

## Egg Power

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Eggs are common household items that offer a wealth of interesting natural history lessons and some fascinating program activities. The next time you are cracking eggs for a camp breakfast, take a moment with the Cubs to explore the fascinating world of the egg.

#### Natural History

Eggs were a major evolutionary development for birds. They greatly enhanced the probability of survival because the shell could contain large food stores. They also allowed birds to penetrate into drier habitats. Yolk fat, when broken down, yields more metabolic water than the primarily protein food in reptile eggs. Consequently, reptile eggs still need some external moisture for development, which probably is one reason reptiles seek out damp earth in which to bury their eggs.

In evolving into flying animals, birds developed a means to excrete waste that has positive benefits to eggs. As a weight-reducing adaptation, birds do not have bladders. The moisture in their food is absorbed by the body, and the resulting waste is uric acid, which is insoluble in water. This insoluble substance is ideal in a closed egg, since it prevents the developing embryo's waste from mixing with the yolk and poisoning its producer.

Eggs come in an sorts of "egg shapes" and sizes. If you scrambled up a single Ostrich egg, you could feed 12 people. At the other end, the tiny Vervain hummingbird of Jamaica lays an egg only 10 mm long.

The largest known bird egg is that of the extinct Elephant Bird of Madagascar. Fossil eggs measured 34 cm by 24 cm and held 4.5 L. One Elephant Bird egg could hold 33,000 Vervain Hummingbird eggs, for example, and the shell was heavy enough that Madagascar natives could use it as a bowl.

Most birds lay eggs relatively the same shape and size as others of their species. The exception is the parasitic European Cuckoo which lays its eggs in the nest of other birds. It varies its egg size to match those in the nest so that the parent bird doesn't reject the Cuckoo egg and push it over the nest edge. The Cuckoo can also lay eggs with coloration to match the host's eggs -- another way to camouflage its work.

Shorebird eggs are more pointed at one end and rounder at the other. This causes the egg to roll in a right circle, particularly advantageous for cliff-nesting shorebirds whose eggs are at risk of rolling away and over the cliff edge.

Eggs come in a variety of colors ranging from browns and reds to blues and greens. They may have streaks, dots, or blotches. Cavity nesters and open nesters that cover their eggs with down or vegetation

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when they leave the nest (some ducks, geese, grebes) usually lay white eggs because there is little need to hide them from sight. White eggs in cavity nests may also help the parents see the eggs in dim light.

#### Egg Activities

Why are eggs round and not square? Dome shaped structures are exceptionally strong because the weight is carried along the curved walls to a wide base; no single point on the dome supports the whole weight of an object on top of it. That is why architects use dome structures for big buildings that can't have supporting pillars, such as concert halls or hockey arenas. It is also why eggs don't crack when the parent bird sits on them.

This weight-bearing property can lead to some interesting activities with egg shells. If you're using eggs at a camp, have the Cubs try this experiment while the food is cooking.

Take four eggs and gently break open the small ends by tapping on a hard surface. Carefully peel away some shell and pour or scoop out the insides. Put some masking tape around the egg's middle and carefully cut around the egg shell, through the masking tape, so that you have four half shells with even bottoms.

Put the egg shells on a table or floor, open end down, and place a book on top with an egg shell under each book corner. Keep adding weight until the eggs crack. See which six can add the most weight. The Ontario Science Centre in Toronto has shown that a single egg can support a person weighing 90 kg!

The next time you are overwhelmed by today's technology, reflect for a moment on the simplicity and genius of design in the lowly egg.

#### Resources

Science Works: An Ontario Science Centre Book of Experiments, Kids Can Press, Toronto, 1984

The Life of Birds, by Joel Carl Wetly; WB Saunders, Toronto, 1975

#### Program Links

Observer 2; World Conservation 1f