

SLS 12 Midterm 1

Kendall Bensch

TOTAL POINTS

57.5 / 75

QUESTION 1

1 Eugenics 5 / 5

✓ - **0 pts** Correct

QUESTION 2

2 Geology 4 / 5

- **0 pts** Correct

- **1 Point adjustment**

- ☞ Uniformitarianism = same processes we observe in action today can account for the grand patterns of the past

QUESTION 3

3 The Darwins 5 / 5

✓ - **0 pts** Correct

- ☞ Great! Similar views to Lamarck more than Linneus

QUESTION 4

4 Acquired characters 4 / 5

- **0 pts** Correct

- **1 Point adjustment**

- ☞ so close! Lamarck!

QUESTION 5

Who said 5 pts

5.1 A 1 / 1

✓ - **0 pts** Correct - as long as the last name, Huxley, is there

- **0.5 pts** a. T.H. Huxley - a correct description of who he was without his name
- **1 pts** a. T.H. Huxley - the wrong name

5.2 B 0 / 1

- **0 pts** b. Oliver Wendall Holmes - Correct - as long

as last name "Holmes" is written

- **0.5 pts** b. Oliver Wendall Holmes - a description of the person or the context without the name or with the wrong name; identify Buck vs. Bell trial

✓ - **1 pts** b. Oliver Wendall Holmes - the wrong name

5.3 C 0 / 1

- **0 pts** c. Theodosius Dobzhansky - Correct - if last name is present and spelled recognizably (even if not spelled completely correctly)

- **0.5 pts** c. Theodosius Dobzhansky - half credit for a correct description of the person even if the name is incorrect, or if name is minimally recognizable from the spelling. Half credit for first name without last name.

✓ - **1 pts** c. Theodosius Dobzhansky - incorrect if wrong name is given

5.4 D 1 / 1

✓ - **0 pts** d. Charles Darwin - Correct as long as last name is there

- **0.5 pts** d. Charles Darwin - Half credit for correct description of the person or correct context given
- **1 pts** d. Charles Darwin - wrong name

5.5 E 1 / 1

✓ - **0 pts** e. Alfred Russel Wallace - Correct last name

- **0.5 pts** e. Alfred Russel Wallace - Half credit for correct description of person or correct context given.
- **1 pts** e. Alfred Russel Wallace - wrong name

QUESTION 6

6 Natural Selection 5 / 5

✓ - **0 pts** Correct - Darwin liked the term because of its analogy to artificial selection and Wallace disliked the term due to the problem of agency implied by the analogy - artificial selection requires a selector.

- **0.5 pts** missing the term "artificial selection"

- **1 pts** mostly correct explanation, but lacking or incorrect use of key terms.
- **2.5 pts** Half credit if the correct reason is given for either Darwin or Wallace, but not for both.
- **3 pts** Rubric categories 3 and 4 apply
- **4 pts** Partially accurate but not the reasoning we were looking for
- **5 pts** Incorrect if neither reason given is correct.

QUESTION 7

Dating the Earth 5 pts

7.1 A 1 / 2.5

- **0 pts** Correct
- ✓ - **1.5 pts** Added up ages in biblical chronology
 - **1 pts** Calculation: added up ages in biblical chronology
 - **0.5 pts** Added up ages in biblical chronology
 - **1 pts** Be more specific. Added up ages in biblical chronology
 - **2 pts** Added up ages in biblical chronology
 - **2.5 pts** Added up ages in biblical chronology
 - **0.5 pts** Completely independent of Leclerc
 - **2.5 pts** Added up ages in biblical chronology
 - **2 pts** Added up ages in chronology of Old Testament

7.2 B 2.5 / 2.5

- ✓ - **0 pts** Correct
 - **0.5 pts** Iron
 - **1.5 pts** Measured the cooling rate of hot iron balls
 - **1 pts** Measured cooling rate
 - **0.5 pts** Heated, not melted
 - **0.5 pts** Earth was not a liquid
 - **0.5 pts** Measured cooling rate

QUESTION 8

8 Mono v. Polygenism 3 / 5

- **0 pts** Correct
- **1 pts** Polygenism applies specifically to the creation by God of multiple human species.
- **2 pts** Mono and polygenism descriptions are reversed

- **2 pts** Polygenism is a creationist, not evolutionary, belief. Separate species of humans created by God.

- **0.5 pts** Human races created as separate species by God (polygenism)

✓ - **1 pts** Polygenism states that multiple human species were created separately by God.

- **1 pts** Connect abolitionism/slavery more specifically to these theories.

- **1 pts** Connect imperialism more specifically to these theories.

- **2 pts** Slavery/colonialism justified using polygenic theories

✓ - **1 pts** Monogenism states that all humans have one common ancestor, not necessarily that the human species descended from Adam and Eve.

- **1 pts** Slavery/colonialism justified using polygenic theories

- **2 pts** Mono and polygenism apply specifically to the creation by God of one or multiple human races.

- **1 pts** Slavery/colonialism justified using polygenic theories

- **1 pts** Polygenism is a creationist, not evolutionary, belief. Separate species of humans created by God.

☞ Monogenism is the belief that there is one human species descended from a common ancestor. Genetic mutations were not understood at the time and many monogenists were creationists, while others were evolutionists.

QUESTION 9

9 Malthus 4 / 5

✓ - **0 pts** Correct.

✓ - **1 pts** need to mention: exponential/ very rapid growth of population if unchecked.

- **1 pts** need to mention: very limited resource

- **1 pts** need to mention: competition/ survival of the fittest as a result of 2 and 3.

- **5 pts** Incorrect

☞ Exponential growth vs. limited resource, competition follows, that is the essence of

Malthus.

QUESTION 10

Paley 5 pts

10.1 A 1 / 2.5

- ✓ - **2.5 pts** No answer given or to get points right
 - + **2.5 pts** Design in nature means designer
 - + **1 pts** Explanation of watch metaphor
- ✓ + **1 pts** Divine creator
 - **0.25 pts** Flipping logic
 - + **1 pts** Perfection or complexity of natural world
 - **0.5 pts** no explanation of complexity/perfection as evidence of design.

💬 What was it about nature that demonstrated this? What does the watchmaker metaphor explain?

10.2 B 1.5 / 2.5

- **0 pts** Correct
 - **2.5 pts** No answer given
 - **0.5 pts** Get the main point, but just describe evolution
 - **0.5 pts** Suggest Paley accepting evolution/change!
 - **0.25 pts** No speciation
 - **1.25 pts** No Paley, no rapid evolution
 - ✓ - **1 pts** No Paley answer or wrong answer
 - **1 pts** Adaptive radiation incorrect
- 💬 You explain what an adaptive radiation is, but failed to describe how Paley would have explained the observable pattern of an adaptive radiation (many similar species which have distinct adaptations to different niches in an ecosystem).

QUESTION 11

11 Eureka! 5 / 5

- ✓ + **2.5 pts** The formulation of Darwin's theory in the Origin of Species was the culmination of careful thought and the meticulous acquisition of evidence over a prolonged period of time, rather than the

expression of a single moment of inspiration.

+ **2.5 pts** There were many factors that influenced Darwin's thinking both during his voyage on HMS Beagle (his geological interest guided by Lyell's work, his interaction with fossils, etc.) and after his return (collaboration with other scientists, e.g. John Gould, reading of Malthus, etc.), not just the Galapagos finches.

✓ + **2.5 pts** Darwin recognized the importance of his theory and overcame barriers to articulate his ideas in a cultural environment where natural theology was the accepted standard.

+ **0 pts** Incorrect

QUESTION 12

12 Vestiges 5 / 5

- ✓ - **0 pts** Correct
 - **2 pts** Darwin was not pre-empted by Vestiges since the basic idea was somewhat different. Rather, it gave him a picture of how unreceptive the scientific community was to transmutationist ideas, at least those without much scientific support.
 - **5 pts** Left blank.
 - **2 pts** Darwin was not inspired by Vestiges, instead the negative scientific reaction to it was part of his hesitation to publish. It caused him to step back and gather more data instead.
 - **1 pts** Wallace was not just supportive of Vestiges, he was inspired to name himself a transmutationist from the minute of reading it. This work turned his thought to theoretical aspects of the natural world.
 - **1 pts** Wallace was did not yet have a theory to compare Vestiges to. Instead, it was the very start of his theoretical thought about the natural world, and marks the origin of his transmutationist perspective.
 - **1 pts** Vestiges not only inspired Wallace to explore, but it also opened him up to the idea of theorizing about the natural world in a transmutationist context.

QUESTION 13

13 Sarawak 2.5 / 5

- 0 pts Correct

- 1 pts Click here to replace this description.

- 5 pts Click here to replace this description.

✓ - 2.5 pts Wallace is stating that a new species will have arisen from an existing ancestor, and so will exist in a similar space and time as that recent ancestor. It is an argument against spontaneous creation.

- 2 pts Click here to replace this description.

- 2 pts Why do you find closely related species in the same time and space? Recent descent from a common ancestor

- 1 pts He had not figured out the mechanism of evolution yet. He is suggesting here that because of common descent from an ancestor, you find closely related species in similar space and time.

- 1 pts Wallace is referring to a genealogical tree of life where you find closely related species in a similar space and from similar times due to common descent from an ancestor

- 5 pts Wallace is referring to a genealogical tree of life where you find closely related species in a similar space and from similar times due to common descent from an ancestor

- 5 pts No answer provided

- 3 pts Wallace is referring to a genealogical tree of life where you find closely related species in a similar space and from similar times due to common descent from an ancestor

QUESTION 14

14 Species and varieties 1 / 5

+ 2 pts Relationship between species and varieties: Darwin argues that the line demarcating species and varieties is fuzzy.

+ 2 pts Citation of experts: Darwin cites disagreement among experts about whether to classify organisms as species or mere varieties.

+ 1 pts Evidence for descent with modification: Darwin argues that the poor demarcation between species and varieties exists because varieties are incipient species.

+ 0 pts Click here to replace this description.

+ 1 Point adjustment

- 1/2 points: Answer discusses differences between species and varieties, but does not address the fuzzy boundary between the two.
- 0/2 points: Wallace did not tell Darwin to hurry up and publish. The main point here is that Darwin cites disagreement among experts about the classification of species v. varieties to support the blurry distinction between the two.
- 0/1 point: answer does not address the implication of species v. varieties for descent with modification.

QUESTION 15

15 Struggle for survival 5 / 5

✓ - 0 pts Correct

- 1 pts Click here to replace this description.

- 0.5 pts Click here to replace this description.

- 2 pts Click here to replace this description.

- 5 pts Empty

71292320

Harvard ID #:

71292320

TF: Tues 12-1:15

Name:

Kendall
Bensche

SLS 12 2018 Understanding Darwinism
Mid-term 1, 2 Oct 2108

Please be sure to put your Harvard ID, Name, and Section Leader on **every** page. Answer all the questions. Answer **only** in the spaces provided. Each question is worth 5 points. Please make sure that your answers are legible and succinct (you will be penalized for adding to your answer irrelevant material that is not germane to the question). You have 75 minutes for the exam, and there is a total of 75 points available; pace yourself accordingly.

1. Distinguish between positive and negative eugenics.

Galton was said to be the "father of eugenics."

Positive eugenics was encouraging those with "favorable" traits to reproduce. Negative eugenics was discouraging those with "unfavorable" traits NOT to reproduce.

Galton thought natural selection no longer applied to the human race and that the "quality" of people was declining.

2. Compare and contrast ^{Cuv}catastrophism and ^{Lyell}uniformitarianism. For each perspective, give the name of the historical figure most closely associated with its development.

Catastrophism was the idea that different epochs were separated by catastrophic events. Cuvier claimed that each new layer of rock was a new epoch.

Uniformitarianism was the idea that the transition from one epoch to another was a process of gradual changes that were too subtle for one man to see in his lifetime. Lyell embodied this notion.

Do not write below line (for grading purposes)

3. Charles Darwin's grandfather, Erasmus Darwin, wrote the following description of evolution:

Organic life beneath the shoreless waves
Was born and rais'd in Ocean's pearly caves
First forms minute, unseen by spheric glass,
Move on the mud, or pierce the watery mass;
These, as successive generations bloom,
New powers acquire, and larger limbs assume;
Whence countless groups of vegetation spring,
And breathing realms of fin, and feet and wing

a. What does he mean by "spheric glass"?

magnifine glass

b. Outline one key difference between the evolutionary theories of Erasmus and Charles Darwin.

Erasmus had similar views to Linneus who did not quite grasp that favorable characteristics were passed down genetically through a process called natural selection as Darwin did. Erasmus thought that life could be created spontaneously.

4. What is meant by "inheritance of acquired characters?" Give the name of the figure in the history of biology most closely associated with this idea.

Linneus is most closely affiliated with this quote. "Inheritance of acquired characters" implies Linneus' idea that a giraffe stretched its neck to reach the higher leaves and, in turn, actually saw some growth in its neck length. Since longer necks were more favorable to shorter necks and allowed giraffes to survive longer, more of the long-necks survived to pass that characteristic down to their offspring.

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5. Who said:

a. How extremely stupid not to have thought of that!

T.H. Huxley (bulldog)

b. Three generations of imbeciles are enough

Francis Galton (eugenics)

c. Nothing in biology makes sense except in the light of evolution

Barrow in Scopes Trial
(defense of Scopes)

d. Seeing this gradation and diversity of structure in one small, intimately related group of birds, one might really fancy that from an original paucity of birds in this archipelago, one species had been taken and modified for different ends

Charles Darwin

e. All the human inhabitants of any one country should have equal rights and liberties before the law; women are human beings; therefore they should have votes as well as men

Wallace (human rights)

6. Darwin and Wallace disagreed over the term "natural selection." Give **one** reason why Darwin favoured it, and **one** reason Wallace objected to it.

Darwin favored "natural selection" because it was the perfect counterpart to "artificial selection". Wallace opposed this term because it implied a divine creator and the whole point of "natural selection" is that there is no divine creator in charge. Wallace preferred the phrase "survival of the fittest" because he thought it was more clear-cut.

Do not write below line (for grading purposes)

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7. a. Archbishop Ussher concluded that creation was completed in 4004BC. How did he come up with this figure?

Ussher believed in God and the creation story. His dates were derived from the bible and other biblical works.

b. Georges Leclerc, Comte de Buffon gauged the age of the planet to be 75,000 years. How did he come up with this figure?

Leclerc studied the cooling rate of iron spheres. He would heat them up as high as humanly possible for the time to simulate what he thought early earth looked like - a molten ball.

8. Outline the differences between the monogenic and polygenic theories of human origins. Why was this debate so topical during the 19th century?

The polygenic theory saw the races as different species. The creation story was the beginning of the "white species" while the "black species" had been around beforehand in Africa. Monogenic theory was the idea Charles Darwin sided with where all human life came from Adam and Eve and the black race spurned from them as a genetic variation. Debate was so topical because black people were being "scientifically proven" to be the inferior race which justified racism and slavery. Most slave owners were polygenists.

Do not write below line (for grading purposes)

9. Both Darwin and Wallace report that T. R. Malthus was an important influence on their development of the theory of natural selection. Outline the key idea of Malthus that had such an impact.

Malthus wrote a book that Darwin and Wallace both read. The book talked about how God had established society's order (monarch at the top, then the prosperous classes, then the laborers all the way at the bottom) and there was no (or VERY limited) social mobility. When there was a shortage of resources, Malthus thought it was only right that the poor, old, sick laborers should die first. This book sparked the idea of natural selection and survival of the fittest.

10. Darwin studied Paley at Cambridge.

a. Outline the essence of Paley's natural theology.

Paley thought that God made things the way they should be with no need for adaptation. He saw the rocks and concluded they had been there since the beginning of the earth. Paley also has a famous quote about a watch.

b. What is an adaptive radiation? Using a Paleyan perspective, explain adaptive radiation.

Adaptive radiation is the idea Charles Darwin sees with his Finches in the Galapagos. One group of finches arrived on an island and experienced explosive amounts of evolution due to the limited competition. 13 different species were found with all different beaks. These beaks had relatively similar general form, but such different function. These varieties allowed the Finches NOT to be so competitive with each other for resources.

Do not write below line (for grading purposes)

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11. An historian of Darwin's Galapagos visit, Frank Sulloway, has written that the chief offence of the Darwin-Galapagos Eureka! legend is that it "masks the complex nature of scientific discovery, and, thereby, the real nature of Darwin's genius." Use what you know about the development of Darwin's thinking to illuminate the "real nature of Darwin's genius."

Darwin did not go to the Galapagos and have a "eureka moment" ... his discoveries were made more humanely over time. Darwin grew up in a world rejecting the Enlightenment movement post French Revolution. He questioned the "old thinkings" and set out to sea to examine not only finches, but natives as well. He published his book, *The Origin of the Species*, which detailed his findings about natural/sexual selection, variation, adaptive radiation, etc, which were radical for his time. Darwin didn't actually say that humans came from apes, but people were able to read between the lines and extrapolate that.

12. The anonymously published *Vestiges of the Natural History of Creation* affected Darwin and Wallace in very different ways. Describe the impacts on each of them.

Darwin recoiled at *Vestiges* and hunkered down for years after to put real scientific evidence behind his own findings to make them more believable to the public. Wallace was inspired by *Vestiges* and set sail to travel the world to further his own research.

Do not write below line (for grading purposes)

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13. In his 1855 "Sarawak Law" paper, A. R. Wallace wrote, "Every species has come into existence coincident both in space and time with a pre-existing closely allied species." What does this mean?

This means that there is variation within a species. Wallace may not have understood how exactly these two (or more) organisms that were so similar but not the exact same came into existence, but he acknowledged the presence of varieties. Darwin found that these variations within a species were "perfectly fertile" (could mate with each other). Organisms that can mate with each other belong to the same species.

14. Darwin frequently makes use of experts to support his arguments in the *Origin of Species*. How does he use various experts to support his arguments on defining species and varieties and the relationship between species and varieties?

Varieties are variations within a species. Darwin found that certain varieties could mate with each other (perfectly fertile) which confines them to the same species. Wallace and Lyell supported this argument and both published works agreeing with Darwin before he published *Origin of the Species*. Wallace wrote Darwin a letter telling him to hurry up and publish his work to keep his presidency. Darwin wanted to add the word "Abstract" to his title but his colleagues did not allow it. Darwin was also advised not to make direct comments about humans coming from Apes because it was too radical at the time and would undermine his work.

Do not write below line (for grading purposes)

15. On the struggle for survival, Darwin states, "The struggle almost invariably will be the most severe between the individuals of the same species, for they frequent the same districts, require the same food, and are exposed to the same dangers." How might this support Darwin's ideas of divergence of character and how species come about?

With the finches on the mainland, they had the same characteristics and were confined to the same space due to predators. When a group of finches arrived on the Galapagos Islands, they experienced divergence of character as there were less predators "hogging up" the other ways of life the mainland finches were barred from. On the mainland, the finches competed with their predators as well as each other for the limited space. On the island, the finches experienced adaptive radiation and branched into 13 different varieties that ate different foods and lived in different habitats. The island finches had less preditorial competition AS WELL as less competition with each other.