Biological Diversity
BSCI 10110-1
MWRF 1:10-2:00
Dr. Mark Kershner

Week 2

9/9
Hypothesis of Natural Selection
- -populations of organisms tend to look like individuals that breed the most
- -all organisms have the potential to produce more offspring than could ever survive
- -some individuals will survive better and produce more offspring than others – because of their traits
- -traits that are advantageous will become more common over time
- -heritable
- -traits are plastic – can change, be selected for as environmental conditions change
- -populations change over time (microevolution)
  - -can result in speciation (macroevolution)

Evolution (Ch 20-22)

Evidence for evolution (Ch 21)
- - . . . as FACT (observations)
  - -Changes over time
    - -directly observed
    - -inferred from indirect evidence

Direct observation
- -bacterial/viral resistance to drugs
  - -MRSA (Methicillin-resistant *Staphylococcus aureus*)
    - -Multi-drug resistance
  - -H1N1 – starting to see resistance to anti-virals
- -Black vs. white peppered moths
  - -Fig 21.3, 21.4, industrial melanism
- -artificial selection
  - -Fig 21.6, 21.7, ancestral species of Brussels sprouts, cauliflower, and cabbage, dog breeds

-Evolution inferred from observations
- -oysters
  - -increase in size, flatter shell
- -equine (horse) evolution
  - -Fig 21.13, size, molars, toe reduction
- -fossils of intermediate forms (“missing links”)
  - -Fig 21.12, whale evolution
- -vestigial structures
  - -Fig 21.17, whale and boa constrictor pelvic bones

-bird evolution
-dinosaur → bird
-Archaeopteryx

9/10
Exam a week from 9/11. Next Thursday's lecture not included on exam.

-*Confuciusornis sancti*
-Fig 21.4
-development
- . . . embryological development
- . . . track certain muscle masses, gene groups
-Fig 21.15
- . . . homology (homologous)
-structures with different appearance/function derived from same structure in a common ancestor
-Fig 21.4
-analogous structures
-share common function, but are a separate origin
-DNA sequencing
-genetic code is same for all organisms
-closely related organisms have a lot more similarity in gene sequences
-Fig 1.10
-Biogeography and Convergent (Parallel) Evolution
-Biogeography: species resemble nearby relatives
-local adaptation
-Convergent Evolution: similar environments contain similar, but unrelated species
-Fig 21.18

Ch 20 – "Microevolution"
-requirements for evolution to occur (particularly relative to natural selection)
-causes of evolutionary change
-importance of "fitness"

Variation → in genes within a population
-without this, there is "nothing to be selected for"
-without genes, there is nothing to be passed on to offspring
-"selection" occurs among individuals
-individuals are being selected, NOT the population
-Populations evolve

9/11

Requirements for Natural Selection

- -variation exists
  - -mutation of genetic code is ultimate source
  - -adaptive variation is NOT acquired by individuals during their lifetime
- -variation results in differences in . . .
  - -reproduction output
  - -survival
- -variation must be heritable
  - -genetic
  - -traits that are not heritable likely disappear if they are not heritable
- -lupines, shells
- -Fig 20.7
- -Fig 21.2

Natural Selection is NOT the same thing as evolution

- -it is a mechanism by which evolution can occur

Natural Selection is NOT random

Natural Selection acts on individual

- -NOT species

Natural Selection has NO purpose/goal

DNA – deoxyribonucleic acid

- Nucleotides- sugar, phosphate group
- Bases – cytosine, guanine, adenine, thymine
- Base pairs – AT, GC

-genotype

- -specific genetic make-up for a given trait
  - -genetic make-up = different forms of the same gene (alleles)

-phenotype

- -“outward expression of the underlying genotype (trait value)”

-Lamarck

- -Fig 20.1