



Arizona's Raptor Experience, LLC
February 2019
~Newsletter~

Greetings from Chino Valley!

We hope you are well and staying warm. At the end of January, we spent the weekend in sunny, warm Tucson for the AZ Falconers Association Desert Hawking Classic field meet. While there we had a chance to hunt with the Harris's Hawks and see many gorgeous birds like the Ornate Hawk-eagle pictured here.

Her beautiful plumage got me thinking about bird feathers. These complex structures play many roles in the life of a bird.

We'll explore feathers in this issue. We hope you enjoy it!

Hope you had a...

*Happy
Valentine's
Day!*



Ornate Hawk-eagle

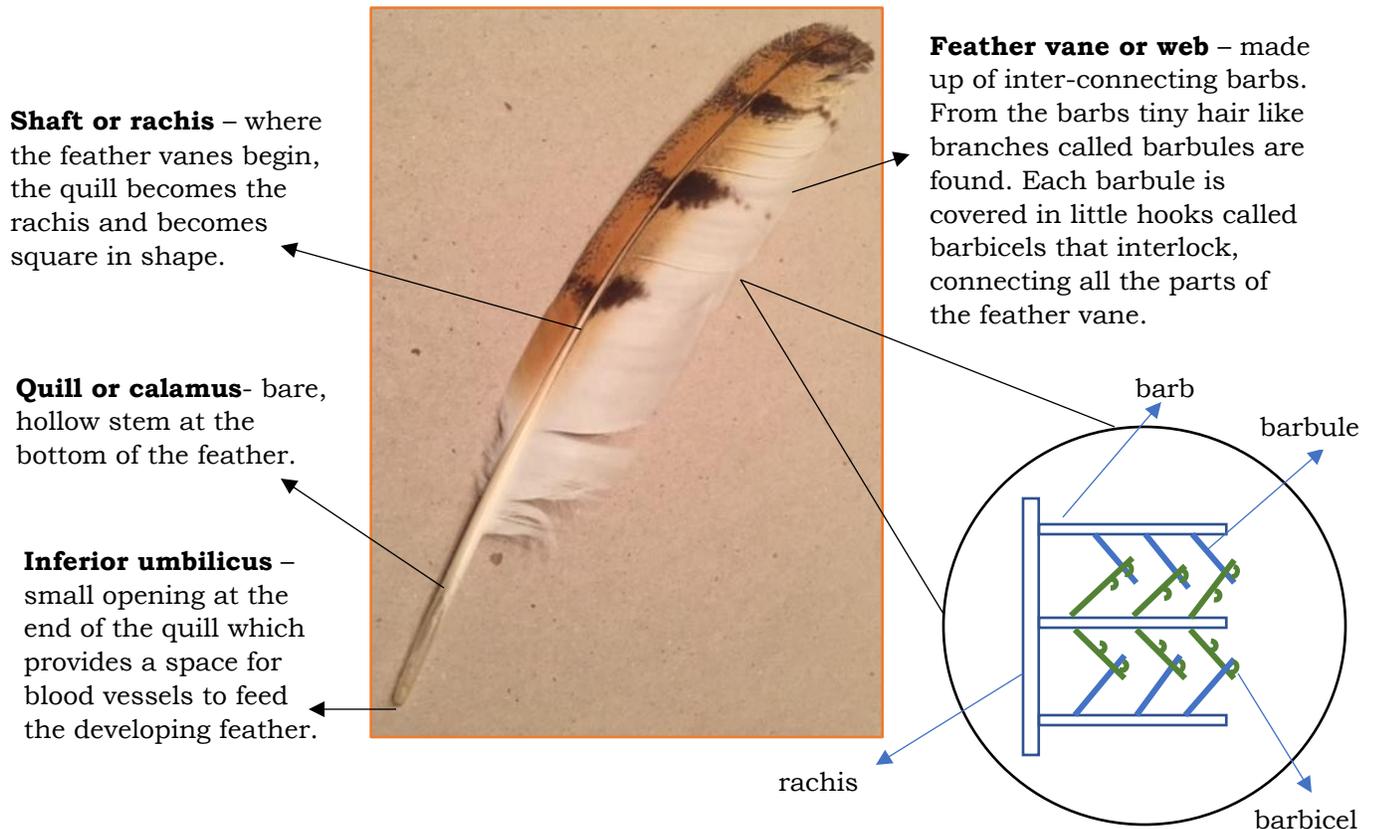
P. Schnell photo

Fascinating Feathers

Have you ever taken the time to examine a bird feather? I mean really look at it closely to see all the parts?



You'll find that feathers are actually very complex structures, even though they are made of a very common material called keratin. Keratin is a protein that is found widely in nature and makes up scales, hair, nails, horns, hooves and of course, feathers. It is the structure of feathers that makes it possible for them to have multiple functions in the life of a bird. They give them not only the power of flight, but feathers also provide insulation, waterproofing, protection from injury, protection from UV light, camouflage, coloration and communication. Let's look at the parts of a primary feather:



Some of the feathers on a bird's body are found in layers, helping to provide insulation and give the streamlined aerodynamic shape necessary for flight. Closest to the skin are down feathers, which are fluffy and lack a lot of structure. They keep the bird warm. Above them semi plume feathers can be found. They are the layer between down feathers and the outer or contour feathers. Semiplumes have a shaft that helps define the birds shape, but they are also quite fluffy providing insulation. Above the semiplumes are contour feathers that make up most of the feathers we can see covering the bird's body. These feathers are stiff and grow over each other like shingles on a roof providing a waterproof barrier and the outer layer of insulation. They also define the bird's shape. Filoplumes and bristle feathers are specialized feathers



that act as sensory organs. Filoplumes are under or stick out from under contour feathers and are responsible for directing movements and vibrations to nerve endings in the bird's skin. They provide the sense of touch. Bristle feathers are found only on the head and neck. They serve a similar function as whiskers, providing sensory information and protecting the eyes. Flight feathers make it possible for birds to fly! These include all the feathers on the wings (primary, secondary, alula and covert feathers, collectively called remiges) and the tail feathers (called rectrices).

Emily, the Swainson's Hawk, showing off her beautiful feathers.

Photo by Kay Cross

As illustrated in this photo of Marlee (Barn Owl) when she was just 13 days old, feathers are distributed in feather tracts called pterylae. The bare areas in between are called apteria and are covered once the feathers grow. Penguins and ostrich are the only birds today that are evenly feathered, retaining the characteristic of primitive birds. *P. Schnell photo.*





Photo by Kay Cross

We notice the feathers on some birds because of their beautiful colors. Flight provides birds an escape from the ground and therefore they do not always need to be drab in appearance to stay hidden.

Color in bird feathers originates both from pigments and from structure. Three types of pigments give birds their coloration. The most common is melanin which gives feathers their black, gray and brown appearance. Carotenoids are responsible for the bright reds and yellows usually seen in contour feathers. Interestingly, carotenoids are only found in plants. Therefore, birds must consume plant materials like colorful berries when feathers are developing to obtain these colors. When the plant material is consumed, the pigments are processed by the liver, delivered to the bloodstream, and then taken to the developing feathers. The least common pigment is called porphyrin and gives feathers

their pinks, browns, reds and greens. These pigments are manufactured in the bird's body and are not affected by diet.

The color blue is interesting in bird feathers, because it is not produced by pigment, but by structure instead. And actually, blue bird feathers are not even blue! If you were to take a "blue" feather and roll it back and forth in sunlight, you'd see the color changes dramatically. In the very fine structure of the feather, the grid that exists between the keratin making up the feather parts and microscopic air cavities, apparently scatters light waves in a way that only sends blue to the observer's eye. The rest of the visible color spectrum is not seen.

Birds feathers that are iridescent get their appearance from a combination of melanin found in the barbules that reflect a variety of colors in the light and again from air cavities that scatter light waves into different wavelengths.

Depending on the angle you view the feather, color can be seen, or the feathers can appear black. The gorget of male Black-chinned and Anna's Hummingbirds are good examples – they often appear black until the bird moves and brilliant purple or red, respectively, can be seen. Peacock feathers are also a good example.



Color and Birds of Prey

Birds of prey in the United States are not known for their color, with one exception. The smallest falcon in North America, the American Kestrel is



Photo by Eric Gofreed, DVM

thought to be the most colorful of the raptors, particularly the male. This species is sexually dimorphic by plumage, meaning the male and the female's feathers look different. The female lacks the bluish-gray on the wings and the red tail feathers of the male. The attractive coloring on the male may aid him, together with the nesting location he finds, in attracting a mate each year.

Interestingly, in most of the birds of prey in N. America, both sexes have the same appearance, the only difference being the larger body size of the female. Many of these species, like Bald Eagles, also mate for life. There is no need for the male to use his appearance to attract a new mate each year.

In some species, like Cooper's Hawks, the male and female share the same appearance, and are monogamous, but often just for the breeding season. They do not necessarily mate for life.

The Northern Harrier can be either monogamous or polygamous, with the male tending to multiple females and nests during the same breeding season. In this species, females (and juvenile birds) are a drab brown. As they age, females will add some cinnamon wash on their breast. The adult male is a beautiful grayish white, thus the nickname the "gray ghost". Northern Harrier's nest on the ground, requiring the female to be more camouflaged.



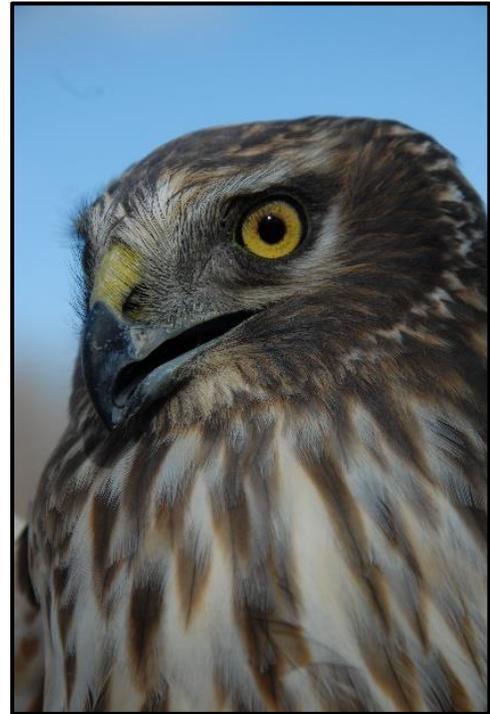
Photo by Paul Schnell



Adult Male Northern Harrier

Photo taken at Braddock Bay Raptor Research

Greece, New York



Female Northern Harrier

P. Schnell photos

Staying Legal with Bird Feathers...

People have long been attracted to colorful feathers and long feather plumes found on some male birds, which are designed to attract female birds in the breeding season. By the end of the 1800's, many bird species were dangerously close to extinction in the United States as a result of market or commercial hunting. Several pieces of legislation, including the Lacey Act of 1900 which prevented the transport of illegally taken game across state lines and the Migratory Bird Treaty Act of 1918 which protected all migratory birds and their parts (eggs, nests, feathers, etc.) saved many birds species from extinction.

Both pieces of legislation are still in place today. What this means is that you can look at feathers you find on the ground, photograph them, study them where they were found or draw them, but you **cannot** keep them. The only feathers you can legally possess are those of hunted species, like pheasant, ducks, turkey, etc., domestic birds like chickens or pet birds and non-native birds like starlings.

