

**Biology 170: Exam 3**

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

1. All of the following are unique (only found in) mammalian characters, EXCEPT:
  - a. Hair
  - b. True mammary glands
  - c. endothermia (warmblooded)
  
2. All of the following are unique (only found in) avian characters, EXCEPT:
  - a. Four-chambered heart
  - b. Air sacs
  - c. Feathers
  
3. Looking at living vertebrates, which of the following is unique to birds and mammals?
  - a. live-bearing
  - b. amniotic egg
  - c. four-chambered heart
  - d. hair
  - e. none of the above
  
4. Which of the following allows you to tell lizards and snakes apart?
  - a. presence or absence of legs
  - b. presence or absence of eye lids
  - c. presence or absence of hemipenes
  - d. endothermic (warm-blooded) vs. ectothermia (cold-blooded)
  
5. Which of the following statements is *FALSE* about Chondrychthyes, the sharks and rays.
  - a. All have internal fertilization
  - b. All give birth to live young
  - c. Males have modified pelvic fins for mating
  - d. None of the above (meaning a, b and c are true)
  - e. a and b
  
6. The following are characters of vertebrates EXCEPT:
  - a. presence of neural crest, which is embryonic tissue that develops near the notochord that gives rise to structures like the brain case
  - b. presence of a vertebral column
  - c. closed circulatory system
  - d. all of the above
  - e. a and b

7. All of the following are ways birds communicate *EXCEPT*:
- visual signals
  - auditory (sound) signals
  - electric signals
  - olfactory (smell) signals
  - none of the above (meaning, that all are ways birds communicate)
8. The Chondrychthyes, like sharks and rays, are different from other fish in that:
- They have ossified ("bony") skeleton
  - They don't have a back bone
  - They do not have swim bladders
  - All of the above
  - a and c
9. Monotremes (echidnas and platypus) are different from all other mammals in that:
- They are ectothermic (cold-blooded)
  - They lay eggs
  - They have hair
  - None of the above
  - a and b
10. Which of the following allowed reptiles, birds and mammals to invade/diversify away from water?:
- Amniotic egg
  - External fertilization
  - Water-proof skin
  - All of the above
  - a and c
11. All of the following are Reptilian orders EXCEPT:
- Crocodylia - crocodiles and alligators
  - Testudinata - turtles
  - Squamata - snakes and lizards
  - Sphenodontia - tuataras
  - None of the above (meaning that a, b, c and d are all reptilian orders)
12. All of the following are similarities between birds and reptiles EXCEPT:
- Presence of one ear bone
  - Multiple bones form the bottom jaw
  - Endothermia (warm-blooded)
  - None of the above
  - a and b
13. Which of the following is a FALSE statement about animal communication:
- Communication only occurs among individuals of the same species
  - There are many ways animals communicate, including vocalizations, visual signals & smell.
  - One reason animals communicate is to establish dominance.
  - None of the above (meaing a, b, c are all true)
  - a and b

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

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

15. In herbivores (plant-eaters), plant matter and cellulose, which are hard to digest, is broken down with the help of:

- a. Mutualistic bacteria in the gut
- b. Specialized teeth called molars
- c. Longer digestive tracts (longer small intestine, especially the cecum)
- d. All of the above
- e. a and b

16. Mammals help retain the heat they produce by:

- a. Having hair
- b. By controlling blood flow to the skin
- c. By panting or sweating
- d. All of the above
- e. a and b

17. Which of the following is a **cost(s)** to living in a social group?

- a. increased parasite transmission
- b. reduced likelihood of predation via dilution effects
- c. increased competition for resources within a group
- d. a and c
- e. a and b

18. All of the following are ways vertebrates have evolved to deal with cold temperatures **EXCEPT**:

- a. Having "anti-freeze" in their blood
- b. Hibernating
- c. Having hair, blubber or feathers
- d. Having gizzards
- e. Migration

19. Losing water is a major problem for land vertebrates. Which of the following are adaptations to prevent water loss?

- a. Modified kidneys and salt glands
- b. Having a layer of blubber
- c. Having gizzards
- d. Having elongated cecums
- e. None of the above

20. Ammonia is an excellent way to remove nitrogenous waste because it is cheap to make (costs little energy). However, ammonia is extremely toxic so one disadvantage is:
- Liver has to work hard to remove toxins
  - It has to be diluted so requires a lot of water
  - Has a pungent smell
  - None of the above
  - a and b
21. All of the following are ways birds can navigate EXCEPT:
- Stellar (star) cues
  - Solar cues
  - Magnetic field
  - Olfactory (smell)
  - None of the above (meaning a, b, c and d are ways birds navigate)
22. All of the following are possible reasons why females typically provide more parental care than males, EXCEPT:
- Males are often uncertain of the paternity of the young, while females are typically certain that they are raising their own offspring.
  - At the start of mating, females have already invested more than males and so females have more to lose if they do not provide enough parental care
  - Females are more tightly associated with young, like in mammals.
  - None of the above
  - a and c
23. Which of the following are possible reasons why males would be monogamous?
- Having two parents (male and female) increases the survival of their young
  - Males can maximize their reproductive output by mating with one female
  - Males have to guard their mates from other males, hence forcing them to remain with one female
  - a and b
  - a and c
24. Which of the following are ways parents can preferentially invest in specific (better) offspring?
- Selective provisioning -- provide resources differently among young
  - Allow siblicide (when one young kill the other)
  - a and b
  - None of the above
25. The cardiovascular system (pumping of blood throughout the body) in vertebrates function to:
- Distribute oxygen throughout the body tissues
  - Remove carbon dioxide from the body tissues
  - Deliver fuel (like sugars) to body tissues
  - all of the above
  - a and b

26. Which of the following is false about Amphibian mating systems.
- All have external fertilization
  - In general, they breed away from water and moist habitats
  - All lay eggs
  - All of the above
  - a and c
27. Which of the following is false about mating systems in vertebrates
- Mammal and birds TYPICALLY provide more parental care than other vertebrates
  - Species that provide little parental care generally show low survival rate of young
  - No amphibian has a copulatory organ
  - All of above
  - a and c
28. Which of the following is **NOT** a character of *all* Chordates, at least at one point in their life cycle?
- Presence of a notochord, which is a flexible rod located between the digestive tube and the nerve cord.
  - A dorsal, hollow nerve cord that develops into the central nervous system
  - Pharyngeal slits
  - Vertebral column
  - None of the above (meaning a, b, c and d are all characters of Chordates)
29. Vampire bats preferentially feed those that have fed them at previous times. This is a great example of:
- Tit for tat or Reciprocal Altruism
  - Spiteful behavior
  - Selfish Herd
  - a and b
30. In class, we discussed pied kingfishers that help raise their siblings and, ultimately, they have the highest reproductive out put when compared to those that do not help and those that help unrelated chicks. This evidence is consistent with:
- Kin selection or inclusive fitness
  - Mutualism
  - Dilution effect
  - a and b

**II. True or false (2 pts each). Bubble in “a” for True and “b” for false on your scantron.**

- Only fish use gills to breathe. F
- To reduce their weight for flight, **ALL** birds do not have a copulatory organ (e.g., penis). F
- Dipnoi (the lung fishes) is the lineage that likely gave rise to tetrapods (land vertebrates). T
- Blue gill nests in the center of a colony experiences a reduction in predation and parasitism rates. This is an example of reciprocal altruism or tit for tat. F
- ALL** living mammals give birth to live young. F

6. One of the many traits that are common between crocodiles and birds is the extensive parental care these organisms provide their young. T
7. Many reptiles rely on their moist skin for breathing. F
8. Birds' air sacs facilitate (help) breathing by preventing the mixture of stale (CO<sub>2</sub> rich) air with fresh (O<sub>2</sub> rich) air. T
9. One disadvantage of being ectothermic (cold-blooded) is that it requires a lot of energy to maintain. F
10. Compared to swimming and flying, running is the cheapest (less energy per unit distance) way to move around. F
11. The alula, the 3-4 feathers attached to a bird's first digit, allows birds to fly by increasing the power of its wing stroke (wing flapping). F
12. *All* bony fishes have external fertilization. F
13. *All* amphibians are egg-layers (oviparous). F
14. *All* reptiles have internal fertilization. T
15. Because most fish species provide little parental care, each young has a low probability of survival. T
16. In a polyandry mating system, a single male often mates with many females. F
17. Cooperative behavior is when both the actor and the recipient of an action benefit. T
18. In long-tailed manakins (discussed in class), young and old males pair up to attract females, with the old male gaining most (if not all) the matings. The young and old males are not related, and the young male eventually inherits the attractive display site when the old male dies. This is an example of kin selection or inclusive fitness. F
19. Resource-defense polygyny should evolve if the females aggregate (come together) in groups that can be easily defended. F
20. Asexual reproduction, like parthenogenesis, is *not* found in birds and mammals. T