

Test 2

PART ONE: Multiple choice questions. Correct answers are boldfaced. Partial credit will be given for partially correct answers.

1. Which of the following are real functions of the air sac system in birds?
 - a. air sacs are infrasound detectors
 - b. in some cases, air sacs are used in sexual displays**
 - c. air sacs produce lift by holding buoyant gases
 - d. air sacs facilitate two-way airflow
 - e. air sacs act as shock absorbers**
 - f. air sacs help birds shed heat**

2. Digestion and food processing in **most** birds are generally characterized by:
 - a. slow rates of digestion
 - b. external maceration
 - c. the ability of the digestive system to change in response to dietary changes**
 - d. large volumes of food held inside the digestive tract for a long time
 - e. efficient extraction of nutrients**
 - f. tooth loss**

3. Some shorebirds exhibit a behavior near their nests in which they will run erratically along the ground in front of a predator, dragging a wing, and vocalizing. This behavior can only be considered a *display* if it:
 - a. has evolved over time**
 - b. is stereotyped**
 - c. is not misleading
 - d. has no effect on what the predator does
 - e. conveys some specific message to the predator**
 - f. benefits the shorebird**

4. Which of the following are accurate statements about factors influencing vocalizations in birds?
 - a. There is a relationship between air temperature and when a bird chooses to sing**
 - b. Syringeal muscle complexity is unrelated to song complexity
 - c. Sound carries better above the tops of trees**
 - d. In general, female birds find large vocal repertoires attractive in males**
 - e. Vocalizations allow birds to communicate while trying to hide their location**
 - f. Vocalizations are partly or completely controlled by genetics**

5. A variety of activities in birds cycle temporally; which of the following may influence the timing of breeding?

- a. **The availability of particular foods**
- b. **Food abundance**
- c. **Melting of snow and/or ice**
- d. **Rainfall**
- e. **Day length**
- f. **The presence of other birds**

6. Which of the following statements about day length are true?

- a. **Day length helps birds determine when to grow bigger gonads**
- b. **Day length helps birds keep track of the time of day**
- c. **Day length helps birds to determine the time of year.**
- d. Day length helps birds to determine if they have had too much UV exposure
- e. Day length helps birds tune their songs to the right pitch
- f. **In the absence of day length cues (i.e., in constant light), birds begin to do things at the wrong time.**

7. Which of the following statements about the circulatory system of birds is TRUE?

- a. **birds have high blood pressure**
- b. birds, like other reptiles, have a three-chambered heart
- c. birds move little blood with every stroke of their hearts
- d. birds have low rates of heart failure
- e. birds keep their heads warmer than their bodies by altering circulation
- f. **birds can slow the flow of blood to everything but the brain, in some cases**

8. In which circumstances should you expect birds to favor vocal over visual forms of communication? (3 points)

- a. when molting, and therefore not looking very good
- b. **when nesting in a crowded colony**
- c. when trying to communicate only in the immediate vicinity
- d. **when trying to communicate in a structurally complex environment**
- e. **when lots of predators are nearby**
- f. **at night**

9. The feeding systems of birds are very diverse; which of the following have been factors in the tendency and ability of birds to evolve so many beak shapes and ways of eating?

- a. **The ability of birds to fly has given them access to every kind of habitat.**
- b. **The loss of teeth in birds has made dramatic shape changes in the jaws possible.**
- c. **High energy needs in birds mean that they have to eat very frequently.**
- d. **The jaw bones of birds are covered with a constantly growing horny sheath.**
- e. **In environments where conditions and food supplies change frequently, natural selection can produce changes in average bill size in as little as one year.**
- f. **Some birds have evolved ways of storing food for use during times when food is scarce.**

10. Which of the following are sensory capacities that birds have but we do not?

- a. **uv vision**
- b. **echolocation**
- c. clairvoyance
- d. **hearing in the range of infrasound**
- e. synesthesia
- f. **ability to detect magnetic fields**

11. The consequences of endothermy in birds include:

- a. a metabolism that consumes little energy
- b. **an increase in energy costs with decreases in body size**
- c. **body temperatures close to the temperature at which proteins denature**
- d. limitations on the ability of birds to move around when they want, where they want
- e. **the need for some birds to allow their body temperatures to drop at night**
- f. the inability of large birds to allow their body temperatures to drop at night

12. When birds are in their thermoneutral zone:

- a. their metabolic rate fluctuates
- b. their metabolic rate has no effect on their body temperature
- c. **they are not expending energy trying to get any warmer or any cooler**
- d. they are colder than their lower critical temperature
- e. **small increases in ambient temperatures do not cause increases in their metabolic rate**
- f. **their metabolic rates are as low as they can be while keeping the bird warm enough.**

Short answer questions; 3 points each

13. Describe one kind of display used by birds, and its purpose, using an example from the video I showed in our class on visual communication. Be brief, but complete enough that someone who hadn't seen the movie could understand!

A variety of answers was possible here; but an *example from the movie shown in class was required*. If you gave an answer which was correct, but was not drawn from the movie, you did not receive points.

14. Give an example of a type of bird that does not breed on an annual cycle and explain why.

Again, a variety of answers were possible here; they include:

Wandering Albatrosses breed less than once per year because they require more than a year to produce one fledged chick

Sooty Terns breed approximately once every 9.6 months because they are not seasonally limited with respect to either food or nesting sites.

15. I showed a film clip in class which showed New Caledonian Crows hunting the larvae (grubs) of a wood-boring beetle. Briefly describe what happened in the film, what unusual behavior was illustrated by the crows, and describe the ability of juvenile crows to engage in the behavior. (3 points).

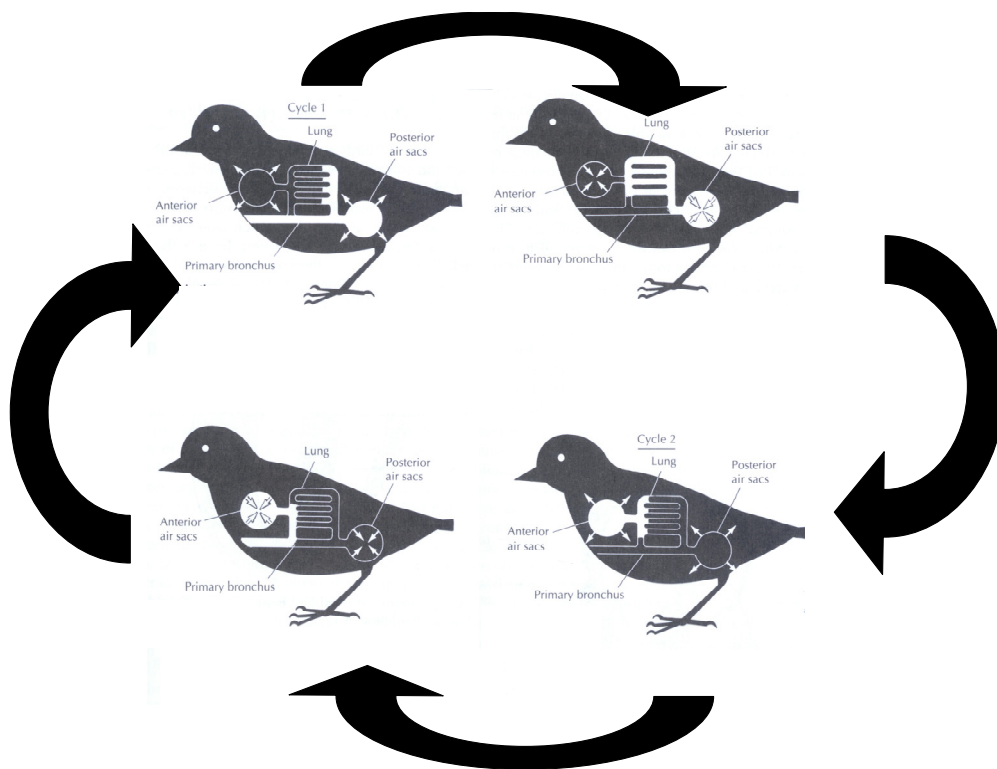
The film showed New Caledonian Crows using twigs as tools to extract the larvae of wood-boring beetles from a tree-trunk. The film showed a crow poking a grub with a twig until the grub bit the twig, then the crow pulled the grub out of the log, killed and ate it. The film also showed a young crow watching an adult use a twig in this way, then the young crow trying and failing. The film stated that the abilities of young crows to use tools is limited, and that they take some time watching adults and practicing before they can use tools successfully.

16. Define the following terms (3 points each):

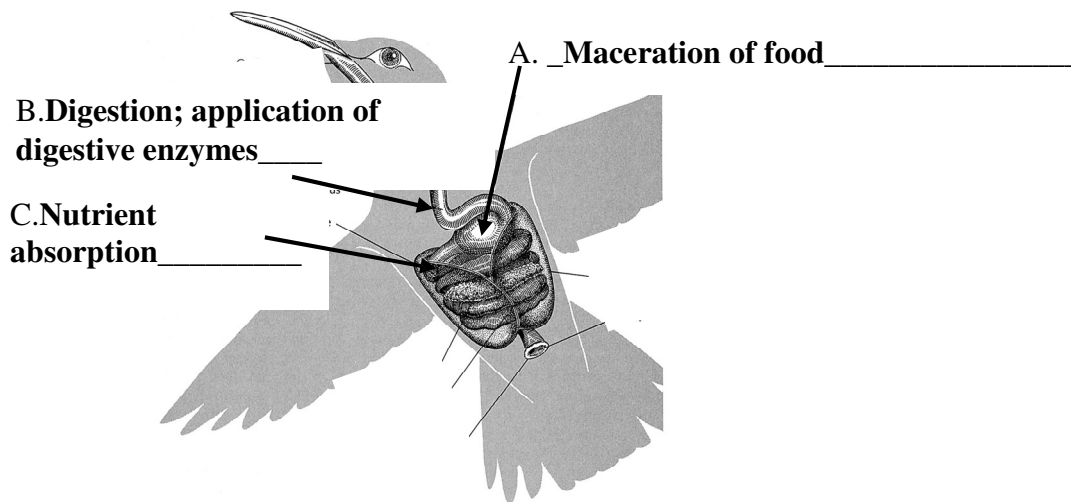
- a) **temporal fovea** – an area of increased/very high cone (photoreceptor) density in the retinas of birds; the fovea is the part of the retina where images are perceived most sharply. The temporal fovea is an “extra” fovea in addition to the central fovea, which serves to enhance the binocular vision of predatory birds.
- b) **pigeon milk** – a liquid substance produced by pigeons, consisting of the shed lining of their crops, which they feed to their chicks.
- c) **tympaniform membrane** – the membrane held under tension in the syrinx of a bird; its vibration when air is passed over it produces sound.
- d) **Syrinx** – a sound producing structure in the throat (trachea) of birds.

Diagram and fill-in-the-blank

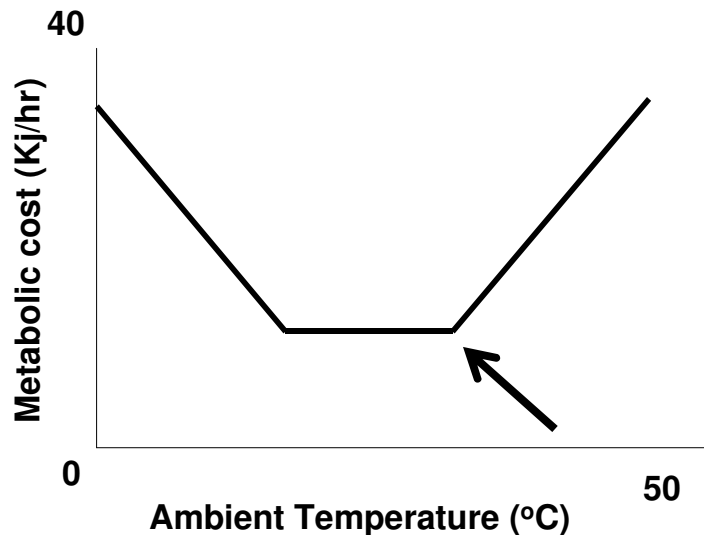
17. On the diagram below, what does the area of white represent? (3 points)
The area of white represents a single volume of inspired air as it moves through the lungs and air sacs of a bird.



18. Fill in the blanks with the **functions** of the relevant organs. (3 points per blank)



19. The diagram below shows the metabolic rate of a blue jay across a range of temperatures. **Draw an arrow pointing at the point** on the graph that represents the blue jay's Upper Critical Temperature (UCT).



20. Write down one question about bird biology that I DID NOT ASK ABOVE. Answer it correctly. (3 pts.)

Again, a variety of answers was possible here, but you HAD TO ANSWER YOURSELF CORRECTLY TO GET POINTS.