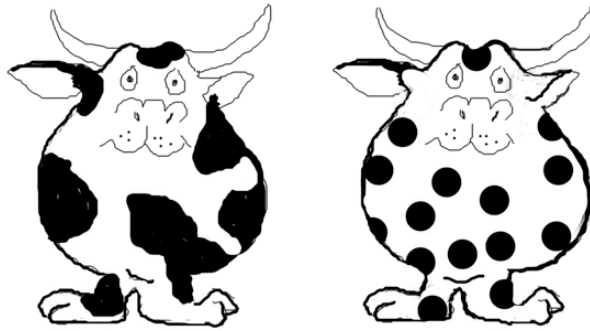


EXAM I

Each question is worth 2 points. Choose the BEST answer!

1. Louis Pasteur performed experiments in which he boiled chicken broth in matching swan-necked flasks. He kept one flask intact, with a water trap in the neck of the flask to capture anything that might float in from the air. He broke off the neck of the other flask, allowing a straight path for contaminants from the air to enter the broth. With these experiments, Pasteur was trying to determine whether
 - a. spontaneous generation of bacteria could occur
 - b. boiling could effectively destroy living cells
 - c. cells would grow at different rates in different shaped flasks
 - d. living things were made of cells
 - e. he could develop a new recipe for his mom's deli
2. Organic evolution in natural populations can result from
 - a. artificial selection
 - b. spontaneous generation
 - c. natural selection
 - d. uniformitarianism
 - e. common ancestry
3. Which of the following can evolve?
 - a. a single bacterial cell
 - b. a single zebra
 - c. a population of wild butterflies
 - d. a group of genetically identical plants
 - e. all of the above
4. The changing of a Snowshoe Hare's fur from white in winter to brown in summer is an example of
 - a. microevolution
 - b. macroevolution
 - c. speciation
 - d. adaptation
 - e. none of the above
5. Ontogeny is defined as the
 - a. evolutionary history of a species
 - b. embryonic development of a species
 - c. evolutionary relatedness of two species
 - d. development of organ systems
 - e. formation of a gastrula
6. Ontogeny can indicate evolutionary relationships between species because
 - a. closely related species usually have very different ontogenies
 - b. the more closely related two species are, the more developmental similarities they share
 - c. it allows a scientist to estimate the extent of inbreeding in natural populations
 - d. distantly related species often exhibit ontogenetic synapomorphies
 - e. fossilized embryos are cheap and plentiful
7. Darwin's theory of evolution by natural selection implies that
 - a. organisms engage in constant physical fighting with each other to survive
 - b. the most evolutionarily fit organisms always survive to a very old age
 - c. the fastest, strongest and smartest organisms are always the most evolutionarily fit
 - d. an individual who leaves many genes to the next generation has a high degree of fitness
 - e. the individual who dies with the most toys wins
8. If humans and raccoons belong to the same Class, then they must also belong to the same _____, although they are *not* necessarily members of the same _____.
 - a. Phylum; Order
 - b. Kingdom; Phylum
 - c. Domain; Kingdom
 - d. Order; Family
 - e. species; Class
9. Which of the following is true of a prokaryotic cell?
 - a. it has a membrane-bounded nucleus
 - b. it can join in large numbers to form tissues
 - c. it is a component of an animal body
 - d. it is a bacterium
 - e. it cannot live outside the body
10. An animal's body (excluding any symbiotic organisms) is composed only of eukaryotic cells.
 - a. true
 - b. false
 - c. what the heck is that?

Behold the rare and elusive Piebald Glorks (*Baliocorpus pumilio* and *Baliocorpus thelxi*):



The two individuals above are members of two very closely related species. Each species has a different spotting pattern. The presence of spots is controlled by a single gene, and DNA sequencing has shown that the "spotting gene" is exactly the same in both species.

11. The species difference in Piebald Glork spotting pattern shown above is most likely due to
a. paedogenesis b. neoteny c. allometric growth d. heterochrony e. mutation
12. Which of the two Glorks above had its "spotting gene" activated earlier in its embryonic development?
a. the one on the right b. the one on the left c. the genes activated at the same time

Match the scientist with the appropriate description in questions #13 - 17. .
(You may use an answer more than once, if you feel it's appropriate.)

- | | |
|----------------------------------|--------------------------------|
| a. Alfred Russell Wallace | d. Anton van Leewenhoek |
| b. Jean Baptiste Lamarck | e. Thomas Malthus |
| c. Charles Lyell | |

13. Invented the microscope, re-igniting the controversy over spontaneous generation.
14. Believed that characteristics acquired during an animal's lifetime could be passed to its offspring.
15. Developed a hypothesis about evolution by natural selection while studying plants in Malaysia.
16. Influenced Darwin's thinking with "An Essay on the Principle of Population" in which he suggested that much of humanity's suffering was the inevitable result of overpopulation
17. This friend of Darwin's believed that gradual processes such as erosion by water and wind had formed the earth's topography over a very long period of time.
18. When humans breed animals and plants in order to produce domestic strains with desirable characteristics, they are engaging in
a. random selection c. artificial selection e. hunting and gathering
b. genetic drift d. natural selection
19. A physical trait that is maladaptive
a. increases the likelihood that the individual will leave offspring
b. decreases the likelihood that the individual will leave offspring
c. does not affect the likelihood that the individual will leave offspring
d. will usually become beneficial if the environment changes
e. will not harm the individual expressing the trait
20. A structure that serves the same function in two different species, but is NOT derived from a common ancestral structure is said to be
a. homologous c. primitive e. adaptive
b. analogous d. derived

21. A scientific hypothesis
 - a. can be proven to be true with many rigorous, repeated experiments
 - b. is a tentative explanation for an observable fact
 - c. can become a theory, at which point it can never be challenged or refuted experimentally
 - d. usually becomes unquestioned dogma, once it has been thoroughly tested
 - e. all of the above
22. In trying to determine whether two taxa are closely related, the most useful characteristics to examine are the primitive ones that they share with many other taxa.
 - a. true
 - b. false
 - c. ask again later, when I've had some coffee
23. A characteristic that is *primitive* is almost always functionally inferior to one that is *derived*.
 - a. true
 - b. false
 - c. who wants to know?
24. A gastrula
 - a. is an early embryonic stage common to almost all animals
 - b. has a single opening that will become either a mouth or an anus in the mature animal
 - c. may become either a protostome or a deuterostome, upon further development.
 - d. has a primitive gut
 - e. all of the above are correct
25. A zygote is
 - a. a type of specialized cell found in certain animal organs
 - b. an environment-resistant resting spore made by bacteria
 - c. a union of an egg cell and a sperm cell
 - d. the first phase of asexual reproduction in some animals
 - e. found only in higher animals, such as mammals
26. If you were to follow the embryonic development of a crocodile and a bird, you would notice that the same embryonic tissue that develops into scales on the crocodile becomes feathers in the bird. This means that bird feather and crocodile scales are
 - a. analogous
 - b. homologous
 - c. homeothermic
 - d. poikilothermic
 - e. primitive
27. Both sharks and dolphins have missile-shaped, fusiform bodies that allow them to move swiftly through water. Although both dolphins and sharks share a distant ancestor that was fishlike, dolphins more recently evolved from terrestrial, four-legged mammals that returned to a marine environment secondarily. This suggests that the streamlined shape of the shark and dolphin are
 - a. homologous
 - b. a product of convergent evolution
 - c. a symplesiomorphy
 - d. a synapomorphy
 - e. more than one of the above
28. Species A is paedomorphic with respect to closely related Species B. This means that
 - a. Species A has more complex anatomy than Species B
 - b. Species A and B are physically almost indistinguishable from each other
 - c. Species B is more highly evolved than Species A
 - d. Species A grows younger, rather than older, as time passes.
 - e. As adults, Species A shows characteristics found in juvenile individuals of Species B
29. The sequence of nucleotide bases (A, C, T, G) on the DNA directly instruct the cell to build which of the following?
 - a. a strand of proteins
 - b. a strand of amino acids
 - c. a strand of sugars
 - d. a strand of lipids
 - e. complex cellular structures
30. Proteins that drive chemical reactions that build the physical structure of the body as well as other chemicals that "run" the body are called
 - a. nucleic acids
 - b. amino acids
 - c. enzymes
 - d. structural proteins
 - e. workaholics
31. To which Domain do we humans belong?
 - a. Bacteria
 - b. Eukarya
 - c. Archaea
 - d. Protista

45. Polar regions are colder than the equator because
- a. there is more ice at the poles
 - b. the poles are always tilted away from the sun
 - c. sunlight strikes the poles at an oblique angle
 - d. the poles are farther from the sun
 - e. the poles have denser atmosphere

Match the animal combination to the biome in which you would be most likely to find it. (You may use an answer more than once, if you feel it's appropriate.)

- a. tropical rainforest c. temperate grassland (prairie) e. tundra**
b. desert d. tropical grassland (savannah)

46. American Bison ("Buffalo"); Coyote; Jackrabbit; Black Racer Snake
47. Jaguar, Toucan; *Boa constrictor*; Scarlet Macaw
48. Caribou; Lemming; Snowy Owl; Arctic Fox
49. Horned Lizard; Jackrabbit; Rattlesnake; Road Runner
50. Zebra; Lion; Cheetah; Hyena; Giraffe

I bet a fun thing would be to go way back in time to where there was going to be an eclipse and tell the cave men, "If I have come to destroy you, may the sun be blotted out from the sky." Just then the eclipse would start, and they'd probably try to kill you or something, but then you could explain about the rotation of the moon and all, and everyone would get a good laugh.

-- Deep Thoughts by Jack Handey