

SLS 12 Midterm 1

Henry Farrell

TOTAL POINTS

62.5 / 75

QUESTION 1

1 Eugenics 5 / 5

✓ - 0 pts Correct

QUESTION 2

2 Geology 5 / 5

✓ - 0 pts Correct

QUESTION 3

3 The Darwins 5 / 5

✓ - 0 pts Correct

💬 great!

QUESTION 4

4 Acquired characters 5 / 5

✓ - 0 pts Correct

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 0.5 / 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 4 / 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.

- ☞ We were looking for the answer that Darwin favoured natural selection because of its ready analogy to "artificial selection" which was a process with which his Victorian readers would have been familiar.

QUESTION 7

Dating the Earth 5 pts

7.1 A 2.5 / 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 / 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 2 / 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.

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

QUESTION 10

Paley 5 pts

10.1 A 2 / 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.

☞ True, but why? What was Paley's logic?

10.2 B 2.5 / 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

☞ Great! I didn't take off points, but think about how Paley would have explained the amazing similarities among species in an adaptive radiation (remember this isn't a normal part of all ecosystems!).

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 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

0/2 points- Answer doesn't address the relationship between species and varieties. The main point here is that the division between species and varieties is blurry.

1/2 points- Answer cites experts that Darwin consulted. However, the main point here is that experts often disagree in the classification of species v. varieties, supporting Darwin's argument that the line between the two is blurry.

0/1 point- Does not discuss implications for descent with modification. Specifically, the blurry distinction supports the idea that varieties

are incipient species.

QUESTION 15

15 Struggle for survival 4 / 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

Didn't mention divergence of character will MITIGATE THE COMPETITION within species, which is the primary mechanism to generate various varieties occupying different ecological niches.

Harvard ID #: 41292679

TF: Tues 12-1:15
Kate

Name: Henry Farnell

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's theory of eugenics has two central types — positive and negative. Positive eugenics involves encouraging "fit" individuals to breed more. Conversely, negative eugenics involves discouraging unfit individuals from breeding through many means, including sterilization.

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

Catastrophism was thought up by Cuvier, who proposed that species went extinct ~~from~~ b/c of natural catastrophies. Uniformitarianism was thought of by Lyell, who believed that the only natural catastrophies that have occurred in the past are comparable to the ones we have today — volcanoes, earthquakes etc. and that this has remained stable over time.

Do not write below line (for grading purposes)

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TF: Tues 12-1:15
late

Name: Henry Farrell

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"?

"Spheric glass" is a microscope reference

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

Erasmus' theories were similar to Lamarck in that he believed use of a particular characteristic led it to be passed to offspring, whereas Darwin had a more complete theory of natural selection where specific traits are selected.

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.

Lamarck believed and coined the term "inheritance of acquired characteristics". The idea states that an organism who uses a particular characteristic frequently and out of necessity (giraffe reaching for trees) will pass that heavily used characteristic to its offspring.

Do not write below line (for grading purposes)

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rate

Name: Henry Farrell

5. Who said:

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

Thomas Huxley

b. Three generations of imbeciles are enough

Buck vs Bell Supreme Court Justice

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

Lyell

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

Alfred Wallace

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 favoured the term because, unlike artificial selection, natural selection "selects" favourable traits in species without anything guiding this process.

Wallace objected because he thought natural selection implied that there was a selector and that the comparison w/ artificial selection would confuse the audience/readers of "the origin."

Do not write below line (for grading purposes)

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

He carefully read bible scripture and used references and dates in holy texts to calculate that the earth was some 5650 years old.

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?

Buffon hypothesized that the earth was once one giant heap of hot metal, so he used cooling metal balls and observed the time it took them to cool to estimate the age of the planet.

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

Monogenic theory details that all mankind descended from Adam and Eve. Polygenic theory states that different races descended from different people, and that only caucasians descended from Adam and Eve. This was a hot topic because conversations about race were beginning to emerge among many racist racial theories of the time.

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 formulated theories about population growth. He stated that population growth, when unchecked, grows geometrically, and that food supply grows more slowly (arithmetically), meaning that there would be an eventual shortage of food and resources and thus death.

10. Darwin studied Paley at Cambridge.

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

Paley's theory of natural theology recognized organisms perfectly crafted attributes for their environments, and attributed them to a designer who knew exactly what the organisms needed.

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

Adaptive radiation occurs when a species arrives on a relatively uninhabited region with little competition (think Darwin's finches) and many mutations turn out to be effective and useful thus there is rapid diversification. Paley would ~~the~~ say that these adaptations were designed by a creator for their specific purpose.

Do not write below line (for grading purposes)

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's genius" was that of intense and meticulous data collection over a long period of time. He thoroughly examined many different species — from the famous finches, to pigeons, to numerous plants, beetles, barnacles and many more. Only after years of this was he confident enough in his methods and data to publish "The origin of species," displaying a wide array of evidence to support his theory of evolution.

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.

"Vestiges" affected Darwin inasmuch as it made him realize that he needed more data and proof, making him shy away from publishing his own volume until 1859, while *Vestiges* was published in the 1840s. Conversely, young Wallace was inspired by Chambers' thought-provoking work, encouraging him to study and travel to uncover more about the topic.

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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?

Wallace's Sarawak Law hints at the theory of common ancestry, and how new species are formed through slight variation and subtle mutation (closely allied) over very long periods of time. He wrote this Law on Sarawak Island.

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?

Darwin surrounded himself with wise mentors and companions who doubled as experts in their fields, whether it be in geology like Lyell, or botany or geography. He was influenced and inspired by another mentor Hooker, as well as his professors at Cambridge like Sedgwick. (Even though Sedgwick would later become an opponent of Darwin).

Do not write below line (for grading purposes)

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TF: Tues 12-1:15
late

Name: Henry Farrell

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?

For organisms of the same species that compete with one another for food and other resources, slight variation may become a larger advantage in the margins, leading to more stark differences and the eventual extinction of the only marginally less-fit species. This leads to divergence of character over long periods of time.

Do not write below line (for grading purposes)