SLS 12 Midterm 1

Tess Fitzsimmons

TOTAL POINTS

72 / 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 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 0.5 / 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 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 2.5 / 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 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

QUESTION 10

Paley 5 pts

10.1 A 2.5 / 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.

10.2 B 2 / 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

This is essentially correct, but didn't quite get how adaptive radiation is different than evolution in general. Also doesn't describe how Paley would explain the similarities among species in an adaptive radiation (remember, this isn't seen in every 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.

A note on timeline: Darwin had already written this abstract for Emma before Vestiges was published.

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 3 / 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: While pigeon breeders were important expert resources for Darwin, the main point is that experts disagree as to the classification of species and varieties.
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 #: 50977277 TF: Cat Chamberlain T. 12-1:15 Name: T. Fitzsimmons

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.

Positive Eugenics is the practice of encouraging genetically 'fit' people to marry one another & have more children. Negative Eugenics is the practice of discouraging genetically 'unfit' people from having children at all.

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 w/ Georges Cuvier) and Uniformitarianism (associated with Charles Lyell) are both pre-Darwinian theories of biological development. Catastrophism is about sudden changes that wipe out large swaths of species (like the biblical flood), hence Cuvier could explain stratified fossil record. Uniformitarianism was about gradual change. Lyell believed that all changes had been no more drastic than the little changes we see in nature today.

Do not write below line (for grading purposes)

Harvard ID #: 50977277 TF: Cat Chamberlain Name: T. Fitzgibbons

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"?

(7) A microscope

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

Erasmus Darwin's theory of evolution had no defined mechanism, "new powers acquire" is very vague. Charles Darwin's theory, obviously, had a clear mechanism in Natural selection.

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" is Lamark's theory. Basically, Lamark thought that every thing had an internal drive ("besion") to push itself to live in its environment. This striving caused change to its physical form which made it more adapted to its environment. These changes could then be inherited. I.e. A giraffe stretched its neck trying to get leaves, and its stretched neck was then passed on to its offspring children.

Do not write below line (for grading purposes)

Harvard ID #: 50977277 TF: Cat Chamberlain Name: T. Fitzsimmons

5. Who said:

a. How extremely stupid not to have thought of that! Huxley (of Darwin's theory of Natural selection)

b. Three generations of imbeciles are enough Oliver Wendell Holmes

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

(?) Morbuzzy

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

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 disliked the term because he thought it implied agency in the process of selection, not the term 'selection' implied a selector. Darwin favored it because it went along well with his analogy between the method of artificial selection and the notion of natural selection. Wallace later proffered the term 'survival of the fittest' because it did not imply agency.

→ Darwin, afterall, was writing in the Origin that the two process worked in the same way.

Do not write below line (for grading purposes)

Harvard ID #: 50977277 TF: Cat Chamberlain Name: T. Fitzsimmons

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

✓ He calculated it by adding all the ages of the Biblical patriarchs together. Basically he did Bible math.

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?

✓ He thought (like other enlightenment people) that the Earth had condensed from a hot cloud of metallurgic matter. So he calculated his time from data he gathered during experiments w cooling metal balls.

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

According to the Monogenic theory of human origins, humans all descended from one species and races are just different variations. According to the polygenic theory of human origins, different races of humans came from different species created at different times. This was topical because abolitionists favored the monogenic view, while supporters of slavery favored a polygenic view (because of the moral distance it placed between slave owner & slave).

Do not write below line (for grading purposes)

Harvard ID #: 50977277 TF: Cat Chamberlain Name: T. Fitzsimmons

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's idea concerning population had an influence on Darwin & Wallace theories on the evolutionary mechanism. Malthus said that all life was a struggle, & that human populations were limited by resources, with the sick & weak dying first. While Malthus saw this as a moral concern, Darwin & Wallace saw in it the foundation of Natural selection/Survival of the fittest

10. Darwin studied Paley at Cambridge.

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

Paley's natural theology rested on the following propositions:
(1) One could see design evident in nature, how perfectly made animals/plants are for their environment.
(2) All designed things have a designer.
(3) Nature must then have a designer (God)

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

Darwin said adaptive radiation was this.
→ Adaptive radiation is the concept (refer to Darwin's finches beaks) that one species of animal can form adapt to various environments into various species that deviate to a greater or lesser extent from the original species form. Paley would have explained adaptive radiation as a compassionate creator, deliberately & intelligently modifying individual species so as to thrive in their unique environments.

Do not write below line (for grading purposes)

Harvard ID #: 50977077 TF: Cat Chamberlain Name: Tara Fitzsimmons

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 'real nature of Darwin's genius" was his keen observation and his incredible ability to accrue evidence. On his visit to the new world, Darwin was unsettled by small facts of biology there (ie the discovery of fossils of large versions of modern animals, the existence of flightless rhea, his dissimilarity to the Fuegians) that a less observant man may have overlooked. These inspired Darwin, however, to spend years upon years organizing evidence to support an evolutionary theory to explain them. His 'aha' moment was in reading Malthus, but these other aspects of his genius was crucial to the writing of Origin

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.

Wallace was a young railway surveyor at the time, and the book had an exhilarating effect on him. He took it as an inspiration to leave his odd job and become a full-time naturalist, collecting specimens for museums. Darwin, who had already started forming natural selection ideas in his head by 1844, was terrified he had been scooped and by the intense public response to Vestiges, he wrote out a 'short' abstract to publish in case he should pass away, then devoted himself to collecting evidence for the full length Origin of species

Do not write below line (for grading purposes)

Harvard ID #: 50977277 TF: Cat Chamberlain Name: T. Fitzsimmons

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?

The two crucial aspects of this law are the reference to space and 'time'. Wallace is realizing two important aspects of the later theory of divergence of character. A species can be alike, but slightly different from a nearby species because they share a similar ancestor, but have adapted to slightly different environments. The 'time' part is trickier, but one might imagine the stratification of the fossil record to understand this. A species fossilized in one strata might be similar to a species in the same strata because they are both the same chronological distance from their shared ancestor.

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 never really sets himself to a firm definition of species or variation, but he does come up with working definitions and tests the difference between variation and speciation by referring to the work of pigeon fanciers. Darwin supposes that a species is separated from another species by a large morphological gap, and that different varieties may descend from a species. He then tests these definitions by tests. His idea that the wide range of varieties of fancy pigeons was due to their descent from one different species of pigeon. Darwin crosses two very different types of pigeon and ends up with Something very like the wild rock pigeon after a few generations. He takes this reversion to mean that we can correctly suppose that the morphological gap between the different types of pigeons was too small to justify descent from different species, and that many varieties within can descend from 1 species.

Do not write below line (for grading purposes)

Harvard ID #: 50977771 TF: Cat Chamberlain Name: T. Fitzsimmons

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?

Darwin believed (refer to his one figure in Origin) that different species were in part produced by divergence of character, i.e. members of a single species living in the same environment could adapt in different directions to avoid competition for resources. Animals that were competing for the same food, for example some of the finches competing for a wide variety of seed sizes, could 'split' in adaptations to the seeds. With some adapting a smaller beak to eat smaller seeds and some adapting a larger beak to eat larger seeds. This, then, produces 2 roughly different species.

Do not write below line (for grading purposes)