Biology 11 Name:

Evolution of Flight: dinosaurs to birds

Purpose:

1. To examine the evidence that supports the evolution of birds from dinosaurs.
2. To examine the characteristics of birds required for flight

Directions:

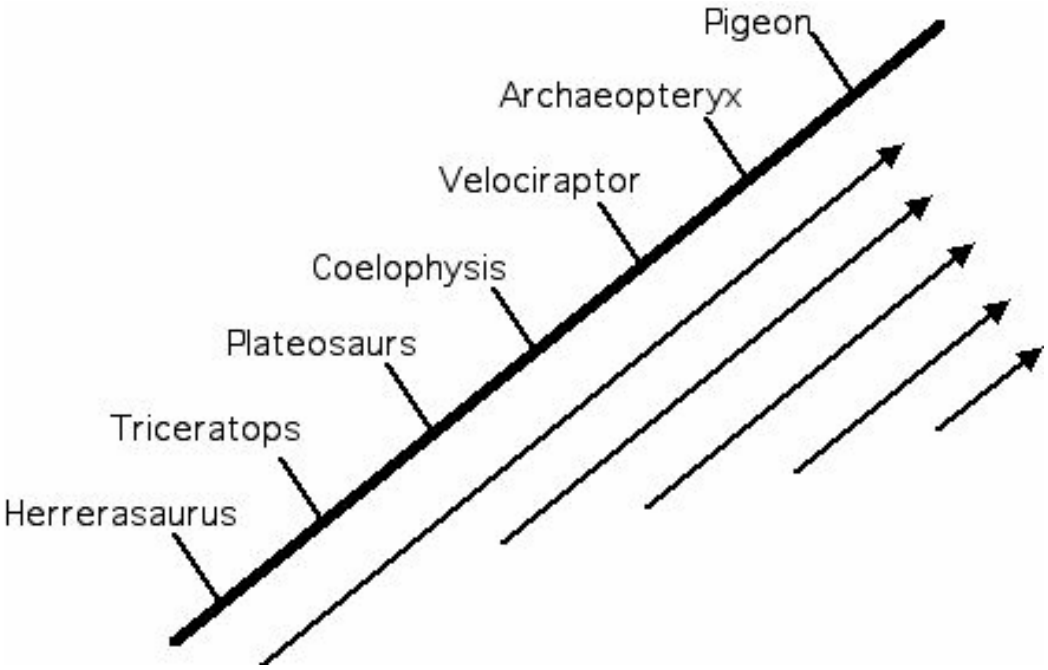
1. Use the following web site
   http://www.ucmp.berkeley.edu/education/explorations/reslab/flight/index.htm
2. complete sections 1-4 on the web page and the corresponding section on the worksheet

Section 1: Introducing Flight

1. Archaeopteryx – ancient wing
   Describe why Archaeopteryx is thought to be an evolutionary link between reptiles and birds.

2. On Cladogram below (arrows), identify the following groups and give a brief description of each:

Group	Characteristics
Dinosaurs	
Saurischians	
Theropods	
Maniraptorans	
Birds	

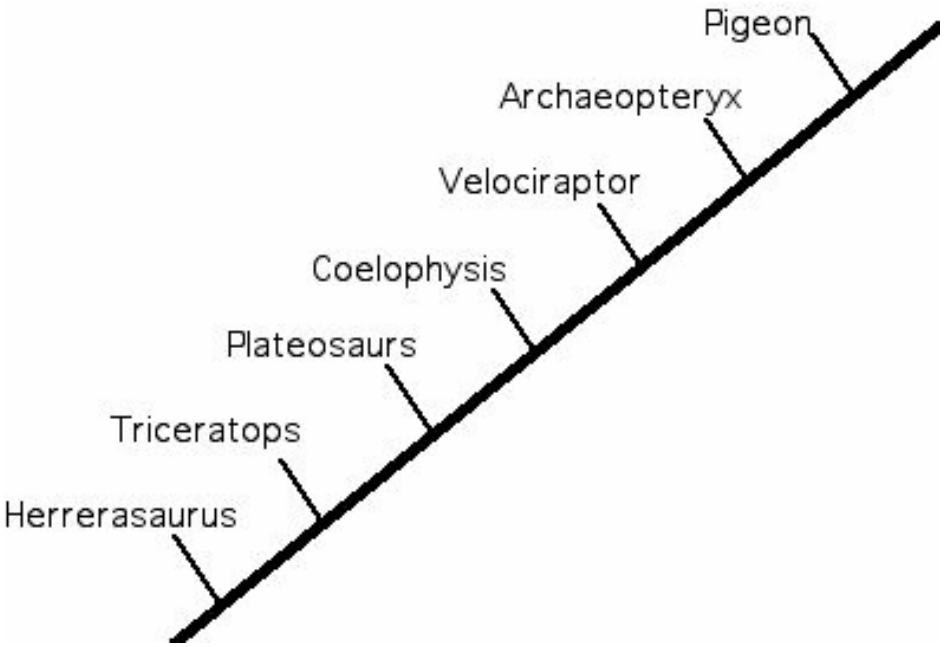


Section 2 – Flight Features: complete the following table

Feature required for flight	Description
1.	
2.	
3.	
4.	
5.	
6.	

Evolution of Flight Features - for each of the flight features, place the appropriate letter on the cladogram where the feature first appeared.

a. bipedalism
b. long digit
c. thin walled bones
d. finger reduction
e. wishbone (furcula)
f. larger sternum
g. half moon shaped wrist bone
h. "out" shoulder socket



Section 3 – Bird Feathers: for each of the following feather types, give a brief function.

a. insulating feathers

i. downy feathers:

ii. semiplume feathers

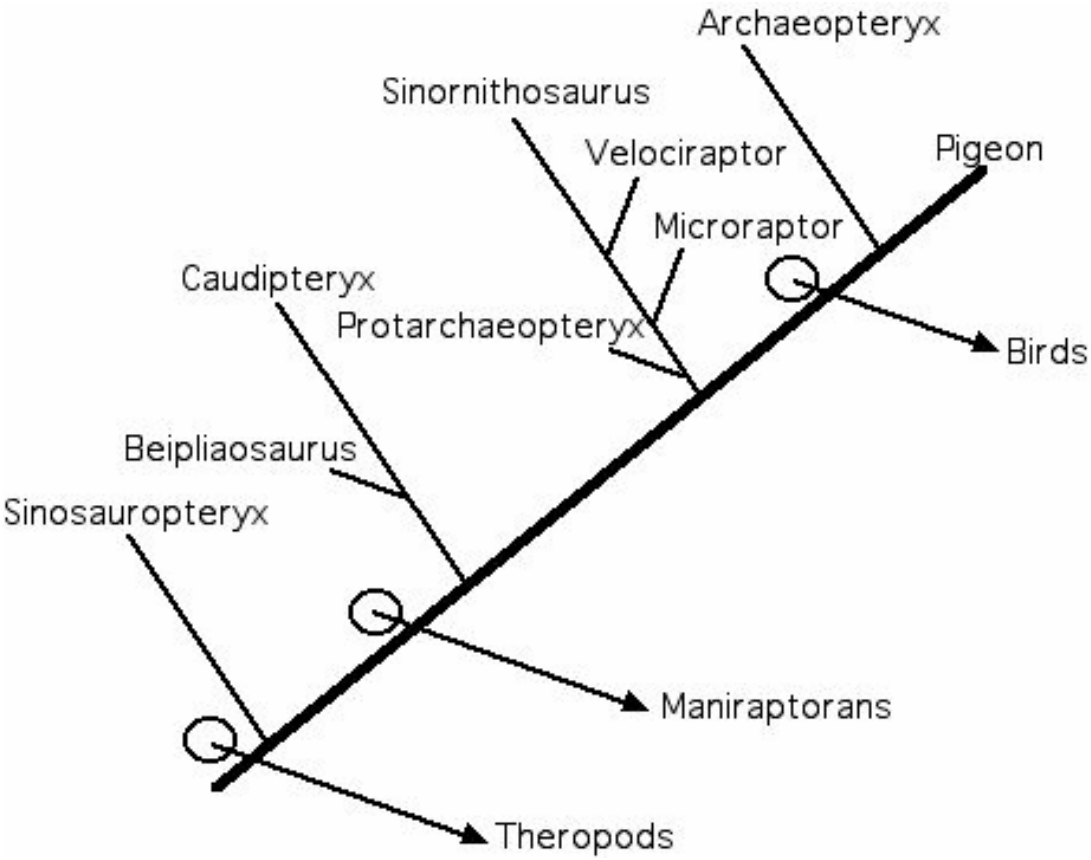
b. contour feathers

c. flight feathers

d. filamentous (describe their structure)

On the cladogram below, label the following with the appropriate letter.

A. insulating feathers first evolved
B. contour feathers first evolved
C. flight feathers first evolved
D. filamentous feathers first evolved



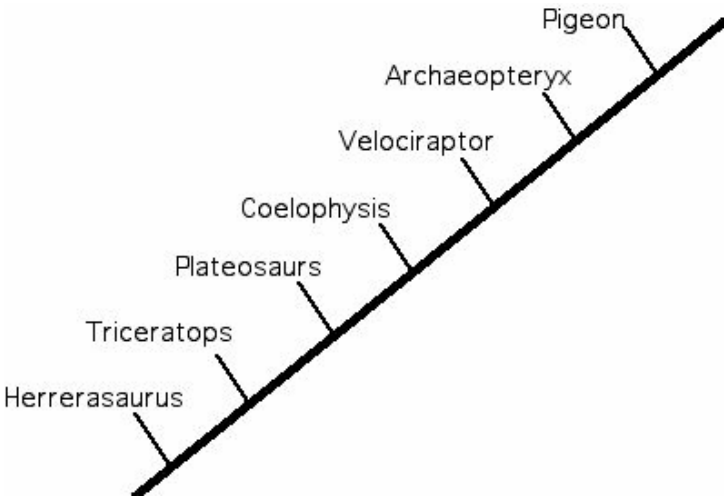
Section 4 – Flight

How does an airplane generate thrust?

How does an airplane wing generate lift?

On the cladogram below, label the following with the appropriate letter.

A. arms become nearly as long as the legs or even longer
B. first appearance of "out" shoulder socket
C. semilunate bone is found



A bird's flight stroke can produce lift and thrust because of a greater range of motion. How do the following bird joints increase range of motion?

a. shoulder

b. wrist

To generate lift and thrust, a bird's wings must …

The relative length of arms compared to legs is important in flight because it indicates …

The increased range of motion in the shoulder joint and wrist joint …

On the cladogram above, label with a D where the increased range of motion necessary to develop a "flight stroke" first appeared.