Questions from Last Class

• What is the Great Chain of Being? Why is it important?
  
  • When did ideas about the world change from this?

• What impact did each of the following people have on evolutionary thought? What ideas are associated with them?
  
  • Linnaeus
  
  • Buffon
  
  • Cuvier
And Lamarck...

- What was Lamarck’s contribution to evolutionary thought?
- What was right and what was wrong about his evolutionary explanation?
Jean-Baptiste Lamarck

Inheritance of Acquired Characteristics

proposes that changes occur during the lifetime of an individual, through use or disuse, can be passed on to the next generation
Elephant’s Child?
Lamarck's Giraffe

Original short-necked ancestor

Keeps stretching neck to reach leaves higher up on tree

and stretching and stretching until neck becomes progressively longer

Driven by inner "need"
Inheritance of Acquired Characteristics

1. Frequent and continuous use of an organ strengthens and enlarges it, permanent disuse causes it to weaken, deteriorate and disappear.

2. Acquisitions and losses are preserved through reproduction.
Influences on Darwin

- Buffon
- Cuvier
- Lamarck
- Malthus
- Lyell
Thomas Malthus

“A struggle for existence”
Uniformitarianism

the same processes that act on the earth today acted on the earth in the past

Hutton

Lyell
Charles Darwin
Voyage on the Beagle
1831-1836
Some of the Finches of the Galapagos
Organizing the finches

G. fortis
G. fuliginosa
G. magnirostris
G. difficultis
G. conirostris
G. scandens
C. pauper
C. parvulus
Cactospiza
Platyspiza
Certhidea
“I have been now ever since my return engaged in a very presumptuous work & which I know no one individual who wd not say a very foolish one.— I was so struck with distribution of Galapagos organisms &c &c & with the character of the American fossil mammifers, &c &c that I determined to collect blindly every sort of fact, which cd bear any way on what are species. — I have read heaps of agricultural & horticultural books, & have never ceased collecting facts — At last gleams of light have come, & I am almost convinced (quite contrary to opinion I started with) that species are not (it is like confessing a murder) immutable. Heaven forfend me from Lamarck nonsense of a “tendency to progression” “adaptations from the slow willing of animals” ... but the conclusions I am led to are not widely different from his — though the means of change are wholly so — I think I have found out (here’s presumption!) the simple way by which species become exquisitely adapted to various ends.”
“By your letter & even still more by your paper in Annals, a year or more ago, I can plainly see that we have thought much alike & to a certain extent have come to similar conclusions.”

To Lyell, 1858: You said this when I explained to you here very briefly my views of “Natural Selection” depending on the Struggle for existence.—I never saw a more striking coincidence. if Wallace had my M.S. sketch written out in 1842 he could not have made a better short abstract! Even his terms now stand as Heads of my Chapters.
ON

THE ORIGIN OF SPECIES

BY MEANS OF NATURAL SELECTION,

ON THE

PRESERVATION OF FAVOURED RACES IN THE STRUGGLE FOR LIFE.

By CHARLES DARWIN, M.A.

FELLOW OF THE ROYAL SOCIETY, LEO NAM, ETC., ETC., ETC.;
AUTHOR OF "JOURNAL OF RESEARCHES DURING H. M. S. BEAGLE'S VENTURE ROUND THE WORLD."

LONDON:
JOHN MURRAY, ALBEMARLE STREET.
1859.

The right of translation is reserved.
Elements of the Theory

• All species are capable of producing offspring faster than the food supply increases - there will be a struggle for existence
Elements of the Theory

- All species are capable of producing offspring faster than the food supply increases - there will be a struggle for existence

- All living things show variation
Elements of the Theory

- All species are capable of producing offspring faster than the food supply increases -- there will be a struggle for existence
- All living things show variation
- **Favorable variations will offer an advantage in the struggle for existence**
Elements of the Theory

- All species are capable of producing offspring faster than the food supply increases -- there will be a struggle for existence

- All living things show variation

- Favorable variations will offer an advantage in the struggle for existence

- These variations, when heritable will be passed on to the next generation and will increase in frequency over time, changing the population
Natural Selection

- Competition
- Variation
- Heritability
- Differential Reproduction
Example

- Two kinds of Sneetches
- Those with bellies without stars and those with stars upon thars
In the beginning....
The Star Belly Sneetches had more fun on the beaches
Over time...
More time...
And then....
Natural Selection

(a) Mode of inheritance  (b) Variation among individuals  (c) Environmental pressure

+ Differential Reproduction
Elephant’s Child?