

Name \_\_\_\_\_

### Biology 170: Make-up/Replacement Exam

**Multiple choice (2 pts each). Mark (bubble-in) the correct answer on your scantron.**

1. Arrange the following taxonomic categories in their hierarchical order from highest to lowest (left to right): Genus, Family, Class, Order, Phylum.

- a. Phylum, Class, Order, Family, Genus
- b. Order, Phylum, Class, Family, Genus
- c. Class, Phylum, Order, Family, Genus
- d. Phylum, Order, Class, Genus, Family

2. The biological species concept defines species as:

- a. Populations that can and do freely interbreed, and are reproductively isolated from other such populations.
- b. Populations that form the smallest cluster or group that form a monophyletic grouping.
- c. Both a and b
- d. None of the above

3. Which of the following is an example (or are examples) of *postzygotic* reproductive barrier?

- a. Zygote inviability
- b. Hybrid disadvantage
- c. Hybrid sterility
- d. a, b and c
- e. None of the above

4. In animal cells, DNA is found in which locations:

- a. mitochondria
- b. ribosomes
- c. nucleus
- d. a and c

5. Which of the following is an example (or are examples) of intersexual choice?

- a. male katydids choosing larger female katydids
- b. large male elephant seals monopolizing female harems
- c. female junglefowl ejecting the sperm of subdominant males
- d. b and c
- e. a and c

6. Which of the following are ways that animals obtain energy and nutrients?

- a. Symbiotically from algae
- b. By eating the feces of other animals
- c. By farming and consuming fungi
- d. From symbiotic bacteria that metabolize H<sub>2</sub>S (Hydrogen sulfide)
- e. All of the above

7. Which of the following is an example (or are examples) of intrasexual ("within sex") competition?

- a. male katydids choosing larger female katydids
- b. large male elephant seals monopolizing female harems
- c. female junglefowl ejecting the sperm of subdominant males
- d. b and c
- e. a and c

8. Which of the following are dissimilar in ant and termite societies?

- a. Chemical trails used to recruit workers
- b. Sex of the workers in colony
- c. Caste determination
- d. b and c

9. All of the following are sources of genetic variation for evolution, *except*:

- a. genetic drift
- b. recombination
- c. mutation
- d. gene flow

10. Which of the following Phyla have radial symmetry?

- a. Arthropoda (insects, spiders, crustaceans)
- b. Cnidaria (jellyfish, anemones, and corals)
- c. Ctenophora (comb jellies)
- d. Mollusca (clams, squid, octopus, and snails)
- e. b and c

11. \_\_\_\_\_ selects for individuals that are at one end of a population distribution. For instance, in a hypothetical population of birds with different wing sizes, this type of selection selects for individuals with very large wings and selects against those with medium to small wings.

- a. Directional selection
- b. Stabilizing selection
- c. Disruptive selection
- d. Genetic drift

12. Within the Bilateria which of the following characters does not distinguish the Protostomes (mollusks, annelids, arthropods) from the Deuterostomes (echinoderms, chordates)?

- a. In Protostomes there are two tissue layers, in Deuterostomes there are three tissue layers
- b. In Protostomes solid masses of mesoderm give rise to coelom, in Deuterostomes folds of archenteron form coelom
- c. Protostomes have spiral and determinate cleavage while Deuterostomes have radial and indeterminate cleavage
- d. In Protostomes the mouth develops from blastopore, in Deuterostomes the anus develops from blastopore

13. \_\_\_\_\_ is when individuals in a population differ in their ability to acquire matings.

- a. Mutation
- b. Natural selection
- c. Sexual selection
- d. None of the above

14. Which of the following are ways that animals obtain energy and nutrients?

- a. Symbiotically from algae
- b. By eating the feces of other animals
- c. By farming and consuming fungi
- d. From symbiotic bacteria that metabolize H<sub>2</sub>S (Hydrogen sulfide)
- e. All of the above

15. All of the follow are unique avian (bird) characters, EXCEPT:

- a. Amniotic eggs
- b. Feathers
- c. Air sacs

16. Looking at living vertebrates, which of the following is unique to reptiles, birds and mammals?

- a. live-bearing
- b. amniotic egg
- c. four-chambered heart
- d. endothermic (warm-blooded)

17. Which of the following lineages of fish gave rise to tetrapods (terrestrial vertebrates)?

- a. dipnoi (lung fish)
- b. chondrichthyes (cartilaginous fish)
- c. sarcopterygii (lobe-finned fish)
- d. myxini (hagfish)

18. Why do we not have a more precise estimate of the number of animal species on earth?

- a. Species that are similar in appearance may only be distinguished using molecular data
- b. many species are as yet un-described
- c. many regions of the earth have not been thoroughly explored
- d. sometimes the same species gets two names so is counted twice
- e. All of the above

19. Rank the following groups from greatest to least (left to right) in the number of described species: Mammalia (mammals), Aves (Birds), Mollusca (clams, snails, etc), and Insecta.

- a. Insecta, Mollusca, Aves, Mammalia
- b. Insecta, Aves, Mammalia, Mollusca
- c. Mollusca, Aves, Insecta, Mammalia
- d. Mammalia, Aves, Insecta, Mollusca

20. Which of the following phyla is thought to have evolved first?

- a. Arthropoda (insects, spiders, crustaceans, etc.)
- b. Cnidaria (jellyfish, anemones, etc.)
- c. Mollusca (clams, snails, squids, etc.)
- d. Echinodermata (starfish, urchins, sea cucumbers)

21. Which of the following allow snakes to eat large prey?

- a. long cecum
- b. unfused mandibles (lower jaw bones are not fused)
- c. strong jaws and teeth for crushing and tearing
- d. a gizzard
- e. none of the above

22. Which theory proposes that the number of species at a site is determined by the balancing of rates of immigration of species to that site with the local extinction of species already present?

- a. Stability-Time Hypothesis
- b. Pleistocene Forest Refugia Hypothesis
- c. Equilibrium Theory of Island Biogeography
- d. Periodic Extinction Hypothesis

23. All of the following are ways fishes communicate EXCEPT:

- a. visual signals
- b. electric signals
- c. olfactory (smell) signals
- d. none of the above (meaning, that all are ways fishes communicate)

24. Which of the following vertebrate groups provide parental care?

- a. mammals
- b. birds
- c. amphibians
- d. a, b and c
- e. a and b

25. Which of the following are not methods that invertebrates have employed to escape predators?

- a. Feeding in the daytime
- b. Warning coloration
- c. Crypsis and camouflage
- d. Spines and shells
- e. Chemical exudates

26. All of the following are ways that cooperation can be maintained among individuals in a group, **EXCEPT**:

- a. Tit for tat or Reciprocal Altruism
- b. Kin selection
- c. Spite
- d. delayed benefits

27. Periods of mass extinction as evidenced in the fossil record may have been caused by:

- a. Episodes of widespread disease
- b. Plate tectonics and the fusion of continents reducing the availability and provinciality (isolation) of suitable habitat
- c. Periodic asteroid or comet impacts leading to a nuclear winter like scenario
- d. B and C
- e. All of the above

28. Which of the following is a *benefit* to living in a social group?

- a. increased parasite transmission
- b. reduced likelihood of predation via dilution effects
- c. increased efficiency of prey capture
- d. b and c
- e. a and c

29. Hamilton's rule  $rB > C$  (where  $r$  is the degree of relatedness,  $B$  is the benefit to the recipient, and  $C$  is the cost to the altruist) predicts that natural selection should favor altruistic acts under certain circumstances. Which of the following circumstances are unlikely to lead to selection favoring altruism?

- a.  $B$  is small
- b.  $r$  is large
- c.  $C$  is large
- d. a and c

30. Which of the following are ways in which the ecology of invertebrates differs from vertebrate animals?

- a. Vertebrates play a larger role in the decomposition of dead plant and animal tissues
- b. Invertebrates are more likely to have eruptive population dynamics (large fluctuations in abundance)
- c. Invertebrates tend to have complex life cycles with morphologically distinct juvenile and adult stages
- d. a and c
- e. b and c

**II. True or false (2 points each). Mark (bubble in) "a" for True and "b" for false on your scantron.**

1. Animals cannot distinguish between kin (related individuals) and non-kin (unrelated individuals). **F**
2. The Arthropoda and the Nematoda are the two largest (number of species) phyla that comprise the Ecdysozoa. **T**
3. One of the reasons why females are typically the choosy sex is that females invest more in producing their offspring. **T**
4. Animal diversity can be thought of as taxonomic diversity (diversity of categories such as species, genera, families, etc.), genetic diversity (protein or DNA sequence variation), and/or morphological diversity (diversity of form). **T**
5. Anisogamy is the differential investment in gametes by different sexes (e.g., one sex invests more energy in producing eggs or sperm). **T**
6. Heritable variation among individuals in a population is essential for evolution to occur. **T**
7. Alternation of generations refers to the alternation of sexual and asexual stages in the life cycles of Hydrozoans (hydroids), aphids, and Cynipid wasps. **T**
8. Analogous traits are those that are similar because of common ancestry, and homologous traits are those that are similar because of convergent evolution. **F**

9. Latitudinal gradients are observations that for most animals groups temperate and boreal regions (high latitude) contain fewer different species than tropical regions (low latitude). **T**
10. Uniformitarianism asserts that the natural agents now at work on Earth have operated in a different manner in the past **F**
11. Lamarckism asserts that changes within an organism's life through use and disuse of certain body parts are heritable (passed on to offspring). **T**
12. Haplodiploidy is the situation in Hymenoptera (bees, ants, wasps) where females have two set of chromosomes and are produced from unfertilized eggs, and males have one set of chromosomes and are produced from fertilized eggs. **F**
13. All fish have swim bladders that allow them to remain buoyant (not sink) in water. **F**
14. Lungs likely evolved from swim bladders. **T**
15. The Porifera (sponges), Cnidaria (jellyfish, anemones, etc.) and Platyhelminthes (flatworms) are phyla with radial symmetry. **F**
16. The extraction of DNA, its amplification using Polymerase Chain Reaction, and the detection of the exact sequence of nucleotides that comprise a fragment of DNA using Cycle Sequencing mimics the process of DNA replication within living cells and provides information (nucleotide sequence variation) that can be useful as characters in constructing phylogenetic trees. **T**
17. One of the major trends in the evolution of the nervous system and in sensory perception is the trend toward increasing cephalization (concentration of sensory and nervous structures in anterior of body) in invertebrates. **T**
18. Air sacs make birds lighter, hence allowing them to fly. **F**
19. Evidence from molecular clock data on DNA sequence variation and from fossil pollen records supports the Pleistocene Forest Refugia Hypothesis as a means of explaining the high species diversity of birds in the Amazon basin. **F**
20. Musk ox adults encircling their young in the presence of predators is an example of mutualistic behavior. **T**