

SLS 12 Midterm 1

Kay Lu

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**

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

QUESTION 3

3 The Darwins 4 / 5

- **0 pts** Correct

- **1 Point adjustment**

- a) Microscope

QUESTION 4

4 Acquired characters 4 / 5

- **0 pts** Correct

- **1 Point adjustment**

- Jean Baptiste-Lamarck

QUESTION 5

Who said 5 pts

5.1 A 0 / 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 0 / 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 2 / 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.

💬 The logic of the watchmaker's metaphor is not that everything must be designed! If you find complex, intimately interconnected parts to a machine, you can see the design. The natural world shows this design, to Paley!

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! 0 / 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 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 4 / 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 #: 20944080

TF: Cat

Name: Kay Lu

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: encourage humans w/ "good" or desired genes
to give birth to the next generation / bear more children.

negative eugenics: prevent humans w/ "bad" or undesired genes
to give birth to children

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

Catastrophism: Cuvier; catastrophies (floods, fires, etc) destroy species / creatures
and onset the next generation/wave of creatures; animals → catastrophies

Uniformitarianism: James Hutton;

→ new animals →
new catastrophies

There is no such things called catastrophies;

Every small change, given enough amount of time, would accumulitively
lead to large changes in landscape.

Despite the two ideas look very different (as described above), they
are both pre-evolutionary ideas that challenges the derive that.

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"?

human eyes or inspection glasses

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

Erasmus: Simple life; born out of spontaneous generation, have internal drive to evolve into a more complex form

Charles: There are no such things as life popping up; species do not follow a linear line of progression; instead, those w/ traits favorable to the local environment get to

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.
- survive and pass on their traits to the next generation

Charles Lyell.

Animals / creatures can pass on the traits that they learn during their lifetime (nurture) to their next generation.
"Soft inheritance"

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5. Who said:

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

b. Three generations of imbeciles are enough Judge Orwell.

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 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 favored it because it has a nice analogy to "artificial selection".

Wallace objected to it because it implies an "agent" in the term "natural selection", while the real idea is that there is no agent at all.

Do not write below line (for grading purposes)

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

By contemplating and researching books/archives/classics
(still cutting-edge research at the time).

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?

By measuring the cooling rate of iron balls.

He decided that the earth was originally a heated ball, slowly cooled down to the current temperature, and thus by measuring the cooling rate of iron balls, he could deduct the age of earth as well.

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

Monogenic: There are only one ancestor of all races; non-whites are ~~more~~ transmutations later during evolution

Polygenic: Different races have different ancestors; God created non-whites first, and then created Adam (and thus Adam is the best, last one). Therefore non-whites are not offspring of Adam and are inferior to whites.

This was topical debate during 19th century due to slavery.
the justification of

Do not write below line (for grading purposes)

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 the population growth overpowers the growth of resources on earth. Since resources such as food & water are limited, there must be checks on the population growth of a species, such as famine, war, etc.

10. Darwin studied Paley at Cambridge.

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

Everything has a designer.

Animals have perfect adaptations to their environment so there must be a designer called God.

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

The ultimate designer, God, has created different forms of life to adapt to the different environment.

Do not write below line (for grading purposes)

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 was originally a natural theologian and thought that God would not bother make so many different forms of same species when the environment is the same, so those must be the same species. But Galapagos has a tremendous amount of biodiversity that Darwin started to change his mind.

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.

Darwin: Darwin was so shocked that the massive negative reactions to *Vestiges* that he decided to delay publishing his theories until he collected a watertight database of evidence to support his argument.

Wallace: On the contrary, Wallace was so inspired by *Vestiges* that he decided to embark on a journey to study more about nature and species.

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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?

There must be a common ancestor at the same place.

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?

By mentioning how experts had a hard time defining species / varieties and how experts usually disagree w/ each other on what is species or varieties, he strengthened his argument for "doubtful forms", which means that there is no clear boundary between species and varieties, and that there could be a transition from varieties to species.

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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?

Since individuals within the same species face constant competition with each other, they have to develop different characters so that they can co-habitate the same place. When these different characters accumulated overtime and the difference between varieties is large enough, new species arise (since Darwin defines species/varieties as : difference in species > difference in varieties).

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