SLS 12 Midterm 1

Jack Kelley

TOTAL POINTS

51 / 75

QUESTION 1

1 Eugenics 5 / 5

✓ **- 0 pts Correct**

QUESTION 2

2 Geology 3 / 5

- 0 pts Correct

- 2 Point adjustment

Catastrophism - cuvier; Uniformitarianism - same processes we observe in action today can account for the grand patterns of the past

QUESTION 3

3 The Darwins 5 / 5

✓ **- 0 pts Correct**

QUESTION 4

4 Acquired characters 0 / 5

- 0 pts Correct

- 5 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 0.5 / 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

a. T.H. Huxley (also known as Darwin's Bulldog)

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 0 / 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 / 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

And adding them together

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 / 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**

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 1.5 / 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

This is mostly correct, but didn't quite get how adaptive radiation is different than evolution in general and confusingly suggest Paley could see evolutionary change as a mechanism. 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! 1 / 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

- **1.5** **Point adjustment**

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

QUESTION 12

12 Vestiges 0 / 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 #: 20983248 TF: Tues. @ 12pm Name: Jack Kelley

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 concept of identifying those with positive, or favorable, traits/characteristics/genetics & helping them reproduce more offspring. On the other hand, negative eugenics is the idea of identifying those with negative traits & characteristics & limiting or stopping them from producing offspring. The first attempts to maximize "positive" traits in the gene pool, whereas, the latter seeks to minimize "negative" characteristics.

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

Kuhn Catastrophism - The changes in geological structures/layers is the result of major events of catastrophy (eg. meteor) that significantly affect Earth's environment for life.

Lyell Uniformitarianism - Changes in geological environment occurs slowly over long periods of time, rather than specific times. Collective shifts in macro-time leads to visible changes.

Do not write below line (for grading purposes)

Harvard ID #: TF: Name:

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 = lens / microscope. Means that first cells / life was too small to be studied, even with the proper tools.

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

Erasmus is arguing that successive generations "bloomed" with new features & characteristics, yet, Darwin's figure in "Origins ..." suggests that some species that happen to be fit enough to thrive in a variety of environments might not evolve into a new species if there isn't a new, favorable transmutation for natural selection to act on.

e.g.

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.

Galton argued that each offspring's characteristics were primarily a result of the genetic material passed from its parent & less due to the secondary causes of environment (nature vs. nurture) Thus, Galton is suggesting that favorable attributes seen in offspring (& even unfavorable, for that matter) can oftentimes be traced back to the genetic makeup received from the parent(s).

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!

Darwin's Bulldog (Lyell)

b. Three generations of imbeciles are enough

Thomas Henry Huxley

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

A.R. Wallace

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

Erasmus Darwin

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 favoured it because it implied that nature, as opposed to some divine entity, would select those with favorable attributes because they would be more likely to survive & reproduce than peers w/ less favorable traits, helping the gene pool grow stronger or die out if it failed to adapt.

→ Wallace argued his term "Survival of the fittest" was more appropriate because Darwin's term implied there was some omnitient being or force that acted as a "selector", which could be a way for critics to suggest that theologists were still correct in assuming God / other power is "selecting"

Do not write below line (for grading purposes)

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

As a theologist & biblical man, this number came from studying the linneages & timeline laid out in the Bible.

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 assumed that Earth used to be a red, hot sphere that gradually cooled over time. Using iron balls, he heated them & studied their rate of cooling, which he proposed was similar to that of the Earth. Using this information, he estimated the time it would take the Earth to cool.

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 suggested mankind all spawned from one creation, with races all spawning through "degeneration" over time based on a variety of factors (eg. region). Polygenic theory stated that only whites spawned from Adam & Eve, & that other races were prototypes for the "true" humans that were formed via other creations. This debate was important in the 1800s because slavery was a hot topic, & many argued that it was justified as non-whites were a different species of human. (eg. cranial measurements for support)

Do not write below line (for grading purposes)

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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 argued that ultimately there was a "carrying capacity" of sorts in nature & that there was only enough food & resources to sustain a limited population of life. This was important to Darwin & Wallace because it fed into their ideas of competition in nature, for "natural selection" & "survival of the fittest", since both argue some species are unfit/not adaptive enough to survive.

10. Darwin studied Paley at Cambridge.

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

Paley argued if you found a pocketwatch, you would see how intricate the mechanics were & know that someone had to create it, because all the parts worked together too well to occur by chance. Thus, he argued God must have made mankind & life because it's too complex to occur on its own.

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

Adaptive radiation is the idea that animals adapt over time due to an everchanging environment, & some changes may be larger than others.

Paley, a theologist, would argue that God uses adaptive radiation to change animals as he planned/designed; Rather than directly in response to environment, it's God's original plan for them to develop in such ways.

Do not write below line (for grading purposes)

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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's work is highly based on the concept of natural selection, which takes form through abiotic/biotic forces acting on characteristics/traits passed through genetic material. However, Darwin's theory relies heavily on genetic inheritance, although the ideas/understanding of these processes was not as clear. Darwin received the Wallace letter & got rid of many parts of his book, however, & this eclipsed much of his discovery & knowledge of these processes as the book is more of an abstract than a summary of experiments/observations.

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.

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 every living species must have been spawned from another, closely related ancestor, & through transmutation ≠ variation, each species can be tied to some earlier form of species. New species come from older, similar 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?

He uses so-called "experts" to show the scientific community was very uncertain about how to distinguish between variation & species. Some "experts" said there were a plethora of species, whereas others claimed many of the proposed different species were actually of the same species, just w/ variation. Ultimately, he uses this confusion in the field of science to suggest that new species spawn over time through variation, and to argue that it's very hard to distinguish the two, since every new species must have spawned from variations of another species.

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 supports Darwin's theory that over time, a wedge may occur within a species, meaning competition over the same resources will promote divergence. Consider the giraffe, which can eat from the tall trees, whereas other animals may eat grass/plants from the ground/bushes. Ultimately, variation will cause one form of a species to have an advantage over the other in competing for certain resource(s). Thus, a species may diverge into two, each with their own traits suitable for different types of competition. Either the divergence will occur, causing a new species to compete for different resources, or the variation that is least fit/competitive will be removed (either via extinction or migration). Thus, a new species acts like a wedge, forcing out those other species less fit to compete.

Do not write below line (for grading purposes)