

BIO 1130FF

An introduction to Organismal biology
Midterm examination
Worth either 15% or 20% of your final grade

Saturday, October 3, 2009

Part A: Multiple choice questions
26 points (1 point/question)

- a) Fill in the bubbles for your name and student number and BIO1130FF for the course code. Fill in the same information in text in the boxes above the bubbles.
- b) Use only a pencil to fill in the answer sheet. If you erase a question be sure to erase all of the pencil mark. Don't place any marks anywhere on the sheet other than where the bubbles are for personal information or your answers.
- c) Do not place any answers on the question sheet.
- d) This is not an open book exam.
- e) **CAUTION to minimize paper waste this part of the exam has been printed back to back**

NOTE: If you do not fill in the student number and course code as **BIO1130FF** it will be impossible to identify your answer sheet and you will receive a **ZERO** for this part of the exam

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Multiple choice questions - Place your answers on the answer sheet

1. An organism that obtains its energy from sunlight is a(n)
 - a. phototroph.
 - b. chemotroph.
 - c. autotroph.
 - d. heterotroph.

2. Which of these conditions are always true of populations evolving due to natural selection?
Condition 1: The population must vary in traits that are heritable.
Condition 2: Some heritable traits must increase reproductive success.
Condition 3: Individuals pass on all traits they acquire during their lifetime.
 - a. Condition 1 only
 - b. Condition 2 only
 - c. Conditions 1 and 2
 - d. Conditions 2 and 3
 - e. Conditions 1, 2, and 3

3. Which eons had atmospheric oxygen present for the entire eon?
 - a. Hadean
 - b. Archean and Proterozoic
 - c. Proterozoic
 - d. Phanerozoic
 - e. Proterozoic and Phanerozoic

4. Many scientific probes sent to other parts of the solar system are looking for signs of something so far known to exist only on Earth, namely _____.
 - a. Life.
 - b. Carbon.
 - c. Gold.
 - d. Nitrogen.
 - e. Water

5. The first *Scala naturae* is attributed to
 - a. Hippocrates
 - b. Linnaeus
 - c. Theophrastus
 - d. Galileo
 - e. Aristotle

6. Why was Darwin and Wallace's theory of evolution by natural selection revolutionary?
 - a. It proved that individuals acclimated to their environment over time.
 - b. It was the first time a biologist had proposed that species changed through time.
 - c. It implied that England's economy would improve if the monarchy were eliminated.
 - d. It dismissed the idea that species are constant and emphasized the importance of variation and change in populations.

7. What is the importance of the Miller-Urey experiment?
- It showed that molecules crucial to life could be produced biotically.
 - It showed that unimportant molecules could be produced abiotically.
 - It showed that molecules crucial to life could be produced abiotically.
 - It showed that unimportant molecules could be produced biotically.
8. In bacterial transformation, cells
- make replicate copies of one another.
 - take up pieces of DNA that are released as other cells disintegrate.
 - take up pieces of DNA through infection of a virus.
 - replicate DNA molecules.
9. In a single molecule of water, two hydrogen atoms are bonded to a single oxygen atom by
- ionic bonds.
 - polar covalent bonds.
 - nonpolar covalent bonds.
 - van der Waals interactions.
 - hydrogen bonds.
10. How does artificial selection differ from natural selection?
- Artificial selection occurs only in computer simulations, not with actual organisms.
 - Artificial selection occurs only with plants.
 - Artificial selection is not based on heritable variation, but on new mutations.
 - Artificial selection is based on conscious choices by humans.
11. What gives rise to the cohesiveness of water molecules?
- ionic bonds
 - hydrogen bonds
 - hydrophobic interactions
 - nonpolar covalent bonds
 - both hydrophobic interactions and ionic bonds
12. What contributes to evolutionary change over time?
- changes in cells
 - changes in the RNA
 - changes in the DNA
 - changes in proteins
13. Which is a defining characteristic that all protocells had in common?
- the ability to synthesize enzymes
 - a surrounding membrane or membrane-like structure
 - a nucleus
 - RNA genes
 - the ability to replicate RNA

14. Prokaryotes that are cylindrical are called
- bacilli.
 - cocci.
 - vibrios.
 - spirilla.
15. The Irish elk and the mammoth are two of the 23 large animals that this scientist found as used as evidence for this process.
- Spontaneous generation
 - Scala naturae*
 - Extinction
 - Transmutation of species
 - Transition fossils
16. An early consequence of the release of oxygen gas by plant and bacterial photosynthesis was to
- change the atmosphere from oxidizing to reducing.
 - prevent the formation of an ozone layer.
 - make life on land difficult for aerobic organisms.
 - make it easier to maintain reduced molecules.
 - cause iron in ocean water and terrestrial rocks to rust (oxidize).
17. The dark, or medieval age, lasted for how long in Europe?
- 1000 years
 - 100 years
 - 500 years
 - 1500 years
18. The major structural component of bacterial cell walls is
- proteoglycan.
 - peptidoglycan.
 - cellulose.
 - arabinogalactan.
19. The renaissance and scientific revolution occurred during which centuries
- 15th to 16th centuries
 - 15th to 17th centuries
 - 16th to 18th centuries
 - 16th to 19th centuries
 - 17th to 19th centuries
20. The fossil *Archeopteryx* is an important transitional fossil because it demonstrates which of the following environmental transitions.
- Marine to terrestrial
 - Freshwater to terrestrial
 - Terrestrial to freshwater
 - Terrestrial to air
 - Terrestrial to marine

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21. The proposition that species change through time was first proposed by whom?
- James Hutton
 - Jean Baptiste de Lamarck
 - Alfred Russel Wallace
 - Georges Cuvier
22. Which of the following does not contribute to prokaryotic genetic variability?
- binary fission
 - gene transfer by conjugation
 - mutation
 - gene transfer by transformation
23. Which of the following events marks the start of the Phanerozoic eon?
- explosion of marine invertebrates and multicellular life
 - The dominance of anaerobic life
 - A stable oxygen environment and the appearance of protists
 - The origins of life
24. Which of the following observations lead to the conclusion that the food competition hypothesis for giraffe neck length might not be correct?
- Male and female giraffes spend most of their time feeding low in trees.
 - Giraffes rarely die of starvation, so food availability is unimportant.
 - In the populations studied to date, giraffes never feed high in trees.
 - In certain populations at certain times of year, only male giraffes feed high in trees.
25. Which of the following effects is produced by the high surface tension of water?
- Organisms resist temperature changes, although they give off heat due to chemical reactions.
 - A insect can walk across the surface of a small pond.
 - Water can act as a solvent.
 - Lakes don't freeze solid in winter, despite low temperatures.
- 36 Researchers have found fossils of Eocene horse species in Colorado. Deeper deposits contain smaller species, and more recent deposits contain larger species. How does this observation support the theory of evolution?
- It suggests that species are unchanging and of recent origin.
 - It shows that all species are related to each other.
 - It provides evidence that species change over time.
 - It proves that environments have changed over time.
 - It does not support the theory of evolution.

STUDENT NUMBER: _____

Don't enter your name.

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Part B: Written questions

- a) Place your name and student number in the space provided below. Be sure that your student number, is on the top of each of the following pages – the exam will be separated. ONLY place your student number on the pages where indicated
- b) Answer all questions in the space provided on the exam. Do not transfer answers to the back of the page.
- c) You may use either pencil or ink for your answers.
- d) Answers as written paragraphs are preferred but point form is acceptable as long as the points are logically organized and not random statements or facts
- e) This is not an open book exam.
- f) There are five pages including this one in part B of the exam, be sure you have all five pages.
- g) Enter the multiple choice exam code in the space provided

Name: _____

Student number: _____

Multiple Choice Exam Code: _____



STUDENT NUMBER: _____

Don't enter your name.

12 pts Part 1. Briefly explain what each of the following terms means or the biological contribution made by the person. Where possible include an example in your explanation from a group or an organism to which the term or name applies.

Organicists

Protobionts

Synthetic theory of evolution

2nd age of sand/silica

STUDENT NUMBER: _____

Don't enter your name.

20 pts Part 2: Fill in the missing word, or provide the one word answer in the space provided at the end of the sentence. If the line is missing, add it to the end of the line.

1. Some bacteria survive by using sulfur compounds in their energy pathways - it's referred to as this type of nutritional strategy. _____
2. This additional circular piece of DNA is found in some bacterial cells. _____
3. These protein building blocks were found in the material produced by the Miller-Urey experiment (two words) _____
4. One of two forms that carbon took in earth's first atmosphere. It was missing in the first Miller-Urey experiments (Two words) _____
5. The presence of variation that is based on a genetic program distinguishes this type of science. _____
6. Bacterial locomotary structure. _____
7. You'll find this is the centre of an artificially created micelle. _____
8. This geological eon occurred from 3.8 Ma ago until 2,500 Ma and includes when oxygen first appears in the earth's atmosphere. _____
9. The fusion reaction in our sun is forming helium from these atoms. _____
10. Bacterial reproduction where plasmids carry pieces of one bacterial genome and combine it with another's. _____
11. Geological eras are combined into these larger units of time. _____
12. Autotrophs get carbon from this (Two words) _____
13. This philosophy on living things saw them as being made up of small machines. _____
14. To develop this, a scientists will either read up and study all the relevant literature that has been published on the topic or look for a pattern in a series of natural observations. _____
15. Whether it's protein or RNA that come first in the chemical origins of life doesn't affect the fact that which ever it was it had to be capable of doing this. _____
16. If a major scientific finding is applicable throughout the universe it reaches this level, unfortunately biological laws will never reach this level if universality is the sole criteria. _____

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Don't enter your name.

17. This started the formation of the universe. _____
18. Physical sciences deal with this type of material, biologists don't and it is one of the reasons that natural sciences were not a part of the scientific revolution. _____
19. From about 4,800 Ma to 3,800 Ma this eon saw the formation of our solar system and our planet earth. _____
20. Your horoscope is this type of prediction. _____
21. The percentage of the matter in our solar system that isn't a part of the sun. _____
22. After observing the migration of the caribou over a number of seasons a young biologist notices that on some days they stand on snow patches rather than grazing. It leads to the idea that standing on the snow protects against the attack of the mosquitoes that are abundant on the same days that this behavior happens. What kind of reasoning is this? _____

Part three of the exam is on the next page

STUDENT NUMBER: _____

Don't enter your name.

12 pts Part 3: Answer the following two questions in the space provided.

1. What is convergent evolution, give an example and explain its potential impact of our understanding of evolution?

2. Use two examples to explain what emergence is.