

**Test 1 KEY**

**PART ONE: Multiple choice questions. Correct answers are boldfaced (3 pts each)**

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1. Birds are not the only animals to have evolved flight; which of the following statements accurately reflect their success as flying animals, and their importance?
  - a. **Birds are more numerous than any other kind of flying vertebrate**
  - b. **Birds have occupied every kind of habitat**
  - c. There are few species of birds, compared to other kinds of flying vertebrates
  - d. Birds are feathered mammals, and thus share much of our physiology
  - e. **Birds are active in the daytime, and so easy to study, compared to most vertebrates**
  - f. **Birds are so attractive to people that birdwatchers generate more economic activity than hunters do.**
  
2. Although they have long been classified as a different group, it is well known that birds evolved from a reptilian ancestor. Which of the following are features of birds that indicate their reptilian ancestry?
  - a. **sclerotic ring**
  - b. a lower jaw made of a single, unfused bone
  - c. anucleate red blood cells
  - d. mammary glands
  - e. **a single inner ear bone**
  - f. feathers
  
3. Evidence that the climate of the planet is changing in ways that will affect birds (as well as all other life) includes:
  - a. the polar ice caps have grown significantly larger in the last 10 years
  - b. the sun is producing less solar radiation
  - c. nights are longer than they used to be
  - d. **the surface temperature of the planet has risen almost a full degree C in just the last century**
  - e. **sea level has risen an average of 3 mm per year since 1993**
  - f. **eleven of the last twelve years are the warmest since humans began recording temperatures**
  
4. Which of the following are ways in which habitat for birds will be affected by climate change?
  - a. **some places will get more precipitation than they do now**
  - b. **some places will get less precipitation than they do now**
  - c. **some habitats will shift their locations**
  - d. **some habitats will be eliminated because a shift in location will not be possible**
  - e. **some habitats will be reduced in area**
  - f. **some habitats will be inundated with rising sea water**

5. What is the significance of the Chinese fossils that I showed pictures of in class?
  - a. **They provide examples of the stages of evolution of feathers from very simple structures to very complex structures similar to modern feathers.**
  - b. The form of feathers on the Chinese fossils, and the locations of feathers on their bodies, demonstrate that feathers had to have evolved for flight.
  - c. **They demonstrate that feathering was probably widespread in the Theropods**
  - d. **They provide evolutionary intermediates between dinosaurs and modern birds**
  - e. **They show that it is possible to evolve four wings on a single animal**
  - f. The fact that they have feathers on them makes it likely that birds evolved from another group of reptiles than the dinosaurs.
  
6. The exact nature of the evolutionary origins of flight have long been debated by ornithologists. Some of the major ideas and evidence about how and why birds evolved the ability to fly include:
  - a. **The arboreal theory proposes that the early birds lived in trees.**
  - b. Early birds, like all other theropod dinosaurs, were quadrepedal.
  - c. **The cursorial theory proposes that early birds used their forelimbs in prey capture.**
  - d. **Baby quail flap their wings when they are chased up an incline.**
  - e. **It has been observed that as a quail's wing feathers grow in, it can successfully run up steeper and steeper inclines.**
  - f. Only large increments of change in wing surface area could have been advantageous to early birds.
  
7. The colors of feathers are among their most striking features. Which of the following are accurate statements about the manufacture and importance of feather colors?
  - a. Carotenoid pigments are manufactured by birds.
  - b. **Melanins make feathers gray, black or brownish, and they also make feathers more resistant to wear**
  - c. **Blue colors result from the physical alteration of light at the surface of a feather caused by the structure of the feather cells.**
  - d. **The wear in feathers resulting in the loss of barbules can change feather color.**
  - e. **Bright red feathers are an accurate indicator of whether males will be good providers of food to their mate and chicks.**
  - f. **Birds in dry, hot climates tend to be light colored.**
  
8. A bird has to balance a number of competing forces in order to achieve flight. Which of the following represent real avian solutions to the problems presented by flight?
  - a. Birds with small wings relative to their body mass flap and fly slowly.
  - b. **The avian sternum has a unique structure for the attachment of flight muscles.**
  - c. **An albatross has sacrificed the ability to spring directly into the air without running in exchange for the ability to fly long distances without flapping.**
  - d. **Vultures use warm, rising air to avoid having to flap.**
  - e. The muscles powering the forelimbs in birds are shifted away from the center of the body
  - f. **No lineage of birds has ever evolved live birth.**

9. Which of the following features of the modern avian body form contribute to the ability of birds to fly?

- a. **Pneumatization of the bones**
- b. addition of digits to the hand
- c. **a complete loss of teeth**
- d. **a smooth feather coat**
- e. **a decrease in size**
- f. **a skeleton that is more rigid than that of most land vertebrates.**

10. Feathers are uniquely modifiable structures, and the types of feathers include:

- a. semibreeds
- b. **semiplumes**
- c. **rectrices**
- d. **contour**
- e. **remiges**
- f. **bristles**

**PART TWO:**

**Short answer and fill in the blank.**

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11. For each of the lines in the table below, fill in the common name of a group of birds, the corresponding order name, one important characteristic of the order, and a short description of their global distribution. (1 point each box in the table = 16 points total). First line in the box is an EXAMPLE, which you may not repeat for credit.

<b>Group</b>	<b>Order</b>	<b>Characteristic</b>	<b>Distribution</b>
Owls	Strigiformes	nocturnal/facial disks of feathers/ acute hearing	Worldwide
<b>A variety of correct answers was possible here</b>			
	<b>I don't engage in double jeopardy – if the names didn't</b>		
	<b>match I graded subsequent responses in the</b>		
	<b>way that gave you the most points</b>		

12. Briefly describe one economic use of a bird or part of a bird. (2 points)

**A number of correct answers would have been possible here, and include use for food, bedding and clothing (down feathers), selling birds in the pet trade, hunting them for food or sport, and watching birds just for pleasure.**

13. Describe what each of the following body parts is and where it can be found on a bird's body. (8 points)

i) furcula – **The fused clavicles; acts as a spring to assist in ventilation during flight; found in the upper region of the chest.**

ii) pygostyle – **The bone, consisting of fused tail vertebrae, which serves as an anchor for tail feathers in modern birds. Found at the tail end of the vertebral column.**

iii) apteria – **The unfeathered spaces in between the feather tracts (pterylae). Found in various places all over the surface of a bird's skin.**

iv) filoplume – **a modified contour feather, with a mostly naked rachis, and a few barbs and barbules near the tip, which serves a sensory function by indicating the position of other feathers. Inset all over the skin, they penetrate the feather coat to lie on the surface of other feathers.**

14. I showed a film clip in class which illustrated the principle that gliding flight is a form of controlled falling. Briefly describe what happened in the film, and how gliding flight was achieved. (3 points)

**In the film clip referred to, a number of people wearing “wing suits” jumped (or purposely fell) off high cliffs. Once they were falling at a sufficient speed, they opened their legs and arms, spreading the “wings” of the suits, in order to create enough drag to slow the rate at which they fell, and to provide enough lift to control their position and direction in the air. Those with the best technique glide long distances, and have good control of their position --- some glide very close to the sides of mountains or other structures. If you did not address the role of drag vs. lift, you lost some points; if you did not actually describe what actually happened in the movie, you lost points, even if you provided a description of how lift is produced on an airfoil.**

15. The graph below shows a change in behavior of Common House Martins over 30 years in response to a change in what environmental factor? (3 points)

**Common House Martins have advanced their date of arrival and egg laying by almost 10 days in response to warming of the climate over the last 30 years; we gave credit if you noted that the seasons had shifted their timing.**

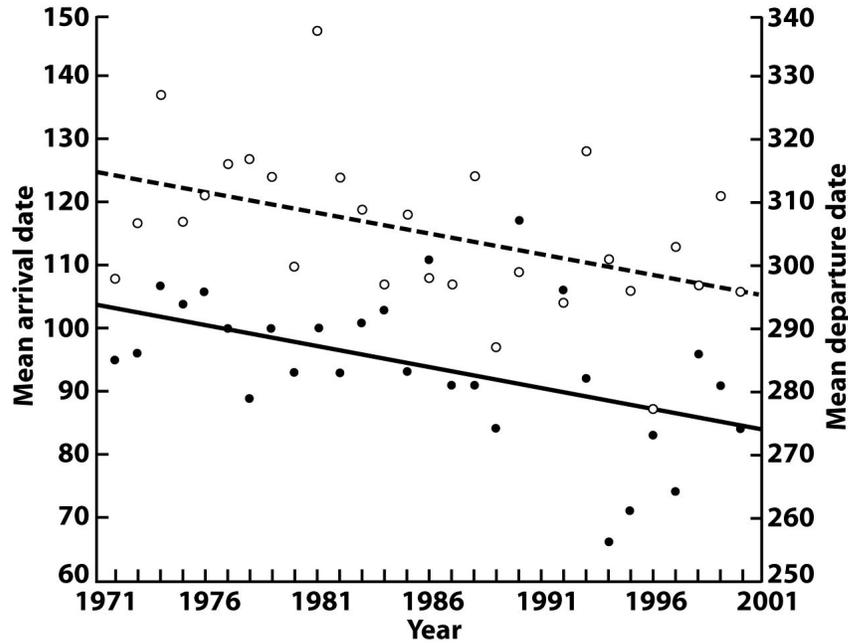
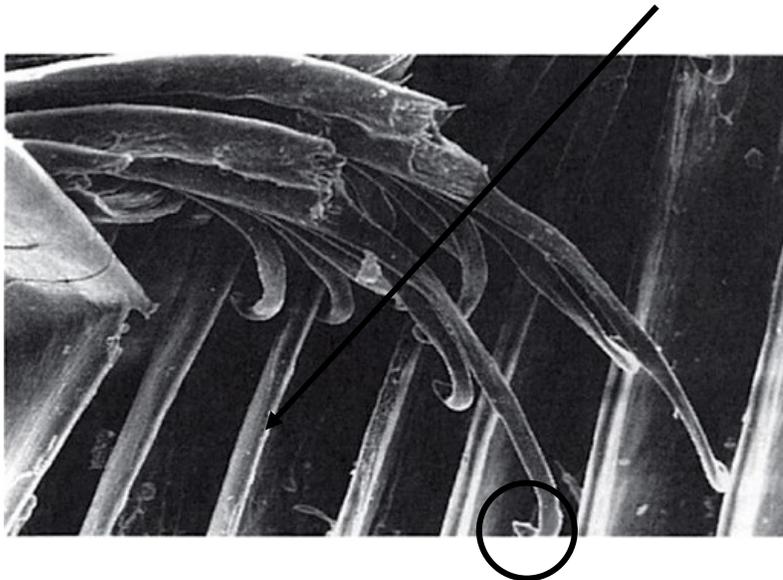


Figure 9-14  
*Ornithology, Third Edition*  
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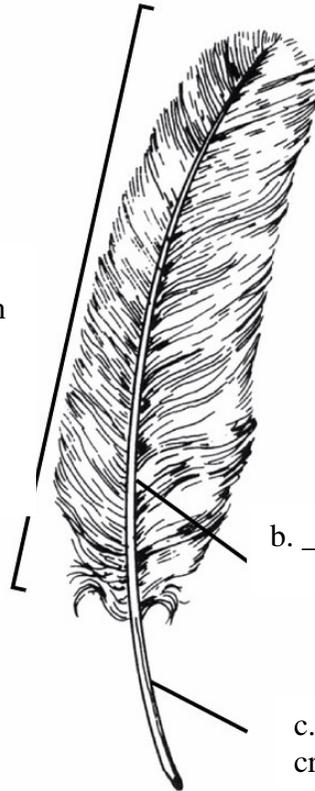
**Labeling (2 points per label)**

16. On the picture below, draw an arrow to a barbule. Circle a hooklet.



17. On the drawing below, label the parts of the feather indicated by the blanks.

a. \_\_\_\_\_ **VANE** \_\_\_\_\_ (if you wrote  
"vein" you got this wrong -- a vein  
is an entirely different structure



b. \_\_\_\_\_ **RACHIS** \_\_\_\_\_

c. \_\_\_\_\_ **CALAMUS** \_\_\_\_\_ (I gave partial  
credit if you said "quill" \_\_\_\_\_

18. (This question has no "right" answer -- you just have to put down SOMETHING pertinent to the question) What's one thing I could do that would improve your comprehension of the material in this course? (3 points)

**Thanks for your help!**