SLS 12 Midterm 1

Sarah Wexner

TOTAL POINTS

58.5 / 75

QUESTION 1

1 Eugenics 5 / 5

✓ **- 0 pts Correct**

QUESTION 2

2 Geology 4 / 5

- 0 pts Correct

- 1 Point adjustment

Catastrophism - Cuvier

QUESTION 3

3 The Darwins 4 / 5

- 0 pts Correct

- 1 Point adjustment

a) Microscope

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 / 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 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 1.5 / 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 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 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

Exponential growth vs. limited resource.

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! 4 / 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

- 1 **Point adjustment**

Very good! This could be improved by including examples of Darwin's research and collaborations.

QUESTION 12

12 Vestiges 4 / 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.

- 1 **Point adjustment**

Wallace was indeed inspired to think of himself as a transmutationist, but the inspiration to go to the Amazon specifically came from a different book written by WH Edwards.

QUESTION 13

13 Sarawak 2.5 / 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

1 Wallace is stating here that new species evolve from a recent ancestor, which, having evolved instead of being generated by a creator, you will find the new species in the same relative geographic space and time because they are recently descended from an ancestral population. He is not talking about competition in this statement.

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.

+ 2 Point adjustment

1/2 points: Answer discusses classification of species and varieties, but does not address the fuzzy boundary between the two. 1/2 points: Darwin does use other experts' characterizations of species and varieties, but his major point here is that even experts can't agree on how to draw the line between the two classifications. 0/1 point: Answer does not address implications of expert's disagreement for descent with modification.

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 #: 21292079 TF: Chamberlain (T 12-1:15) Name: Sarah Wetter

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 the 'fit' to reproduce whereas negative eugenics attempts to dissuade/prevent the 'unfit' from reproducing. An example of positive eugenics is a breeding program. Negative eugenics, on the other hand, could be enacted through 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 is the belief that different geological epochs were ended by natural disasters such as floods or volcanic eruptions and segments natural history. It is associated with Ussher. Uniformitarianism, associated with Lyell, sees the world as a continuing progression, and asserts that what we see now is a continuation of past processes. This sentiment is summarized by the statement "The key to the present is in the past."

Do not write below line (for grading purposes)

Harvard ID #: 21292079 TF: Chamberlain Name: Sarah Wixner

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" refers to the human eye - unseen by man

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

Erasmus Darwin believed in the ability of organisms to self-select for certain traits and the self-promotion of progress whereas Charles saw change as a product 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 is most closely associated with the idea of "inherited of acquired characteristics." In this theory, species have a "besoin" - a motivation/motor for change which allows their desired traits to become a part of their body plan in the future.

Do not write below line (for grading purposes)

Harvard ID #: 21292079 TF: Chamberlain Name: Sarah Werner

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

Dr. Berry

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

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.

One reason Darwin favored the term "natural selection" was due to his belief in sexual selection, a point which Wallace objected to. Wallace disliked the term "natural selection" because he believed it was confusing, as it implied the presence of a selector.

Do not write below line (for grading purposes)

Harvard ID #: 21292079 TF: Chamberlain Name: Sarah Wexner

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

Ussher relied on the Bible to date the world, and used the timeline of the Flood to infer the date of the earth's creation.

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?

Leclerc did experiments and observed the cooling of iron balls to calculate the age of the Earth.

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

Monogenism asserts that humankind is descended from one ancestor that has varied over time, and that different 'races' are different 'varieties'. Polygenism, on the other hand, says that humankind originated separately in multiple locations, and that the different 'races' are not all the same kind of human. This debate was so topical because these theories were used to support theories of racial hierarchy in order to defend colonialism and slavery in the USA.

Do not write below line (for grading purposes)

Harvard ID #: 21292079 TF: Chamberlain Name: Sarah Wexner

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 outlined the idea that the population (of England) was increasing too rapidly, and that it had to be checked by vice, misery, and restraint, especially among the poor, in order to keep a natural balance. This informed / inspired Darwin's theory of natural selection and 'survival of the fittest' because it explained the mechanism by which populations are limited and that they must compete for scarce resources in order to survive.

10. Darwin studied Paley at Cambridge.

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

Paley's essential idea is that design is evidence of God in nature. According to Paley, all things have design, and all designs have a designer, and that the universe is evidence of God's presence.

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

Adaptive radiation is the process that results in speciation. In this process, different species adapt from a common ancestor to fill different biological/environmental niches. In a Paleyan perspective, adaptive radiation is evidence of intelligent design. He would say that each species was "a thought in the mind" of the Creator, and was created specifically for a certain environment.

Do not write below line (for grading purposes)

Harvard ID #: 21292079 TF: Chamberlain Name: Sarah Wexner

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' legend is a myth because the "eureka" moment did not occur on the Galapagos at all. Instead, it emerged in the years following the Beagle voyage and was influenced by the observation and influence of other naturalists. Darwin's friend, a prominent botanist helped him identify the different species of his collection, and Darwin relied on the expertise and collaboration of others. His theory, as can be seen in his extensive field books and journals, emerged slowly over time.

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 a controversial book because it denied the presence of God in a progressionist explanation of the history of the Earth and the creation of species, including man. Darwin was terrified by 'Vestiges', and he became more tentative as it was criticized, especially by his former professor Adam Sedgwick. Wallace on the other hand, was inspired by 'Vestiges' and decided to travel to the Amazon because of its description in the book.

Do not write below line (for grading purposes)

Harvard ID #: 21292079 TF: Chamberlain Name: Sarah Wiener

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?

By this, Wallace means that new species have developed from their ancestors to compete with their ancestors and other similar species. This means that they are in constant, intense competition. The 'Sarawak Law' is used to explain / support the theory of "survival of the fittest" by which evolution occurs. 1

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 makes use of experts when trying to prove a new idea, for example in his discussion of pigeons and explanation of the existence of a common ancestor, the rock pigeon, Darwin relies on the support and definition of other naturalist to affirm the grounds on which he builds his argument. He relies on experts to classify varieties and species for him, and makes his argument built on their classification.

Do not write below line (for grading purposes)

Harvard ID #: 21292079 TF: Chamberlain Name: Sarah Wixner

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?

It is easy to explain this statement by looking to the example of Darwin's finches. Different species of finches with different size/shape of beaks adapt to fill slightly different niches. Over time, what was once one kind (species) of finch with lots of variations will transform into distinct species, as only those with certain, divergent attributes will survive and reproduce, until that finches with that variation (i.e. a longer, narrower beak) participate in a level of inbreeding so as to cause a genetically distinct species. Because the struggle for survival is so intense, species must be able to adapt quickly if they are to survive and not become extinct due to competition by closely-related species that have slight but critical advantages.

Do not write below line (for grading purposes)