

SLS 12 Midterm 1

Sahara Kirwan

TOTAL POINTS

64 / 75

QUESTION 1

1 Eugenics 5 / 5

✓ - **0 pts** Correct

QUESTION 2

2 Geology 5 / 5

✓ - **0 pts** Correct

QUESTION 3

3 The Darwins 4 / 5

- **0 pts** Correct

- **1** Point adjustment

- ☞ a) a microscope b) Erasmus believed in spontaneous generation whereas Darwin had a mechanism for evolution

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 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 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 3 / 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 1 / 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 description of adaptive radiation is inadequate, not touching on either rapid diversification or speciation, and the explanation of Paley's interpretation fails to engage with how Paley would struggle or not to describe the similarities and subtle differences among species like Darwin's finches.

QUESTION 11

11 Eureka! 2.5 / 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 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

- **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

QUESTION 14

14 Species and varieties 4 / 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.

+ **1 Point adjustment**

🗨 1/2 points- Answer points out an instance in which organisms were classified species or varieties. However, the answer doesn't address the blurry line between the classification of species and varieties. (Note: Question is getting at the fact that Darwin consulted multiple experts who couldn't agree on the classification of organisms as species or varieties.)

QUESTION 15

15 Struggle for survival 5 / 5

✓ - **0 pts** Correct

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TF: Cat Chamberlain

Name: Sahara Kirwan

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: encouraging the "fit" in society to reproduce, meaning those with good qualities (e.g. intelligence, wealth, etc).
Negative: discouraging or preventing the "unfit" in society to reproduce.

Positive and negative eugenics are a way by which the social structure can be altered.

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

Catastrophism, ^{the development of which is} most closely associated with Georges Cuvier, describes how in order for extinction ^{of a species} to occur, a natural catastrophe must occur. Geological epoches end with geological events. Meanwhile, uniformitarianism, ^{the development of which is} most closely associated with Charles Lyell, can be explained as no geological events or catastrophes in the past, only changes as such we can see taking place today. Uniformitarianism refutes that geological epoches end with geological events.

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"? "Spheric glass" ^{may} refer to the naturalists prior to their knowledge of evolution.
- b. Outline one key difference between the evolutionary theories of Erasmus and Charles Darwin.

Erasmus Darwin believed in "E conchis omnia," that everything has come from shells, from something small. Darwin does not ever state that all species have originated from ^{the same} "something small" necessarily, rather that different species can share a common ancestor.

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.

The "inheritance of acquired characteristics" implies a "besoin," a need for an organism to push itself up an evolutionary scale. As coined by Jean-Baptiste Lamarck, organisms arise from organic matter and push themselves up the evolutionary scale. The motor, or interior force, that drives this is "besoin," a kind of inheritance of acquired characteristics.

Do not write below line (for grading purposes)

5. Who said:

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

TH Huxley

b. Three generations of imbeciles are enough

Oliver Wendell Holmes

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

Robert Chambers

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

AR 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 the term "natural selection" because he believed it worked as a great analogy for artificial selection. Much like a breeder chooses to bring about weirder pigeons, natural selection gives rise to the smartest, fittest pigeons. Wallace objected to the term "natural selection," however as he thought that it implied a selector. As artificial selection is controlled by a decision-maker, someone who makes deliberate choices, Wallace thought "natural selection" connoted a person making deliberate choices, which contradicts the whole concept of natural selection.

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?

Using biblical chronology, he conjectured the dates of the creation of Adam and Eve in the Garden of Eden as well as Jesus Christ's ascension to Heaven.

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?

Through experimental analysis, Buffon measured the rate of cooling of iron balls. He thought the earth ^{was} originally formed as a red hot sphere.

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

Polygenism, as coined by Samuel Morton, refers to the idea that there are different species of mankind created by God as fixed entities, that the different races have different origins, not a common ancestor.

Meanwhile, monogenism refers to the idea that different races emerged as varieties from one common ancestor/one species. This debate was so topical as it had racist and religious implications: polygenism implied that only whites were descendants of Adam and Eve, while monogenism carried connotations of a post-origination degeneration (the non-whites), regardless of all descending from Adam & Eve.

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 argued that the power of the population was infinitely greater than the subsistence of the earth, meaning the food and resources that could be provided. Malthus claimed that as people kept reproducing, the state of overpopulation of the earth could not be supported by its resources, and therefore suffering in the form of famine, disease, and poverty would have to balance this out. It was from this Darwin in particular concluded that under natural selection, the fittest would survive.

10. Darwin studied Paley at Cambridge.

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

Natural theology refers to the proof of the existence of the creator in all of His works, i.e. ^{design in} humans and nature. Paley argued that, under ^{the concept of} natural theology, that all things show design, all designed things have a creator, and thus the universe has a creator whom we call God.

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

Adaptive radiation refers to the changes undergone within humans and/or nature to match their environment. From a Paleyan perspective, adaptive radiation may therefore refer to the changes in design in humans and/or nature undergone "perfectly" so that they can match their 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."

The Eureka! legend almost implies that Darwin happened to stumble upon natural selection and the evolutionary process that he wrote about in his works. However, we know that the "real nature of Darwin's genius" depended on his geological fieldwork in Wales (wedges theory), his transmutation notebooks, his journey on the HMS Beagle to other parts of South America — this all made up a gradual ^{scientific} discovery of natural selection and the evolutionary process.

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" took Darwin completely aback — given the criticism it was receiving, Darwin took immediately to his own work and tried to find ^{watertight} scientific data to support his own theories. Meanwhile, Wallace was very inspired by Chambers' work, so much so that it prompted him and Bates to travel up the Amazon River so that he could explore some of the philosophical questions he pondered following his reading of "Vestiges."

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?

The "Sarawak (Borneo) Law" implies that every species shares a common ancestor; one species must have originated from another closely-related species, but perhaps through divergence of character ^{where} species that once competed for the same niche ^{at the same time in the same place} evolved to have different traits to minimize that competition, thus over time becoming different enough to become different species — they have become these separate species.

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 very confusingly distinguishes between species and varieties within the "Origin of Species," but he uses scientific data and experiments that other experts have collected and conducted to explain his ideas. For instance, he uses John Gould's data / observations on the 13 different species of finches to explain how while there is a common ancestor, varieties of finches became apparent and diverged enough to become different species across the Galapagos Archipelago.

Do not write below line (for grading purposes)

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?

In sum, this concept within Darwin's struggle for survival means that intraspecific competition is graver than interspecific competition. This supports Darwin's idea of the divergence of character ^{individuals of} as a given species once had competed for the same niche, meaning the same resources (food, habitat, etc), some of the individuals evolved to have different traits that supported their survival in this same niche, but with these different traits, competition actually minimized and enough so over time to produce different species no longer characterized by intraspecific competition.

Do not write below line (for grading purposes)