

## **BIRD NOTES**

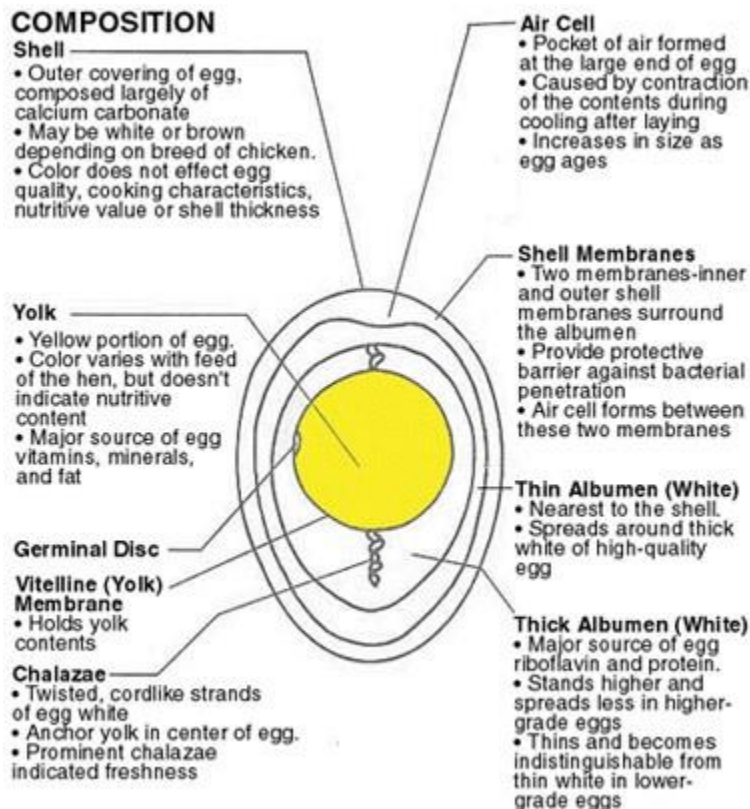
Most ground nesting birds rely on synchronous hatching as a means of survival so that their clutch can be moved all at once from the vulnerable nest site. To achieve that end, the parents wait until all eggs are in place before beginning incubation.

Other species stagger the arrival of young to avoid the instant massive demands for food by nest full of newborns. These parents begin incubating with the first egg as soon as it is laid, giving it a head start over subsequent eggs.

### Maryjo Koch **Bird Egg Feather Nest**

Let's first take a look at the inside of an egg. I will refer to the picture below to illustrate some of the inside structures and their function. Let's look at a real egg activity. All you have to do is to crack open a fresh egg and empty the contents into a clean white dish. See if you can identify some of the structures inside the egg. Examine the shell itself. It looks smooth, but actually has many pores which allows oxygen to enter the egg. The chick within the egg must be able to respire----to exchange gases and water vapor with the outside world-----or it will suffocate. Find the thin shell membrane and notice that it is not attached to the inside of the shell wall at one end. In eggs which are not completely round the air cell is always located at the large end of the egg.

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The shell is composed of  $\text{CaCO}_3$  (calcium carbonate). Birds transfer sometimes as much as 12% of the calcium from the mother's bones to provide the hard outer covering of the egg. To replenish stores of bone calcium birds will eat pieces of the egg shell after the chick has hatched. The egg shell must be strong enough to support the weight of the incubating bird. This fact was unfortunately realized when the population of raptors (especially Osprey, Peregrine Falcon and Bald Eagle) in the US began to decline as the result of the use of the pesticide DDT during the 1950's and 60's. This chemical was found to inhibit the deposition of calcium in the egg shell. The result was a weakened egg shell unable to support the weight of the incubating parent. The developing chick could not survive this. Thanks to the ban of DDT use in the 1970's the populations of the effected raptors are now recovering.

Let's continue looking your cracked open egg. Find a small white circle on the surface of the yoke. This is the germinal spot or blastula—which will not develop any further if looking at an unfertilized egg. There is a thick coating of albumin surrounding the yoke and a much larger n outer layer of thin albumin. Attached to two ends of yolk is a thickened band of albumin called the chalaza, whose function it is to keep the developing embryo on the surface of the yolk. The purpose of the yolk is to provide nourishment for the developing chick.

As the chick develops the egg becomes lighter. There is a substantial loss of water and fat from the yolk. The eggshell becomes thinner as the chick uses maternal calcium for strengthening its own skeleton. Even though the egg shell is thinner it still represents a significant barrier for the chick to break out of its calcium prison. Two structures found only in chicks are the egg tooth and a substantial enlargement of neck muscles along the nape of the neck known as the hatching muscle. The chick is able to repeatedly scratch the inside of the egg weakening it to the point where the chick is able to push against the weakened area with its enlarged muscle and break open the egg.

Clutch size refers to the number of eggs laid by a bird. The number is determined by various forces: heredity, health of the bird, health of the environment and "tricking a bird into laying more than usual." After removing an egg from the nest of a Bald Eagle, the female senses this loss and will lay another egg. The removed egg and the resulting eaglet are cared for through fledging. This process has been used for years to replenish the declining population of raptors.

The shape of a particular bird egg is primarily due to the environmental forces that have shaped the evolution of a species. Cavity nesters such as kingfishers and owls produce round white eggs since there is little danger of them rolling out of the nest. Cliff dwelling birds, such as gannets and murres tend to produce long pointed eggs which will roll in a tight circle when touched preventing them from falling off the nest site. Many ground dwelling birds produce heavily pigmented eggs which blend in with the environment.

Questions or comments? Email me at [eapyeritz@gmail.com](mailto:eapyeritz@gmail.com).