Primates and Primate Evolution

- Who are the modern primates?
- What are their two major divisions?
- What is the geographic range of living primates?
- What is the size range of living primates?

Primate evolution

- When did primates first appear in the fossil record?
- What are the epochs of the Cenozoic and what kinds of primates are found in each epic?
  - What do we find in the Paleocene and where?
  - What do we find in the Eocene and where?

Eocene primates

- What kinds of primates are found in the Eocene?
- What did they look like? What kind of environment did they live in?
- What "grade" of primates are found in the Eocene?
- Are these primates of the Strepsirrhine or Haplorhine lineage?

Strepsirrhines

- What are the characteristics that define the strepsirrhines?
    - Which are primitive to primates and which are derived?
- What are the different kinds of strepsirrhines? How do they differ?

Lemurs

- Where do they live?
- How do they live?
- What are their identifying characteristics?

Lorises

- Where do they live?
- How do they live?
- What are their identifying characteristics?

Tarsier

- Why is the Tarsier considered both a Haplorhine and a Prosimian?
- What features align it with each group?

Midterm review

- Chapters 1-6, 1/2 of 7, little bit in 8
- Everything will be able to be done on the test
- Bring writing utensils
- Multitude of formats
- Use the "Questions from Last Class" to study

Questions from last class

- What is evolution
    - How do you define it?
    - What are living examples of evolution?
- Is evolution JUST a theory?
    - What does it mean to say this?

More questions

- Why is anthropology a science?
- What is the scientific method?
- What is a scientific theory?

Questions from last class

- What makes a science a science?
    - What is the scientific method?
    - What is a hypothesis? How is it tested?
    - Does scientific research prove things false or true?
- What is a theory, scientifically?
    - Does being a theory make evolution more or less believable?

Question:

- A scientific theory is

  a. a guess about how the world works.

  b. a really good guess about how the world works.

  c. a hypothesis in need of testing.

  d. a hypothesis that has been tested a couple of times and might hold true.

  e. an idea that has been tested and retested and stood up to all tests - its as close to fact as scientists get.

Question:

- A scientific theory is
  a. a guess about how the world works.
  b. a really good guess about how the world works.
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  e. an idea that has been tested and retested and stood up to all tests - its as close to fact as scientists get.

Question:

True /False

To say that evolution is a theory means that there is no compelling evidence to support it.

Question:

True /False

To say that evolution is a theory means that there is no compelling evidence to support it.

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

Question:

The idea that all species that could exist did exist and that they were immutable is called the _____.

Question:

The idea that all species that could exist did exist and that they were immutable is called the FIXITY OF SPECIES.

Question:

- Archbishop James Ussher calculated the age of the earth using

a. geologic evidence

b. astronomical data

c. simple guesswork

d. the Bible

e. ancient Greek and Roman texts

Question:

- Archbishop James Ussher calculated the age of the earth using

a. geologic evidence

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c. simple guesswork

d. the Bible

e. ancient Greek and Roman texts

Question:

True/ False

_____ Buffon is associated with the idea of Catastrophism.

Question:

True/ False

____FALSE_____ Buffon is associated with the idea of Catastrophism.

And Lamarck...

- What was Lamarck's contribution to evolutionary thought?
- How does Inheritance of Acquired Characteristics explain evolutionary change?
- How was it right? How was it wrong?

Question:

The problem with Lamarckian evolution is _____.

Question:

The problem with Lamarckian evolution is acquired characteristics cannot be inherited - they don't affect the gametes.

Last Time

- What was Malthus's contribution to Darwinian thought?

- What was Lyell's and Hutton's contribution?

Darwin

- When did Darwin go on the Beagle?
- When was *The Origin of Species* published?
- Why did it take so long?
- Who was Alfred Russell Wallace?

Darwin, cont.

- Why is it called Natural Selection?
- What are the necessary conditions for evolution by natural selection?

(book has 3, I gave 4)

- Can anything evolve by natural selection?
- Is "Survival of the Fittest" an accurate description of the theory? Why or why not?

Question:

_____ is the idea that the processes that shape the world are the same today as they have been in the past.

Question:

UNIFORMITARIANISM is the idea that the processes that shape the world are the same today as they have been in the past.

Question:

The critical idea that all things are in a struggle for existence was the idea of (Hutton / Malthus).

Question:

The critical idea that all things are in a struggle for existence was the idea of (Hutton / Malthus).

Question:

- Of the following which is not an element of natural selection

a. competition for resources

b. variation amongst individuals

c. differential reproduction

d. differential survival

e. heritability of the variations

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e. heritability of the variations

Question:

Natural selection operates on the level of the

(individual / population).

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(individual / population).

Heritability - a 3 Part question

- How come we resemble our parents? That is, **how is our heritable information passed from generation to generation?**
- How does the genetic code create a characteristic?
- Where does variation in the code come from?

Heredity

- What is a phenotype? What is a genotype?
- How are phenotypes created?
- What are the relative influences of genetics and environment on phenotype?

3 Part question

- How does the genetic code create a characteristic?
- How come we resemble our parents? That is, how is our heritable information passed from generation to generation?
- Where does variation in the code come from?

DNA

- What is DNA?
    - What is its shape? Why is the shape important?
- Where is it found?
- What does it do?

DNA

- What bases make up DNA?
- How do they pair?
- What does the sequence of bases do?

Proteins

- What is a protein?
- What are amino acids?
- How do they make proteins?
- How does DNA make proteins?

Protein Synthesis

- What are transcription and translation?
- How does RNA differ from DNA
- What is the difference between mRNA and tRNA?
- How does the ribosome help?
- How is the protein made?

Question:

DNA codes for amino acids in its sequences of (2 / 3 / 4) bases.

Question:

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Question:

The organelle in the cytoplasm of the cell that matches up mRNA and tRNA anticodons is called a _____.

Question:

The organelle in the cytoplasm of the cell that matches up mRNA and tRNA anticodons is called a RIBOSOME.

Question:

DNA has 64 different codes to code for _____ amino acids. Mistakes can occur because these codes are _____, there is more than one for many of the amino acids.

Question:

DNA has 64 different codes to code for ___20___ amino acids. Mistakes can occur because these codes are REDUNDANT, there is more than one for many of the amino acids.

Question:

What is a protein?

Question:

What is a protein?

A building block of life, created by one or more polypeptide chains

Question:

The specific sequence of DNA that we carry on one of our chromosomes is called a(n)

(gene / locus / allele).

Question:

The specific sequence of DNA that we carry on one of our chromosomes is called a(n)

(gene / locus / allele).

Question:

- The base that bonds with adenine in DNA is

a. cytosine

b. thymine

c. guanine

d. uracil

e. cyclomine

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a. cytosine

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e. cyclomine

Question:

The process of matching tRNA anticodons with a strand of mRNA is called (transcription / translation).

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The process of matching tRNA anticodons with a strand of mRNA is called (transcription / translation).

Mendel

- What was Mendel's contribution to our understanding of Heredity?
- What is the Law of Segregation?
- What is the Law of Independent Assortment?
- What is a punnett square and how is it used to illustrate the principles of inheritance?

Question:

Mendel's idea that each individual has two particles of inheritance for each trait and that they pass one of each pair on to their offspring is the _____.

Question:

Mendel's idea that each individual has two particles of inheritance for each trait and that they pass one of each pair on to their offspring is the PRINCIPLE OF SEGREGATION.

Question:

Given two parents, both heterozygote for a trait, what is the probability of having an offspring with the recessive phenotype?

Question:

Given two parents, both heterozygote for a trait, what is the probability of having an offspring with the recessive phenotype?

25%

Question:

Draw a punnett square of the potential offspring of a parent with AB bloodtype and one with O bloodtype.

Question:

Draw a punnett square of the potential offspring of a parent with AB bloodtype and one with O bloodtype.

	O	O
A	AO	AO
B	BO	BO

Question:

Mendel used the term _____ to refer to the form of a trait that could be hidden in combination with another form.

Question:

Mendel used the term RECESSIVE to refer to the form of a trait that could be hidden in combination with another form.

How is genotype determined?

- How does DNA code for the making of proteins?
- How do the two copies of DNA you carry work together to create your phenotype?
- How do you get your two copies of any chromosome or locus through meiosis?

Meiosis

- How does meiosis divide cells?
- What are haploid and diploid cells?
- Describe the process of meiosis?
- When and how during meiosis is variation introduced?
- How do you get new genotypes?

Where does variation in the code come from?

Mutation

Crossing Over

Recombination

What are the different types of mutation?

- insertion, deletion, substitution
- How do each of these potentially change the protein created?
- How common is mutation?

Question:

The division of somatic cells is called
(meiosis / mitosis).

Question:

The division of somatic cells is called
(meiosis / mitosis).

Question:

The process by which the chromosome pairs exchange information in meiosis, exchange parts of themselves is called _____.

Question:

The process by which the chromosome pairs exchange information in meiosis, exchange parts of themselves is called CROSSING OVER.

Question:

Independent assortment of chromosomes is shown in the (reductional / equational) division stage in meiosis.

Question:

Independent assortment of chromosomes is shown in the (reductional / equational) division stage in meiosis.

Question:

Mutations during (meiosis / mitosis) can be passed on to the next generation.

Question:

Mutations during (meiosis / mitosis) can be passed on to the next generation.

Question:

True/False

All mutations that occur during meiosis have an impact on the phenotype of the individual carrying the mutation.

Question:

True/False

All mutations that occur during meiosis have an impact on the phenotype of the individual carrying the mutation.

Question:

- Name three ways in which variation is introduced during meiosis.

Question:

- Name three ways in which variation is introduced during meiosis.

- mutation, crossing over, recombination

Question:

- The mutation with the least possible impact on the phenotype is a (n) _____ mutation.

a. insertion

b. deletion

c. replacement

d. chromosomal

e. point

Question:

- The mutation with the least possible impact on the phenotype is a (n) _____ mutation.

a. insertion

b. deletion

c. replacement

d. chromosomal

e. point

Question:

- Mutations often have little phenotypic effect because

    a. they often occur in non-coding regions.

    b. codon changes are often insignificant because of the redundancy of DNA

    c. proteins can withstand minor amino acid variations

    d. all of the above

    e. A and B only

Question:

- Mutations often have little phenotypic effect because

  a. they often occur in non-coding regions.

  b. codon changes are often insignificant because of the redundancy of DNA

  c. proteins can withstand minor amino acid variations

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Question:

(Pleiotropy / Polygeny) is the affect of a single gene on a multitude of different traits.

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(Pleiotropy / Polygeny) is the affect of a single gene on a multitude of different traits.

Question:

Having two of the same alleles for a trait is termed being _____.

Question:

Having two of the same alleles for a trait is termed being HOMOZYGOUS.

Question:

_____ is the proportion of the total variation observed in a trait within a population that can be attributed to genetics rather than to the environment.

Question:

HERITABILITY is the proportion of the total variation observed in a trait within a population that can be attributed to genetics rather than to the environment.

Modern Synthesis

- What is the modern synthesis?
- How do we define evolution?

Questions

- What are the four forces of evolution?
- How does each change gene frequencies within and between populations?
- What is a population?
- What are Macroevolution and Microevolution?

Microevolution and Macroevolution

- How does Microevolution add up to macroevolution?
- How are species created?

The four forces

- What is genetic drift?
    - When is genetic drift most effective?
- Why is mutation so important?
- What is the role of gene flow in maintaining species?
- What are the different ways in which Natural selection works?

Question:

_____ is the ultimate source of all new variation.

Question:

MUTATION is the ultimate source of all new variation.

Question:

Selection of the middle of a range of variation is called (directional / stabilizing / disruptive) selection.

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Selection of the middle of a range of variation is called (directional / stabilizing / disruptive) selection.

Question:

- Short term evolutionary changes are called
  a. epigenetic
  b. megaevolution
  c. microevolution
  d. macroevolution
  e. quantum evolution

Question:

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a. epigenetic

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d. macroevolution

e. quantum evolution

Question:

Name the four forces of evolution and how each affects variation within and between populations.

Question:

Name the four forces of evolution and how each affects variation within and between populations.

mutation - increase, increase

nat sel - decrease/maintain, increase

genetic drift - decrease, increase

gene flow - increase, decrease

Question:

Speciation due to geographic separation of two populations is called (allopatric / sympatric) speciation.

Question:

Speciation due to geographic separation of two populations is called (allopatric / sympatric) speciation.

Question:

Define Evolution.

Question:

Define Evolution.

Changes in gene frequencies over time.

Microevolution and Macroevolution

- How does Microevolution add up to macroevolution?
- What are species?
- How are species created?
- What are anagenesis and cladogenesis?

Question:

Small changes in gene frequencies from generation to generation is (microevolution / macroevolution).

Question:

Small changes in gene frequencies from generation to generation is (microevolution / macroevolution).

Question:

Species are defined as populations which are _____ from other populations.

Question:

Species are defined as populations which are reproductively isolated from other populations.

Question:

Evolutionary changes in a lineage over time resulting in the change from one species to the next is called _____.

Question:

Evolutionary changes in a lineage over time resulting in the change from one species to the next is called anagenesis.

Last time

- What are the sources for human variation?
- How do humans vary across geography?
- What is a cline?

Last Time

- What forces have been responsible for shaping modern human variation?
- What have humans adapted to?
- How has culture impacted adaptation and vice versa?
- What are the different ways of adapting to an environmental stressor?

Adaptation

- What is adaptation?
    - What is genetic adaptation?
    - What is acclimatization?
- How do these shape human variation?

Last time

- How have humans adapted to?
    - solar radiation
    - disease
    - heat/cold
    - altitude
- What other examples can you think of of something that resulted through adaptation?

What have humans adapted to?

- Can you name at least one environmental stressor, how it can impact fitness, and how humans adapt, culturally, behaviorally, physiologically, and genetically to that challenge?

Human Variation

- How has all this adaptation resulted in human evolution?
- How do biology and culture impact each other in human adaptation?
- How does this variation add up to what we think of as racial differences among people?

What is Race?

- What is a RACE?
- How do we define it biologically?
    - Do humans fit the biological definition of race?
- How do we define it culturally?

FAHV

- What does it mean to say that humans vary more within populations than between?
- What is Fst?
- How are populations real but races not?
- What are the historical and political impacts to defining race?
- How do racial definitions differ from culture to culture?

Question:

The continuous geographic variation of a trait is called a _____.

Question:

The continuous geographic variation of a trait is called a CLINE.

Question:

True / False

Each human population in general has all the same alleles as other human populations, just at different frequencies.

Question:

True / False

Each human population in general has all the same alleles as other human populations, just at different frequencies.

Question:

- Of the following, which is NOT a genetic adaptation to living in the arctic?

a. more body fat, rounder bodies

b. shorter limbs

c. larger noses

d. darker skin

e. more rapid respiration

Question:

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a. more body fat, rounder bodies

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Question:

Tanning is a (genetic adaptation / acclimatization) to greater solar radiation.

Question:

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Question:

Name one environmental stressor that humans have to adapt to and how they might adapt with behavior, acclimatization, and, over time, genetically.

Question:

Name one environmental stressor that humans have to adapt to and how they might adapt with behavior, acclimatization, and, over time, genetically.

Disease: wash hands, build up antibodies, genetic solution like sickle cell.

Question:

Bergmann and Allen's rules predict that the body shape in a cold environment will be _____.

Question:

Bergmann and Allen's rules predict that the body shape in a cold environment will be short and stocky.

Question:

True/ False

A human's skin color is a good indicator of their geographic origin.

Question:

True/ False

A human's skin color is a good indicator of their geographic origin.

Question:

True/ False

Human populations are different enough from one another that different biological races can be defined.

Question:

True/ False

Human populations are different enough from one another that different biological races can be defined.

Last class

- How do you determine relationships amongst organisms?
- What are homologous and analogous structures?
- Which are more useful for determining relationships? Why?

Similarity between organisms

- What are the different forces that can create similarities between organisms?
- Why do some similarities indicate relationship while others do not?
- Which indicate a shared evolutionary past?

More...

- What are primitive and derived characteristics?
- Why are shared-derived characteristics most useful in determining relationships?
- What is the principle of parsimony and how does this apply to determining the relationships amongst organisms?

Humans

- How are humans classified?
- Why are we classified in this way?

Mammals

- What characteristics define mammals?
- What are these characteristics an adaptation for?

Question:

A bird's wing and a bat's wing are considered (homologous / analogous) structures.

Question:

A bird's wing and a bat's wing are considered (homologous / analogous) structures.

Question:

- The traits that are most useful in determining relationships between organisms are
  a. analogous traits
  b. homologous traits
  c. primitive homologous traits
  d. derived homologous traits
  e. shared derived homologous traits

Question:

- The traits that are most useful in determining relationships between organisms are
  a. analogous traits
  b. homologous traits
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Question:

(Cladogenesis / anagenesis) is the process of a lineage changing significantly over time from one form to another, perhaps from one species to another.

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Question:

Analagous structures are those that are similar between two organisms due to shared (form / function).

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Question:

Shared-derived characteristics are most useful for determining relationships among organisms because of the principle of _____, which says that the fewer evolutionary steps, the more likely the tree.

Question:

Shared-derived characteristics are most useful for determining relationships among organisms because of the principle of PARSIMONY, which says that the fewer evolutionary steps, the more likely the tree.

Question:

Name 3 defining mammalian traits.

Question:

Name 3 defining mammalian traits.

hair, mammary glands, homeothermy

Question:

Mammalian traits show an adaptation for

Question:

Mammalian traits show an adaptation for ___ADAPTABILITY____.

Question:

True / False

Humans don't make very good primates because we have the specialized skeleton for bipedalism.

Question:

True / False

Humans don't make very good primates because we have the specialized skeleton for bipedalism.

Question:

The correct way to write the human genus and species is:

a. Homo sapien

b. homo sapiens

c. *Homo sapiens*

d. sapiens sapiens

e. Homo sapien

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c. *Homo sapiens*

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e. Homo sapien

Primate Characteristics

- What characteristics define primates?
- What are they an adaptation for?
- What was the likely early primate adaptation?

Question:

- Which of the following is not a primate characteristic?

a. emphasis on vision

b. specialization for quadrupedal locomotion

c. tendency towards omnivory

d. expanded infancy and childhood

e. bigger brains than many other mammals

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Question:

T / F

Primates show an overall trend for dietary specialization, as exemplified by the tooth combs seen in the lemurs and lorises.

Question:

T / F

Primates show an overall trend for dietary specialization, as exemplified by the tooth combs seen in the lemurs and lorises.

Question:

- Primates probably resulted in the mammalian adaptive radiation as an adaptation for a
  a. insectivorous life
  b. terrestrial herbivorous life
  c. arboreal life
  d. nocturnal life
  e. predatorial life

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Primates and Primate Evolution

- Who are the modern primates?
- What are their two major divisions?
- What is the geographic range of living primates?
- What is the size range of living primates?

Primate evolution

- When did primates first appear in the fossil record?
- What are the epochs of the Cenozoic and what kinds of primates are found in each epic?
  - What do we find in the Paleocene and where?
  - What do we find in the Eocene and where?

Eocene primates

- What kinds of primates are found in the Eocene?
- What did they look like? What kind of environment did they live in?
- What "grade" of primates are found in the Eocene?
- Are these primates of the Strepsirrhine or Haplorhine lineage?

Strepsirrhines

- What are the characteristics that define the strepsirrhines?
- Which are primitive to primates and which are derived?
- What are the different kinds of strepsirrhines? How do they differ?

Lemurs

- Where do they live?
- How do they live?
- What are their identifying characteristics?

Lorises

- Where do they live?
- How do they live?
- What are their identifying characteristics?

Tarsier

- Why is the Tarsier considered both a Haplorhine and a Prosimian?
- What features align it with each group?

Question:

- The first true primates are found in the
  - a. Paleocene
  - b. Eocene
  - c. Oligocene
  - d. Jurassic

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Question:

- The rapid diversification of a group into many different species or types due to the availability of many different ecological niches is called _____.

Question:

- The rapid diversification of a group into many different species or types due to the availability of many different ecological niches is called adaptive radiation.

Question:

- Modern primates live on all the continents EXCEPT:
    - A. Europe
    - B. North America
    - C. Australia
    - D. All of the above
    - E. B and C only

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- Modern primates live on all the continents EXCEPT:
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    - C. Australia
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Question:

- The two major divisions of the primates, the two suborders, are
  - A. Catarrhini and Platyrrhini
  - B. Strepsirrhini and Haplorhini
  - C. Old World and New World
  - D. Lemuriformes and Simiiformes
  - E. Humans and all the rest

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  - D. Lemuriformes and Simiiformes
  - E. Humans and all the rest

Question:

- The primates of the Eocene are best described as _____ grade primates.

Question:

- The primates of the Eocene are best described as prosimian grade primates.

Question:

- Of the Strepsirrhines, only the (lemurs / lorises) are sometimes diurnal.

Question:

- Of the Strepsirrhines, only the (lemurs / lorises) are sometimes diurnal.

Question:

- Characteristics that define the strepsirrhines include
    - A. arboreality
    - B. prehensile tails
    - C. tooth comb
    - D. nails on all digits
    - E. C and D both

Question:

- Characteristics that define the strepsirhines include
    - A. arboreality
    - B. prehensile tails
    - C. tooth comb
    - D. nails on all digits
    - E. C and D both

Question:

- One characteristic that shows that tarsiers are evolutionarily closer to monkeys and apes than to lemurs and lorises is
  - A. a moist rhinarium
  - B. a tooth comb
  - C. post orbital closure
  - D. tapeta lucetum
  - E. retention of a claw.

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