation.
The beaks of Darwin’s finches are adapted to the variety of food types available on the different islands in the Galapagos Islands.
The beaks of Darwin’s finches are adapted to the variety of food types available on the different islands in the Galapagos Islands.
A cactus finch
The cactus finch feeding
Mockingbirds with no fear of humans
Darwin Bay on Tower Island
Masked booby nesting grounds on Tower Island
Sitting with a masked booby
Fratricide among masked boobies. Every living adult killed its sibling. What is the evolutionary advantage?
Masked booby and blue-foot booby rookeries
A blue-footed booby
Let’s do the booby dance!
Let’s do the booby dance!
Mating ritual and bonding
Red-footed boobies roost in trees
Frigate Bird: why does the male have this red balloon?
Equatorial penguins in the Galapagos
This flightless cormorant shows adaptations similar to penguins.
Sea lion mother and pup
Sea lions only fear sharks
More individuals die than survive
Marine iguanas, the only ones in the world
A male marine iguana
Godzilla lives!
The land iguana, the living relative of the marine iguanas.
Don’t try this at home, folks!
A giant tortoise
A tortoise at the Darwin Research Station
Hanging out at the local water hole
Jaws!
We took pictures until the “cows came home.”
What are these crabs doing?
Hope this lecture hasn’t left you feeling “crabby”!
Variation, Homology, Convergent Evolution, and Vestigial Organs
Variations within Natural Populations are the Raw Materials for Natural Selection
One species of tree snail
Chromosomes contain Genes composed of DNA
The Anatomy of a Gene. Helical strands of DNA contain the blueprints for all forms of life.
The DNA molecule contains nitrogenous bases (A,T,C,G) that code for different amino acids, which form proteins.
Universal Tree of Life
Homologous features are used to recognize common evolutionary ancestry.
Examples of homologous features in the forelimbs of tetrapods.
Homology within Hominoids

Gibbon  Human  Chimpanzee  Gorilla  Orangutan
Hominoids
Homologous development between different species indicates common ancestry.
Analogous features indicate convergent evolution and **not** common ancestry. A good example are wings.
Evolution of Tetrapods
Acanthostega and Ichthyostega
Evolution of Whales
vestigial whale hips
Vestigial organs in humans

- Nictitating membrane
- Pointed canine
- Third molar
- Mammæ on male
- Hair on body
- Segmental muscles on abdomen
- Vermiform appendix
- Pyramidalis muscle
- Caudal vertebrae