

Name: Student Answers!

Usual Row # _____

HOUR EXAMINATION #2

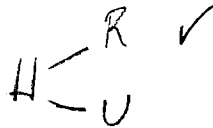
Geology/Interdepartmental 100: History of Life

November 3, 2017

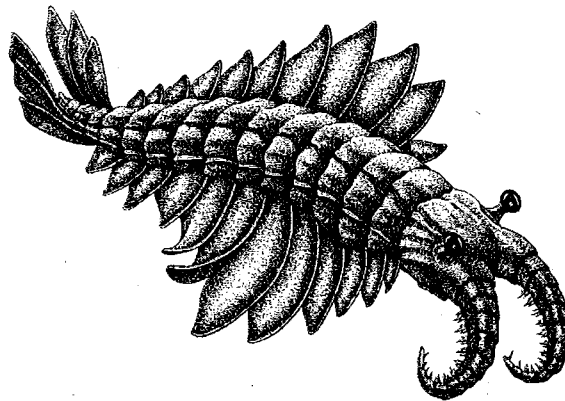
(All tests are due at 8:50 a.m.)

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 means having the same ancestor. Homologous structures are similar structures found in different animals that may not serve the same purpose but have a common ancestor. An example are the wings of Bats & Birds. This example includes human arms, the legs of dogs, & the fins of a whale. They have a humerus, radius, & an ulna in each of their structures.



2. Here's a fun but scary extinct organism I hope you recognize. Please answer the questions below it. [6 points]



What is its genus name? Anomalocaris

During what geological period did it live? Cambrian

What were its life habits? (How did it move and how did it eat?):

Used its fin-like segments that make up its body to swim and caught prey with its arm-like appendages, putting it into its food processor-like mouth to grind up.

3. Identify, define and/or describe any **three** of the following term pairs. 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 or Acanthostega (Tell me which you are using.)

live both on land and in water.



Acanthostega is the first known amphibian, and appeared in the Devonian. Acanthostega is a labyrinthodont, meaning that the enamel in its teeth was folded in on each other, hence making the tooth stronger. These strong teeth tell us that Acanthostega was eating the large insects on land. Coming from the lobe-finned fish, Acanthostega had the humerus, radius, and ulna limb structure, along with wrist bones and defined digits. Importance to the history of life is the tracing of the homolegous structure, which is shared w/ us.

trilobite or nautiloid (Tell me which you are using.)

Trilobites first appeared in the Cambrian. They had flat bodies and lived on the ocean floor. Because of their abundance in the fossil record they can be used for relative dating, as more recent trilobites developed distinct features such as large eyes and the ability to roll up into a ball. They went extinct in the Permian.

Dimetrodon or captorhinid (Tell me which you are using.)

Captorhinids are Anapsids in the Reptile class, who appear in the Carboniferous. Though not lizards, evidence shows that they did live a lizard-like lifestyle. They are important to the HOL because as some of the first reptiles, they are the stem group from which extreme diversity in reptiles evolves.

placoderm or ostracoderm (Tell me which you are using.)

Placoderms were important for the HOL because they displayed the first instance of internal fertilization and live birth. They had sharp bones in their jaw instead of ~~teeth~~ mineralized teeth, and would use both jaws sometimes.

Devonian.

urochordate or cephalochordate (Tell me which you are using.)

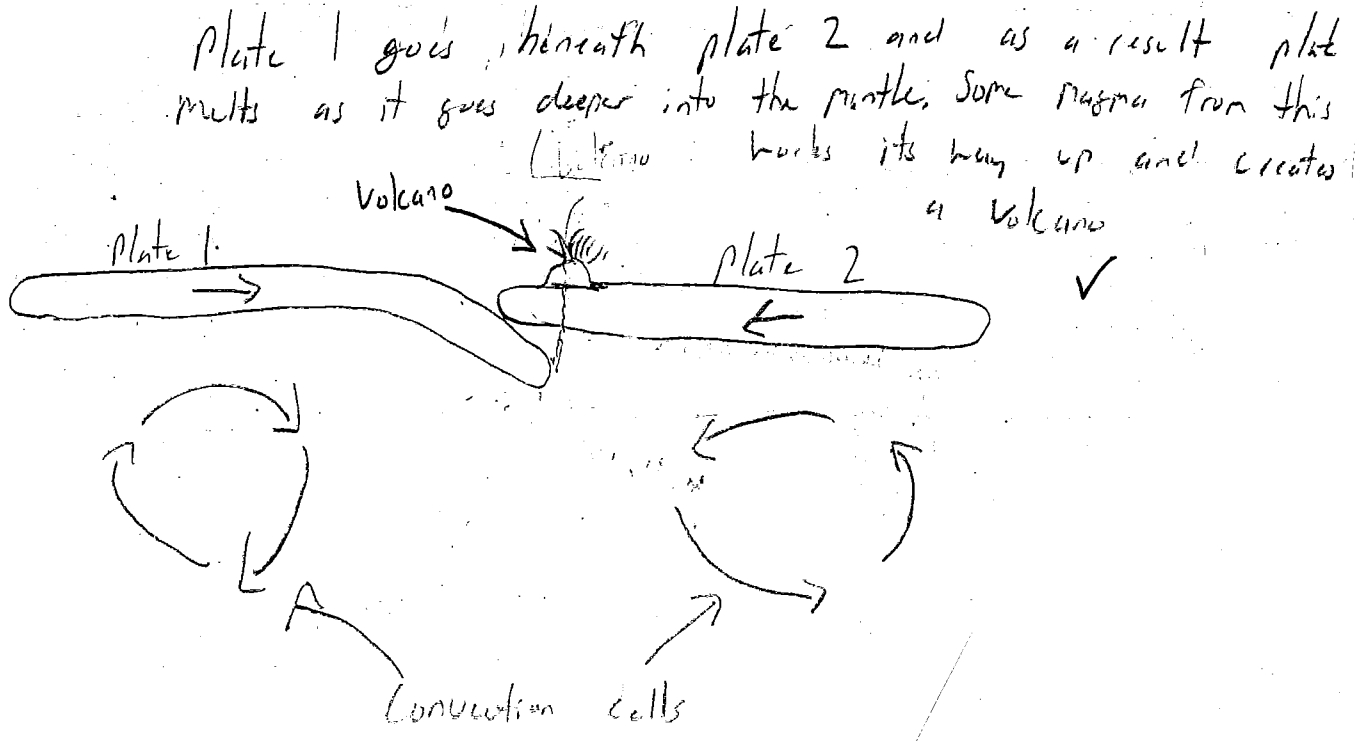
Urochordates (such as tunicates) are very basic chordates, that are free swimming + tadpole-like as juveniles, but morph into sponge-like organisms as adults. However, unlike sponges they have organs and chordate features such as a notochord and hollow dorsal nerve tube. They are important because through Paedomorphosis (retention of juvenile traits into adulthood) some evolved into cephalochordates like Pikania, which eventually led to fish.



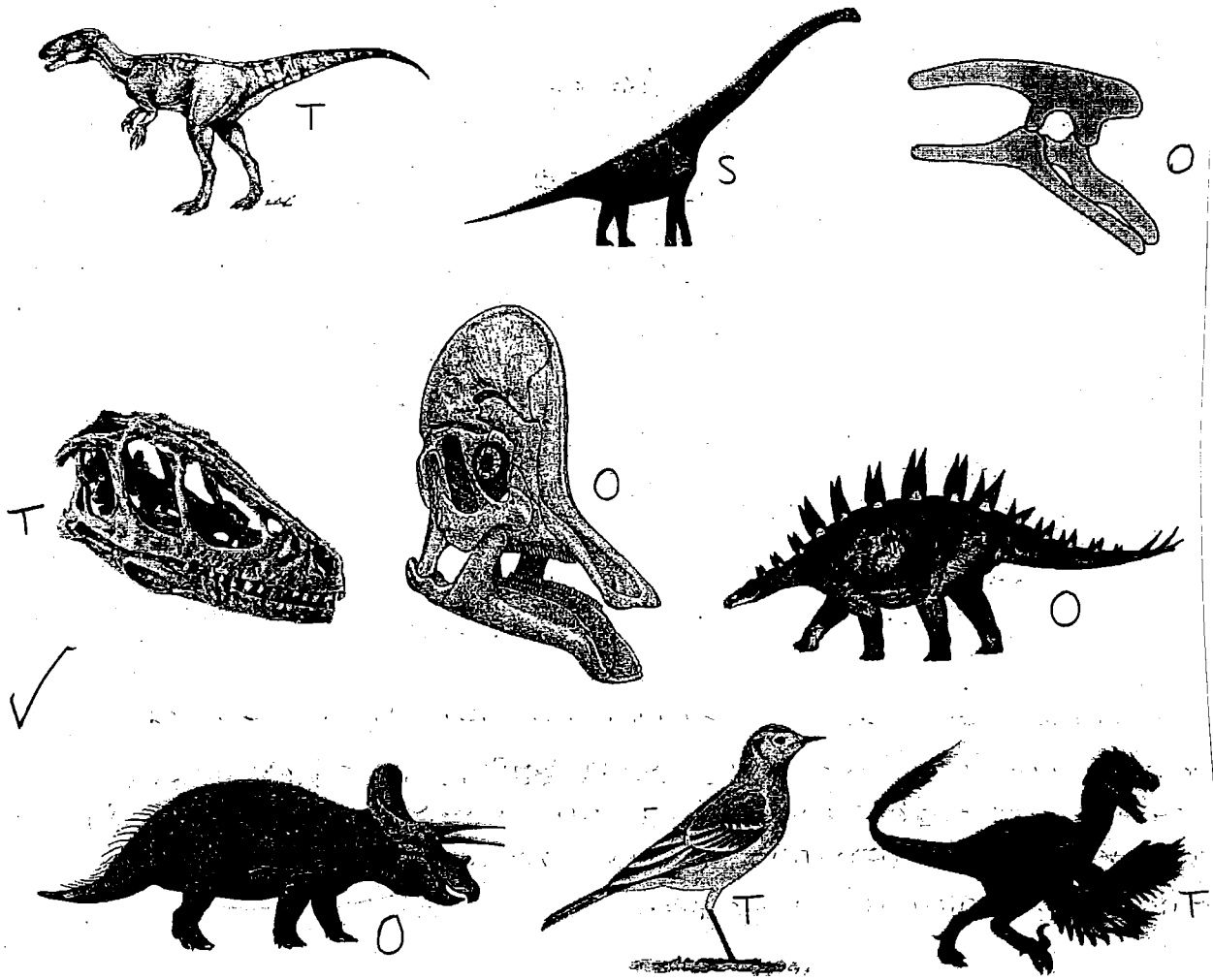
4. Plate tectonics is the reason why the Earth is a dynamic planet. Define below the **Red Queen Hypothesis** in evolutionary theory and why evolution is inevitable for life on a changing planet. [10 points]

The Red Queen Hypothesis gets its name from the Red Queen from Alice's Adventures in Wonderland. The Red Queen said that "it takes all the running you can do to stay in the same place". This quote was applied to evolutionary theory - organisms must constantly adapt to a constantly moving and changing Earth. Evolution is inevitable because a changing planet means that climates change with the environment + changing and predators/prey are constantly being introduced to new communities. When a climate changes, organisms have to adapt to warmer/cooler temperatures or else go extinct. When new predators are introduced, prey must find a way to adapt and survive and the original predators will also need to adapt or go extinct since no two organisms can occupy the same niche (competitive exclusion principle)

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



6. This should be no surprise! Please indicate beside each diagram whether the animal is a **theropod** (T), **sauropod** ("S") or **ornithischian** ("O") dinosaur. Make sure the letter is next to the correct diagram. [9 points]



7. Who are the archosaurs (list the archosaurs we have covered) and how is this group defined? [6 points]

Archosaurs have alligator and crocodiles and dinosaurs
 This group defined as subclade diapsida have teeth in
~~two~~ socket ✓

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

Period during which the mosasaurs went extinct: Cretaceous ✓

Period during which the trilobites first appeared: Cambrian ✓

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. Therapsids are inferred to have chewed their food. What is the fossil evidence that they were chewers? How is chewing important to the metabolism of an organism? In other words, because therapsids chewed their food, what can we conclude about their metabolism? [9 points]

Therapsids had a secondary palate ✓ and we can see this from the fossil evidence. Because therapsids had legs underneath them, which meant they had an active lifestyle. The secondary palate allowed Therapsids to breath while they ate, they didn't have to always breath through their mouth while they ate, they could eat more and have more energy to live their active lifestyle. The secondary palate created a sinus which allowed to flow to the lungs. ✓

