

# SLS 12 Midterm 1

Skylar-Bree Takyi

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

great!

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 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 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 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 2.5 / 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 un receptive 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 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

**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: the practice of encouraging those <sup>humans</sup> deemed fit to reproduce.  
<sup>(often white, often rich)</sup>

Negative: the practice of discouraging the unfit (historically the mentally ill, ~~poor~~ poor people, POC) from reproducing.

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

Georges Cuvier was a proponent of catastrophism. This is the idea that Earth has experienced several epochs, each with more progressive/advanced species than the last, and divided by huge catastrophes (massive flood, earthquake, tsunami, volcano). In each epoch, species are perfectly adapted + so they go extinct following catastrophe. Charles Lyell supported uniformitarianism, the idea that Earth is constant, eternal, and has experienced the same kinds of changes throughout time. Thus, the present is key to the past - all historical ~~just~~ change can be understood by the changes that occur today.

Do not write below line (for grading purposes)

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"?

microscope. things even scientists cannot see (yet.)

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

Erasmus believed in spontaneous generation, that organic life forms suddenly sprang to being from organic matter.  
Charles believed in natural selection/evolution.

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.

Jean-Baptiste Lamarck believed organisms could acquire characteristics during life that they would then pass on to offspring. For example, giraffes that stretched their necks to reach higher foliage would pass on longer necks.

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Do not write below line (for grading purposes)

Harvard ID #: S1170806

TF: Tues @ 12

Name: Skylar-Bree Takyi

5. Who said:

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

T Huxley

b. Three generations of imbeciles are enough

Charles Darwin

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

Alfred Russell 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 liked that natural selection was easily analogous to artificial selection, an already understood term. Wallace disliked that the term suggested there was someone (i.e. God) doing the selecting when the whole ~~point~~ point is that it's a mechanism of nature and not a divine process.

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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?

James Ussher was a biblical literalist, and so he added all the ages of the biblical patriarchs to come ~~up~~ up with "Earth's age."

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 conducted an experiment w/ hot iron metal balls and observed the time it took them to cool. He believed the Earth had once been a hot metal ball that ultimately cooled, and used the balls' cooling time to calculate/estimate how long it took Earth to do the same.

8. Outline the differences between the monogenetic and polygenetic theories of human origins. Why was this debate so topical during the 19<sup>th</sup> century?

- | <u>poly</u>   | <u>mono</u>   |
|---|---|
| <ul style="list-style-type: none"> <li>different races have different ancestors</li> <li>only white people descend from Adam &amp; Eve</li> <li>white people are the newest, most evolutionarily advanced race</li> </ul> | <ul style="list-style-type: none"> <li>all humans have one common ancestor</li> <li>races may be different varieties of that one species</li> </ul> |

The debate was topical because polygenism allowed a method of pseudoscientific racism that <sup>slaveholders</sup> ~~bigots~~ were reluctant to give up. imperialists

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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 wrote "Essay on the Principles of Population" which held that the capacity for population growth was far greater than that which Earth could sustain. Thus, those organisms/species that were weaker would not survive as there were not enough resources for them. Both Darwin + Wallace reinterpreted this as natural selection, the process by which better-suited species thrive + propagate + ill-suited/slow-adapting organisms die out.

10. Darwin studied Paley at Cambridge.

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

"observation of the eye is a cure for atheism." he saw in nature's scientific splendor evidence of God's plan. he believed in perfect design, that God had created a harmonious + meticulously designed Earth.

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

adaptive radiation = rapid adaptation + speciation (basically a microcosm of evolution)  
Paley would understand adaptive radiation to be yet another manifestation of God's perfect plan + eye for detail. Only God could design several species of finch perfectly tailored to the kind of food available to them.

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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 did not have one eureka moment. His journey to discovering natural selection included long-term exposure to many schools of thought, extensive correspondence w/ other scientists, and his own inquiry. For example he read his grandfather's <sup>early</sup> evolutionary thoughts in his poems. He read Malthus. He bred pigeons ~~to see~~ and observed their frequent returns to rock pigeon markings. It was a long series of ideas <sup>and</sup> observations that created natural selection, not a single Eureka moment.

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 was discouraged by the publishing. He put off publishing his own work + set about proving it through evidence (ie experimenting w/ pigeon breedings, studying his children in comparison to apes.)

Wallace, on the other hand, was inspired by the work, leading him + Henry Bates to become specimen collectors around the world (Amazon + SE Asia).

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TF: Tues @ 12

Name: Skylar-Bree Takyi

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?

It means that every species has an evolutionary precedent.  
~~Because~~ In order for a species to <sup>have</sup> arise, it must <sup>have</sup> come from an older, similar species. No spontaneous generation here!

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 struggles to definitively distinguish between species + varieties - he supports this moment of inconclusivity by attesting that even the most learned, skilled botanists struggle to differentiate. Nonetheless, he maintains that these same experts pay close attention to varieties, because as species vary, pass on that genetic variability, and become more prevalent + distinct, they become separate sub-species + ultimately, distinct species.

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Do not write below line (for grading purposes)

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TF: Tues @ 12

Name: Skylar-Bree Takayi

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?

Here Darwin is noting the way competition can affect the survival of certain individuals in a species. Divergence of character holds that those individuals that ~~do not compete~~ (i.e eat different food) will more likely reproduce + propagate, thus evolving away from the similarities that caused the competition in the first place. Over long periods of time, this movement away from filling the same niche could result in the creation of a new, distinct species.

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Do not write below line (for grading purposes)