SLS 12 Midterm 1

Marcella Park

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**

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 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

Competition for limited resources.

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.**

Paley's natural theology was a belief that you could understand the world and god's design rationally. What was his logic? What was the evidence from the natural world that he used?

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.

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 #: 60977623 TF: Cat Chamberlain Name: Marcella Park

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 encourages reproduction by people/specimens with "good" genes. (preferably with each other) Negative eugenics discourages reproduction by people/specimens with "bad" genes, e.g. mental illnesses.

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

Both catastrophism and uniformitarianism dealt with great, long epochs of earth's history that scientists came to accept had happened. Catastrophism, championed by the self-styled "Napoleon of Natural History" Cuvier, posited that large-scale disasters and anomalies (like great floods, the rapid formation of huge mountain ranges) separated these epochs, wiping out much of life on earth each time and making way for new species. Uniformitarianism, meanwhile, championed by geologist Lyell, claimed that natural history unfolded very slowly and gradually, without too many dire events, and that "the present is the key to the past."

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"?

May refer to glasses / microscopes / other devices for seeing small things.

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

Erasmus Darwin had no mechanism for evolution and described it as spontaneous change that couldn't go into more detail about the <u>how</u>. Charles Darwin had the <u>how</u> in his mechanism of 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.

Lamarck believed that organisms could pass down special characteristics acquired in their lifetime, e.g. the giraffe who stretches his neck hard enough to end up with a longer one in his lifetime, and (somehow) passes it down to his offspring.

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!

T. H. Huxley

b. Three generations of imbeciles are enough

Oliver Wendell Holmes

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

Some famous biologist who won important prizes ... a modern-day one.

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

Russian? From first Century.

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

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.

Darwin formed the term "natural selection" because it made for a handy analogy with artificial selection as exemplified in pigeon breeding.

Wallace objected to it because it implied a "selector" like the analogous pigeon breeder, and Wallace wanted it emphasized that there was no one intelligent mind orchestrating it all — it was a mix of circumstances and chance traits.

Do not write below line (for grading purposes)

Harvard ID #: 60976623 TF: Cat Chamberlain Name: Maudlin Park

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

he went through the Bible, particularly its genealogies, and carefully counted up all the listed ages and years.

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 measured the cooling of hot iron balls as an analogy to the theory that earth had once been a hot ball of metal and cooled down to become what it is now.

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

Monogenists believe that humans are all of the same "race," or "species" — At that time this meant all humans were descended from Adam and Eve.

Polygenists believe that the different human races are separate — were created / originated separately, perhaps placed by God where they were meant to live.

This was significant in the 19th century as abolitionists tended to be monogenists and slave owners to be polygenists (this distinction helped justify one under the other).

Do not write below line (for grading purposes)

Harvard ID #: 60976623 TF: Cat Chamberlain Name: Marcella Park

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 that the population of the earth tended toward exceeding the means of the earth to support it, and that the mechanism of controlling this population was vice — The "vices" of the (usually) poor, such as unhealthiness and unhealthy habits, kept populations down to the proportion supportable by our resources.

10. Darwin studied Paley at Cambridge.

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

Paley believed that everything was carefully designed by God for its own special purpose. A part of this theology was the fixity of species.

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

Adaptive radiation is the branching of a population into subgroups (species!) with different traits. ~~in response to~~ ~~scarce/not resources. The branching of allow the different groups to exploit use of a broader range of these resources, making the population more adaptable.~~ From a Paleyan perspective, these different traits (e.g. the distinct beak shapes of the Galapagos finches) must have been carefully given to different species by God to perfectly suit their environments!

Do not write below line (for grading purposes)

Harvard ID #: 60777623 TF: Cat Chamberlin Name: Marcella Park

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 didn't come up with his theory of evolution on the Beagle voyage. Far from it. He spent years classifying and collecting more natural things, scribbling in his Transmutation notebooks, and shaping his evidence into arguments. It was only because of Wallace's letter that he published the Origin when he did, and he thought of it as an abstract to which he could have added more careful argument and detail. "Darwin's genius" could break down into two things: 1. his ability to synthesize all this observation (and some very abstract philosophical theory coming from Malthus) into a monumental theory, and 2. his ardent devotion to arguing that theory as carefully and as the most tirelessly possible.

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.

The Vestiges' publication discomfited Darwin, by stirring up controversy that he feared his work would stir up, and by making him fear his work wouldn't be seen as original. Meanwhile, Wallace was inspired by the Vestiges to see it claims for himself. He left for the Amazon after reading it, and it was there that he observed the evidence for his own theory of evolution.

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 speciation happens not spontaneously (i.e. plopped down by God) but somehow in correlation with predecessor species. The implication is that new species evolve from older ones.

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 sees the fact that experts have such a variety of conflicting opinions on which differences create species and which differences create varieties — to blur the line between species and varieties and argue that it is the same mechanism that drives variation and speciation — speciation is merely the further continuation of variation.

Do not write below line (for grading purposes)

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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?

This "fiercest struggle" corresponds to Darwin's idea that new species come about from variation within single ancestor species (as opposed to the intermingling of multiple separate species). This "struggle" also sets the circumstances in which divergence of character would occur as subgroups of the species adopt different characteristics that allow them to take advantage of a wider range of resources and neither a wider range of dangers instead of continuing to compete for the same scarce range or all being decimated by the same dangers.

Do not write below line (for grading purposes)