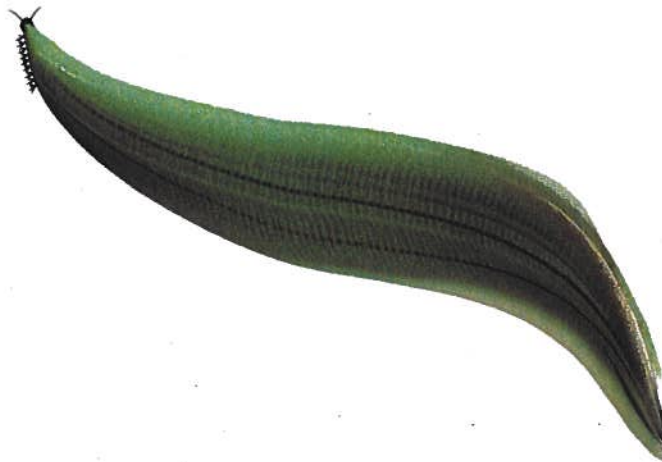


**HOUR EXAMINATION #2**  
Geology/Interdepartmental 100: History of Life  
April 5, 2019  
(All tests are due at 8:50 a.m.)

1. A critical (and familiar) question for any evolution course: Please define *homology* below and give an example of a pair of features from two separate organism groups considered evolutionarily *homologous*. [8 points]

Homology is when different organism groups have similar features because they both evolved from a common ancestor with that feature. One example is the pterosaur wing and the human arm, which both have a humerus, radius, and ulna, which we both inherited from a common ancestor. ✓

2. Here's an extinct organism from the Burgess Shale. Please answer the questions below it. [8 points]



- What is its genus name? Pikaia  
During what geological period did it live? Cambrian  
What phylum does it belong to? Chordata  
What subphylum does it belong to? Cephalochordata

3. Identify, define and/or describe any **three** of the following terms. Be sure to include **dates, examples and diagrams** where appropriate. For each selected term, state its importance in the History of Life. (If more than three are answered, only the first three will be graded.) [15 points total]

Tiktalik

Tiktalik is a Devonian transition fossil. It was a fish with characteristics similar to an amphibian, for example it could support itself on its lobe-fins. This fossil is important because it shows how <sup>some</sup> fish adapted and eventually evolved into amphibians.

Acanthostega

The Acanthostega was the first amphibian in the Devonian. The labyrinthodont has a row of labyrinthodont teeth to support the predatory lifestyle. Additionally, Acanthostega is the first tetrapod or having four limbs which allowed the animal to fulfill a new niche on land. These animals evolved from lobe-finned fish. The importance of Acanthostega in the history of life is that it is the first Amphibian.



malleus, incus, stapes

The malleus, incus, & stapes, also referred to as the hammer, anvil, & stirrup bones are bones found in the mammalian ear that are remnant of the reptilian jaw bones. In mammals the convert sound waves into nervous impulses and are why they have such great hearing.



placoderm or ostracoderm (Your choice. Tell me which you are defining.)

A ~~small~~ large carnivorous fish. Placoderms had bony exoskeletons on their face, with teeth-like bone structures. Placoderms, based on fossil evidence of live birth, are the first known creatures to do so. Placoderms had the first known jaw, evolved from gills. However, it rotated in a unfortunate manner which prevented placoderms from seeing forward with their mouth open. Silurian

brachiopod or nautiloid or bryozoan (Your choice. Tell me which you are defining.)

Bryozoans began in the Ordovician and are still here today. They are filter feeders. They are also colonial meaning they share internal tissue with one another.

It's important to the history of life because they are one of the many first filter feeders.

Stalk of bryozoans

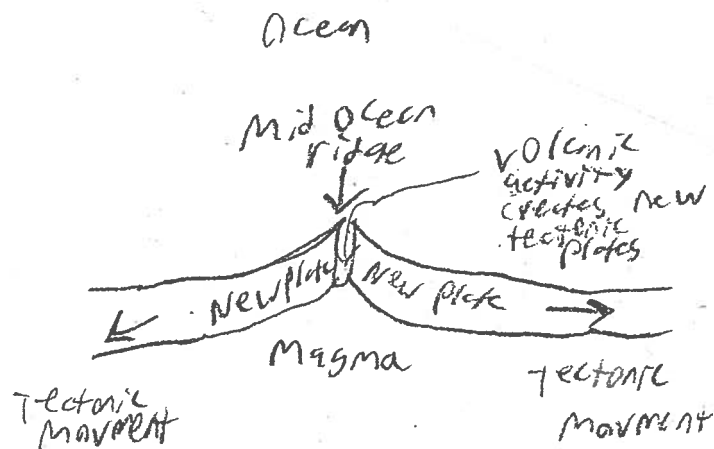


single bryozoan

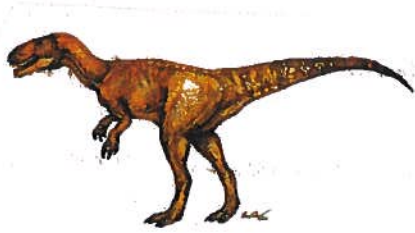
4. Plate tectonics is the reason why the Earth is a dynamic planet. Define below the **Red Queen Hypothesis** in evolutionary theory and why evolution is inevitable for life on a changing planet. [8 points]

The Red Queen Hypothesis comes from a phrase said by the Red Queen to Alice in Alice in Wonderland. She said "You have to keep running to stay in the same place." Essentially, this means species must continue running (evolving) if they want to stay in the same place (keep from going extinct), because the environment and predators are always changing too. ✓

5. Speaking of plate tectonics, please draw below a cross-section of either a **spreading center** or a **subduction zone**, showing the associated volcanoes in their proper positions. [10 points]



6. No surprise! Please identify the type of dinosaur with one of the three group names we know from class. Make sure the name is clearly associated with the diagram. Use only the three names – no genera or species. [9 points]



THEROPOD



SAUROPOD



ORNITHISCIAN



THEROPOD



ORNITHISCIAN



ORNITHISCIAN



ORNITHISCIAN



THEROPOD



THEROPOD

7. How are the archosaurs defined? Please also list two examples of archosaurs. [6 points]

Archosaurs are defined by the presence of teeth in sockets. Dinosaurs and crocodiles are both archosaurs.

8. Fill in the blanks! [10 points total]

Period during which the plesiosaurs went extinct: Cretaceous

Period during which the mammals first appeared: Jurassic

Period during which the first fish appeared: Cambrian

✓ Period during which the first dinosaur appeared: Triassic

Period during which the ichthyosaurs went extinct: Cretaceous

9. What evidence do we have that pterosaurs were endothermic? [9 points]

The evidence we have that tells us that pterosaurs were endothermic is that they were able to fly. ✓ flying takes a lot of energy and if they would have relied on outside factors (env) to regulate their body temperature, like ectothermic organisms, they would not have been able to have enough energy to fly. In addition, they had pycnofibers, ✓ which are essentially quills (made of keratin), to help insulate them.

10. What can fossil tracks and trails tell us about dinosaur metabolism? [7 points]

The tracks of dinosaurs can tell us that they were very active thus would need a faster metabolism thus being endothermic, more importantly you can see dinosaurs different from reptiles/amphibians tracks are not causing carriers constraint, dinosaurs hind limbs are directly under the ✓ body so can run + breath at same time more efficiently than reptiles/amphibians, Lastly no tail marks are observable showing their tails are held up and not drag on the ground.

11. You didn't think I'd forget the **End-Triassic Extinctions**, did you? What is our evidence that massive volcanic eruptions caused the extinctions, and what is the plate tectonics cause for these eruptions? Note that you are **not** being asked to describe the extinction scenario, just this *evidence* and *cause*. [10 points]

Volcanic eruptions were caused by longer rifting, it starts to break apart and get torn in half to make the Atlantic Ocean.

## CAMP

Central Atlantic magmatic Province.

This CAMP shows basalts that are related to volcanism.

Lastly climate disruptions, this same disruption occurs in the Permian.