SLS 12 Midterm 1

Elijah Tai

TOTAL POINTS

70 / 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**

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 / 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 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 4 / 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 1.5 / 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.**

True, but what is the evidence in nature that requires a designer?

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 5 / 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.

Great!

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 #: 21368318 TF: Tuesday 12:00. Name: Elijah Tai

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 encouraging the fit or the population with the desired traits to have more offspring.

Negative eugenics is discouraging the non-fit or population with undesired traits to have less offspring.

One is active selection of positive traits, one is preventative selection against negative traits.

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

Catastrophism mainly formulated by Cuvier included sudden epochs of catastrophe which resulted in extinction of some species.

Uniformitarianism, mainly formulated by Lyell, postulated that any change that happened in the past resemble the types of changes we see now.

Uniformitarianism implies an older earth because the changes are more gradual to cause extinction or significant geographical change.

Do not write below line (for grading purposes)

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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"?

You cannot see anything even with a magnifying lens.

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

One key difference is that Darwin believed in natural selection, whereas Erasmus may have had a more Lamarkian view that "New powers" are simply "aquired."

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.

Lamark is most associated with the idea. The main gist is that any aquired characteristic can be passed on. For example, if a kid decides to work out a lot and this becomes really strong as an adult, then his kids will be born stronger because of the father's "aquired characteristic."

Do not write below line (for grading purposes)

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5. Who said:

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

TH Huxley

b. Three generations of imbeciles are enough

Galton?

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

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.

Darwin favored it because it was conceptually close to artificial selection and pigeon breeding which was well known and popular at the time. The only difference is that nature is doing the selecting, and this is easy for his readers to follow.

Wallace objected that the term implies a "selector" who is doing the selection, when really there does not need to be a selector. (In context, this selector may be a God or deity)

Do not write below line (for grading purposes)

Harvard ID #: 213683 TF: Tuesday 12:00 Name: Elijah Tai

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

He added up the generations in the bible and the week of creation to create a timeline of the Earth.

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 experimented with the cooling rate of metal balls, making the assumption that the earth initially was a liquid metal ball.

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 is that humans stem from a single earlier origin. Polygenic theory is that in the beginning there were different "types" of humans.
This was extremely topical because of imperialism and racism — Monogenic theory implied that humans are basically the same in origin, and this there is not much grounds for one race having priority over another. The opposite is true for polygenic theory.

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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 believed that population growth was geometric but food increase was arithmetic, thus at some point there could not exist enough food for everyone. He then proposes a remedy of controlling population growth and other vices.

Darwin and Wallace realized that this was an example of competion and could be applied to the natural world where only some (the fittest) would survive.

10. Darwin studied Paley at Cambridge.

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

Paley's idea is that a watch implies a watch maker. Thus, nature implies divine design.

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

Adaptive radiation is that there is an explosive increase in the number of species and varieties in a given environment. Paley may have attributed this to divine design that God assigned each species to occupy a specific niche and that is why the species are so well adapted.

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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 formulate is main ideas until arriving back to London. In reality, Darwin had been thinking about the topic for a long time, corresponding with many academics, studying species ect. He was influenced by his father, Malthus, and many other people. such as his professors at Cambridge (Sedgewick) or his contacts at the Linnaeus Society. There was not a singular "aha" moment at the Galapagos.

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 made Darwin hesitant about publishing, especially because it was viewed critically by many academics. Also, Darwin did not want to publish immediately after, thus potentially seeming like a copy. Darwin wanted to aquire more evidence, so he spent a long time studying pigeons and barnacles.

Wallace on the otherhand was very excited by the book and its impact during the time and it spurred him to launch into his evolutionary investigations.

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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?

He means that all species are related — that each species comes from a very similar species, in some moment in the history of the earth. It is very close to Darwin's theory except that it is missing the component of natural selection.

At the time, however, "Sarawak Law" did not get much attention.

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 cites how experts often have trouble distinguishing species from varieties — that experts may often disagree, or may think that some animals/organisms might be right inbetween the two definitions.

Darwin uses this ambiguity to suggest or set the stage for his argument that varieties evolve over time into species, thus explaining why both terms are not quite as distinct as previously thought.

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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?

Darwin argues that intraspecific competition is more intense than interspecific competition — that the competion within the species is the main driving force of natural selection.

This supports the divergence of character and the formation of species by showing that to outcompete other members of the current species, some subset of the species may be forced to aquire (by survival) new traits that differ from the original species. Over time these subsets will slowly occupy different niches, and over time, will become a new species altogether. This results from the fact that the competition of these new species (inter specfic) is much less than the original competition (intraspecific). (Thus, leading to divergence).

Do not write below line (for grading purposes)