Birds of Prey: Adaptation Analogies

*Starred Items refer to live birds or specimens at Velma Morrison Interpretive Center

Part	Try	Why	Reference
Eyes	• Close your left eye • Hold arm out straight in front of nose. • Raise index finger • Line the finger up with an object 5-10 ft away. • Open left eye while closing right eye. • Repeat open and closing eyes. • What happens?	**Depth Perception** -It takes two eyes focusing on the same object to have good depth perception.	Awesome Adaptations, Bird Vision, Part 4. http://www.birdsofprey.blm.gov/nat-res/bop.htm
Eyes	• Place first two fingers together on both hands. • Hold these fingers parallel against eye brows at a slight angle. • What happens? • What has this activity to do with baseball caps?	**Brow Ridge** -Some birds of prey like Red-tailed Hawks, and Golden Eagles have a bony ridge above their eyes, or brow ridge. This ridge shades and protects their eyes.	Awesome Adaptations, Bird Vision, Part 3. *Bald Eagle and Bateleur Eagle
Eyes	• Create a circle-tunnel with 4 fingers and thumb. • Hold these in front of eyes (like binoculars). • What do you see or not see?	**Birds of Prey Field of View** -The field of view for an owl is about 110 degrees, with about 70 degrees being binocular vision. By comparison, humans have a field of view that covers 180 degrees, with 140 degrees being binocular. -An owl's neck has 14 vertebrae, which is twice as many as humans. This allows the owl to turn its head through a range of 270 degrees measured from a forward facing position.	Awesome Adaptations, Bird Vision, Part 3. Owl Pages: http://www.owlpages.com/articles.php?section=Owl+Physiology&title=Vision

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Eyes	• Stand behind a participant and explain to students that birds' eyes occupy much more space proportionally in their skulls then human eyes do in our skulls. • As you announce, "That humans would have to have eyes the size of tennis balls to occupy as much space", hold the tennis balls in front of a participant's eyes.	**Comparison of size of eye in a skull.** -If we had the vision of an eagle we would be able to detect the twitch of a rabbit from a distance of two miles. -Compared to ours, an eagle's retina is physically larger.	Awesome Adaptations, Bird Vision, Part 1. http://www.birdsofprey.blm.gov/nat-res/bop.htm http://www.seaworld.org/animal-info/info-books/raptors/senses.htm
Ears	• Cup your hands and hold them up to your ear. • Have some one speak to you. • Remove your cupped hands. • What happens?	**Facial Disc** -Some owls, the Harpy Eagle, and the Northern Harrier have a facial disc or ring of feathers around their face. -The facial disc focuses the sound in to the bird's ears.	http://www.peregrinefund.org/Explore_Raptors/index.html *Some owls, Harpy Eagle, and Northern Harrier
Feet	• Place a bumpy glove on the hand of a participant. • What has this glove to do with Bald Eagles or Osprey?	**Spicules** -The underside of the toes of Bald Eagles and Osprey are covered with spicules or tiny projections, also aid in holding slippery fish.	http://www.npwrc.usgs.gov/resource/wildlife/closlook/osprey.htm *See Osprey specimen.

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Talons	• Ask this simple question, "A talon used for catching fish could be what shape?" • Have the participant draw the shape or make the shape with their finger. • A variety of answers are possible.	**Osprey Talons** -Osprey talons are much more circular (fish-hook shaped) than other bird of prey talons. - The Osprey can rotate its outer front toe, which enables it to grasp prey with two toes in front and two in back. All other hawks have three toes in front and one in back.	Awesome Adaptations, Beaks, Legs and Feet, Part 2 http://www.npwrc.usgs.gov/resource/wildlife/closlook/osprey.htm http://www.owlpages.com/articles.php?section=Owl+Physiology&title=Talons
Feathers	• Fray a braided nylon rope (4 ft. long) for about 1 ft. • Hold the non-frayed end rope with the left hand, and grasp the other end of the rope just below the frayed end. • Spin the frayed end of the rope with the right hand. • Repeat the process with a 4 ft. long non-frayed rope. • What do you hear?	**Silent Flight** -The leading edge of primary owl feathers is fringe-like and not sharp like a falcon feather. -The fringe-like edges break down the air flow in to many mini-turbulence flows breaking up the sound. -It is like one wave being broken up in to many wavelets.	http://www.owlpages.com/articles.php?section=Owl+Physiology&title=Feathers
Body Shape	• Hold up a sleek sports car, and ask a participant, "This car is most like what bird of prey?" • Or ask, "This car is most like a Red-tailed hawk, a Golden Eagle, or a Peregrine Falcon?" • Hold up a truck and repeat the same questions.	**Do you drive a falcon?** -The sleek sports car is most like the Peregrine Falcon. It is small, very fast, and cannot carry much weight. -The truck is most like Golden Eagle. It is larger, slower, and can carry five times the weight of a Peregrine Falcon.	

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Wing	• Ask a participant to show how their arm is similar to a bird's wing. • Or, give the participant a list of anatomy terms related to bones in a bird's wing and ask them to point to the place on their arm that goes with a given term. For example, have them point to their *humerus*. • Ask a participant this question, "If human arms are similar to a birds wing, why can't humans fly?" • Answers will vary involving feathers, bones, and wings.	**Bird Wing Compared to Human Arm** -Human arms have 22 bones. Bird wings have about 11 bones. -The *Bird's Wing* diagram (pg. 5-6) shows how bones from human arms are similar to and different from the bones in a bird's wing.	Awesome Adaptations, Dumping Weight *Prairie Falcon skeleton in Ecology room *Discovery room bird bones display http://www.environment.gov.au/biodiversity/migratory/waterbirds/shorebirds/feather.html

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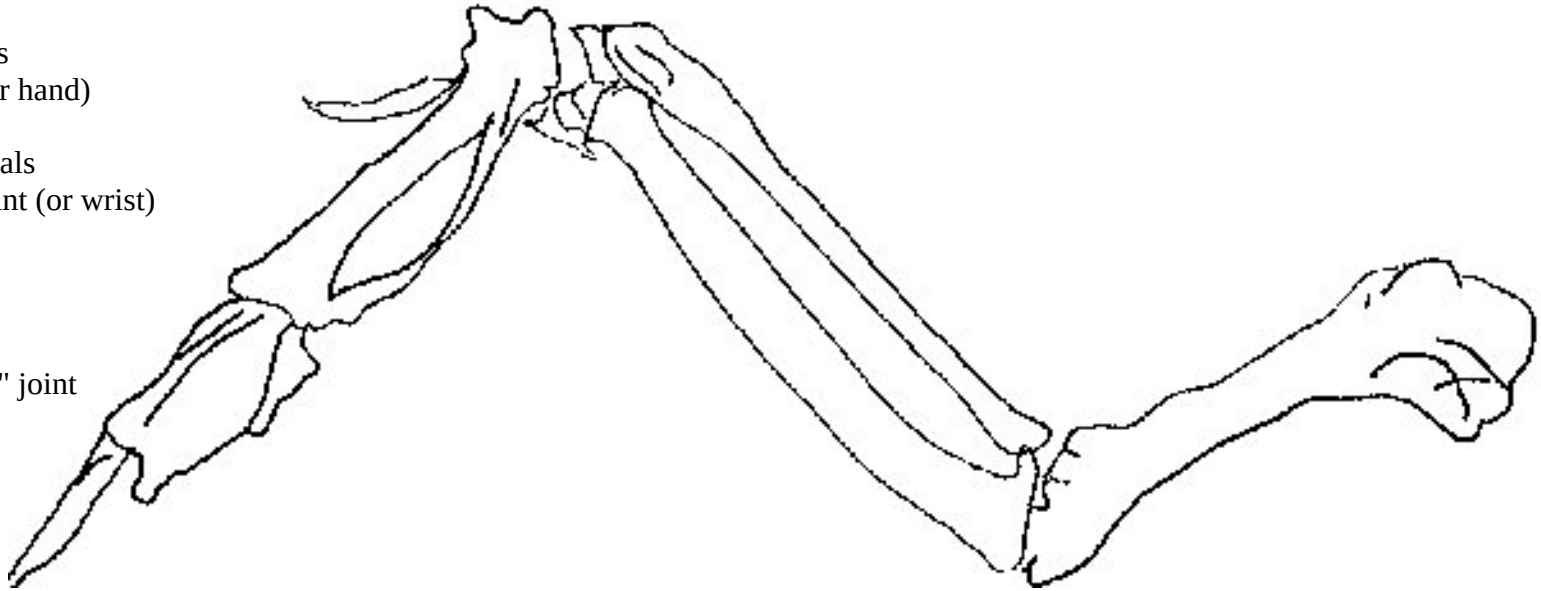
Bird Bone List

A. Phalanges
B. Manus (or hand)
C. Alula
D. Metacarpals
E. Carpal joint (or wrist)
F. Ulna
G. Radius
H. "Elbow"
I. Humerus
J. "Shoulder" joint



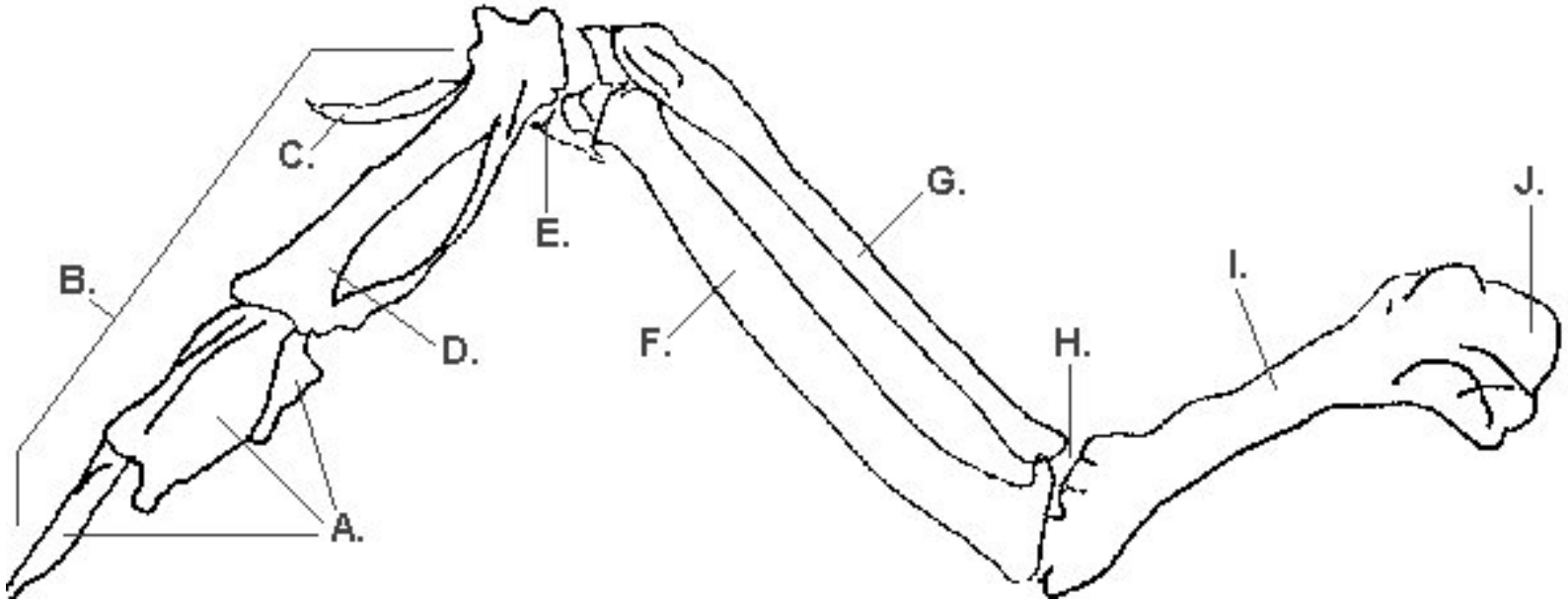
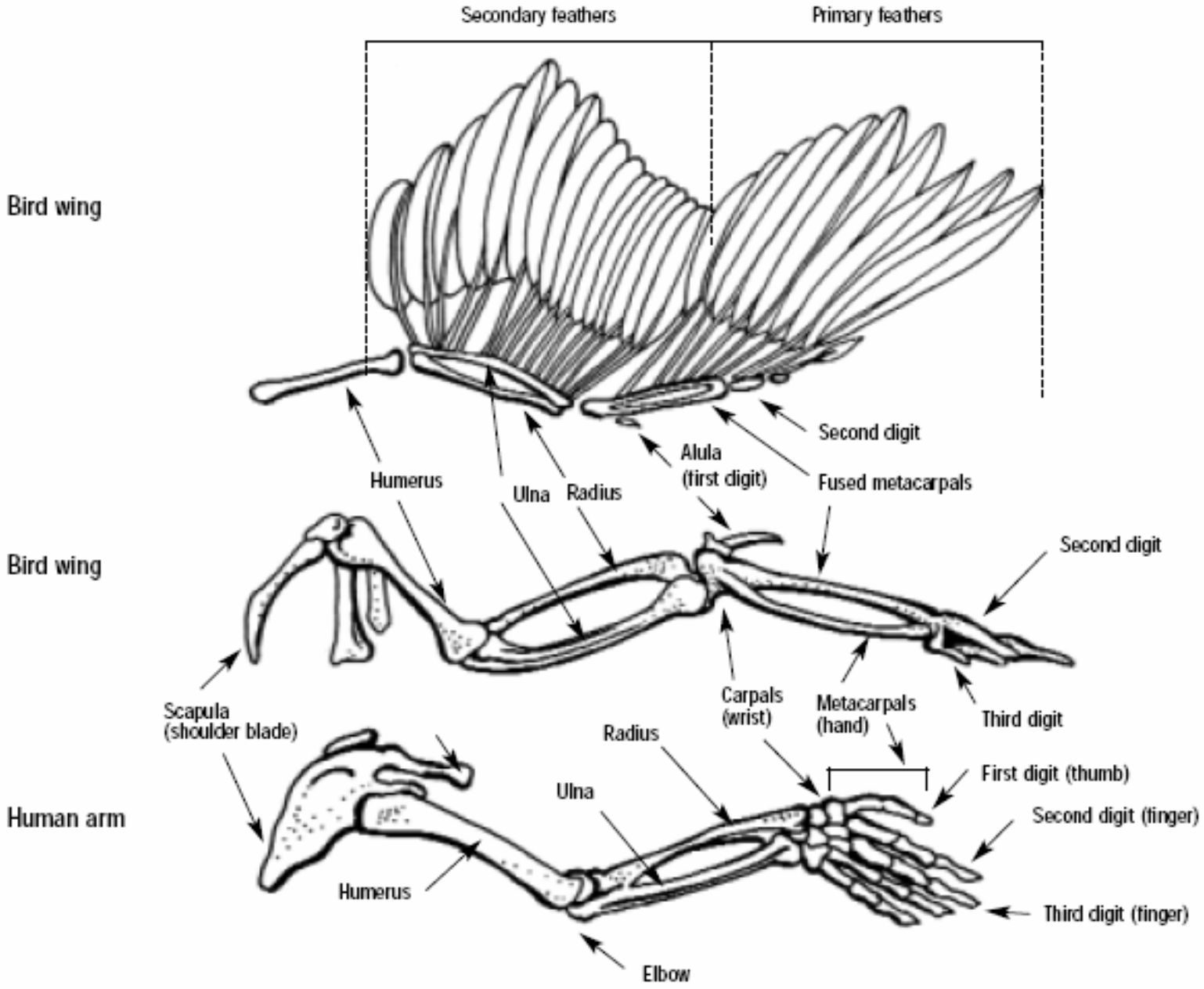


Fig. 3 Comparison of bird wing with the human arm



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