SLS 12 Midterm 1

Sunaina Danziger

TOTAL POINTS

56 / 75

QUESTION 1

1 Eugenics 5 / 5

✓ **- 0 pts Correct**

QUESTION 2

2 Geology 5 / 5

✓ **- 0 pts Correct**

QUESTION 3

3 The Darwins 4 / 5

- 0 pts Correct

- 1 Point adjustment

b) Erasmus believed in spontaneous generation whereas Darwin had a mechanism for evolution: natural selection

QUESTION 4

4 Acquired characters 1 / 5

- 0 pts Correct

- 4 Point adjustment

It is the passing of traits between generations of characteristics acquired over the lifetime of the individual. Lamarck supported this. E.g. A bodybuilder's beefy arms or a giraffe's long neck

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 1 / 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 0 / 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 2.5 / 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.

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 1.5 / 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 5 / 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 3.5 / 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

- 0.5 Point adjustment

Exponential growth of population if unchecked. Also this has nothing to do with divergence of characters.

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.

True, but what did this design imply? What was his argument about the watchmaker saying?

10.2 B 1 / 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

Explanation of adaptive radiation confuses it with evolution, doesn't provide mechanism for this change, and implies that individuals are changing themselves. It also fails to describe how Paley would explain the subtly differences of different species in an adaptive radiation. Why are they similar? Why are they different?

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 4 / 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 2 / 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.

0/2 points- Darwin does not think that inheritance of acquired characteristics explains most of the variation within species. He cites experts who disagree on the classification of species versus varieties to reinforce the idea of a blurry line between the two classifications.

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 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

Harvard ID #: 90977a89 TF: Catherine Name: Sunaina Darisetty

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 theorized the distinction between positive and negative eugenics. Positive eugenics involved encouraging offspring among individuals with perceived "positive" traits and health qualities (social status as well), negative eugenics involved discouraging individuals with perceived "negative" traits, status etc. from having offsprings.

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

Catastrophism, associated with Cuvier, assumed that the Earth's development/ state of rock formations had been determined by a series of "catastrophic" events in history. Uniformitarianism, associated with Lyell, articulated the idea that the "present contains knowledge about the past" (looking at rock formations/geology currently would provide insight on the past).

Do not write below line (for grading purposes)

Harvard ID #: 90977489 TF: Catherine Name: Suraina Danziger

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"?

A microscope

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

Erasmus Darwin believed that "traits" were passed down directly between ancestors and that younger generations automatically assumed positive traits of their ancestors, becoming "better equipped" over time, that progress constantly moved in a forward direction. Darwin instead noted that species often "reverted" to previous traits,

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.

"Inheritance of acquired characters" implies that traits are immediately passed between individuals and their offspring. It a concept used to justify the practice of eugenics, most directly propagated by Galton.

Do not write below line (for grading purposes)

Harvard ID #: 90477989 TF: Catherine Name: Suraina Daniels

5. Who said:

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

Huxley

b. Three generations of imbeciles are enough

Oliver Wendell Holmes (Buck vs. Bell)

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

Asa Gray

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

John Gould

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

A.R. 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.

Wallace objected to the idea of "natural selection" as it implied the role of a divine creator "selecting." Darwin favored it because it better drew a distinction between "natural" and "sexual" selection, whereas "survival of the fittest" purely implied competition & didn't account for colorful male birds.

Do not write below line (for grading purposes)

Harvard ID #: 90077069 TF: Catherine Name: Suraina Danziger

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

Ussher added the ages of everyone in the bible to arrive at 4004 BC (the time of the creation of Adam/Garden of Eden)

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?

The Count of Buffon experimented with heating balls of iron (did not believe in finity/divine creation) and projected 75,000.

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

Monogenic theories of human origins suggested all modern humans derived from the same origin (although many monogenists, like Blumenbach, classified various skulls by "race"). Polygenists effectively projected that every race was its own species deriving from distinct ancestors (Samuel Morton), came at a time of imperial expansion, Darwinism being exploited in a social context to justify subjugation of others based on race.

Do not write below line (for grading purposes)

Harvard ID #: 90177489 TF: Catherine Name: Sunaina Dandekar

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, part of a wave of reactionaries to the French Revolution, proposed the idea that there was not adequate subsistence for the total human population. This influenced Darwin's and Wallace's notions of competitive exclusion and divergence of character.

10. Darwin studied Paley at Cambridge.

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

Paley believed that every living being exhibited a form of divine "design," justifying variation.

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

Adaptive radiation is the development of different physical traits to best meet its functions/environment, Darwin projects the adaptation of different beaks for finches. A Paleyan perspective would say that species/variations within species exist as they do because of God's design.

Do not write below line (for grading purposes)

Harvard ID #: 90977489 TF: Catherine Name: Sunaina Danziger

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."

The Darwin-Galapagos "Eureka" moment assumes Darwin suddenly arrived at the ideas he articulated in Origin of Species in the Galapagos upon seeing its wild life. He had earlier been inspired by collecting beetles while in university, and influenced by his progressive/scientific family. The "real nature of Darwin's genius" involved studying a vast array of wildlife in the Galapagos and beforehand, influenced by figures who came before him. He also engaged with other experts, such as John Gould, on finches.

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 was widely read but panned by critics. Darwin, who had just returned from the Beagle Expedition and began writing the Origin of Species, was encouraged to slow his writing process fearing the critical climate. Wallace was instead inspired by its ideas, and soon thereafter left to explore the Amazon.

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?

Wallace's idea hinges on "survival of the fittest" and the notion that modern species have developed the favored attributes of "pre-existing allied species" to best survive in their various habitats. Species living in similar climates (though in different places) likely also are "closely allied" in that they share traits used to best exist/perform daily functions). He uses kangaroos in Australia as an example.

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 uses various experts to explain the idea of "doubtful forms" specifically. Individuals (Lamarck, for instance), theorized "self-motivated change" various species "pushing themselves up the evolutionary tree." But Darwin, understanding this framework, argues that the same type of scheme can explain variations within species. He uses pigeons to experiment with "reversion," or the idea that inter-breeding can result in traits associated with an earlier ancestor (the rock pigeon). Often just as much intra-species variety as inter-species,

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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?

Individuals of the same species effectively co-exist in the same niche, "Divergence of character" implies that variation exists within species/species come to develop greater intra-variation to avoid "competitive exclusion," or to make it such that the same species are not directly competing for the same resources/habitats. Variation can occur to such an extent (in function, need, etc.) that new species come about, limiting the extent to which competition for the same resources occurs.

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