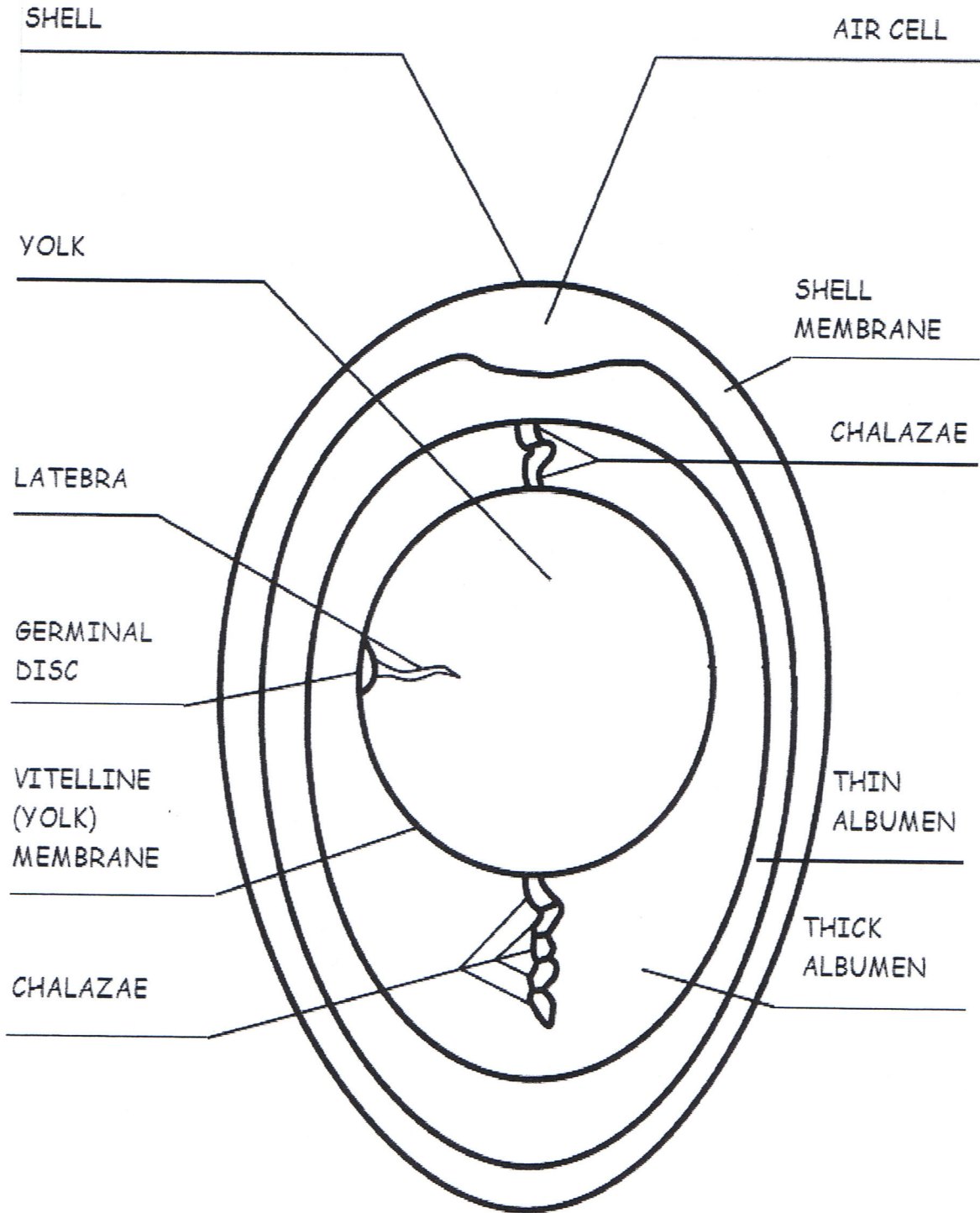


Composition of
the Egg

COMPOSTION OF THE EGG



AIR CELL

The empty space between the white and shell at the large end of the egg.

When an egg is first laid, it is warm. As it cools, the contents contract and the inner shell membrane separates from the outer shell membrane to form the air cell.

The candler uses the size of the air cell as one basis for determining grade. In Grade AA eggs, the air cell may not exceed 1/8-inch in depth and is about the size of a dime. The air cell of Grade A eggs may exceed 3/16-inch in depth. For Grade B eggs, there is no limit on air cell size.

As the egg ages, moisture and carbon dioxide leave through the pores of the shell, air enters to replace them and the air cell becomes larger.

Although the air cell usually forms in the large end of the egg, it occasionally moves freely toward the uppermost point of the egg as the egg is rotated. It is then called a free or floating air cell. If the main air cell ruptures, resulting in one or more small separate air bubbles floating beneath the main air cell, it is known as a bubbly air cell.

You can see the air cell in the flattened end of a peeled, hard-cooked egg.

ALBUMEN

Also known as egg white. Albumen accounts for most of an egg's liquid weight, about 67%. It contains more than half the egg's total protein, niacin, riboflavin, chlorine, magnesium, potassium, sodium and sulfur. The albumen consists of 4 alternating layers of thick and thin consistencies. From the yolk outward, they are designated as the inner thick or chalaziferous white, the inner thin white, the outer thick white and the outer thin white. Egg white tends to thin out as an egg ages because its protein changes in character. That's why fresh eggs sit up tall and firm in the pan while older ones tend to spread out.

Albumen is more opalescent than truly white. The cloudy appearance comes from carbon dioxide. As the egg ages, carbon dioxide escapes, so the albumen of older eggs is more transparent than that of fresher eggs.

When egg albumen is beaten vigorously, it foams and increases in volume 6 to 8 times. Egg foams are essential for making soufflés, meringues, puffy omelets, and angel food and sponge cakes.

CHALAZA

Ropey strands of egg white which anchor the yolk in place in the center of the thick white. They are neither imperfections nor beginning embryos.

The more prominent the chalazae, the fresher the egg. Chalazae do not interfere with the cooking or beating of the white and need not be removed, although some cooks like to strain them from stirred custard.

GERMINAL DISC

The entrance of the latebra, the channel leading to the center of the yolk. The germinal disc is barely noticeable as a slight depression on the surface of the yolk. When the egg is fertilized, sperm enter by way of the germinal disc, travel to the center and a chick embryo starts to form.

MEMBRANES

- **Shell Membranes**

Just inside the shell are two shell membranes, inner and outer. After the egg is laid and it begins to cool, an air cell forms between these two layers at the large end of the egg.

- **Vitelline Membrane:**

This is the covering of the yolk. Its strength protects the yolk from breaking. The vitelline membrane is weakest at the germinal disc and tends to become more fragile as the egg ages.

SHELL

The egg's outer covering, accounting for about 9 to 12% of its total weight depending on egg size. The shell is the egg's first line of defense against bacterial contamination.

The shell is largely composed of calcium carbonate (about 94%) with small amounts of magnesium carbonate, calcium phosphate and other organic matter including protein.

Shell strength is greatly influenced by the minerals and vitamins in the hen's diet, particularly calcium, phosphorus, manganese and Vitamin D. If the diet is deficient in calcium, for instance, the hen will produce a thin or soft-shelled egg or possibly an egg with no shell at all. Occasionally an egg may be prematurely expelled from the uterus due to injury or excitement. In this case, the shell has not had time to be completely formed. Shell thickness is also related to egg size which, in turn, is related to the hen's age. As the hen ages, egg size increases. The same amount of shell material which covers a smaller egg must be "stretched" to cover a larger one, hence the shell is thinner.

Seven to 17 thousand tiny pores are distributed over the shell surface, a greater number at the large end. As the egg ages, these tiny holes permit moisture and

carbon dioxide to move out and air to move in to form the air cell. The shell is covered with a protective coating called the cuticle or bloom. By blocking the pores, the cuticle helps to preserve freshness and prevent microbial contamination of the contents.

Uses for eggshells vary from the thrifty (compost) to the creative (decorating).

YOLK

The yolk or yellow portion makes up about 33% of the liquid weight of the egg. It contains all of the fat in the egg and a little less than half of the protein.

With the exception of riboflavin and niacin, the yolk contains a higher proportion of the egg's vitamins than the white. All of the egg's vitamins A, D and E are in the yolk. Egg yolks are one of the few foods naturally containing vitamin D.

The yolk also contains more phosphorus, manganese, iron, iodine, copper, and calcium than the white, and it contains all of the zinc. The yolk of a Large egg contains about 59 calories.

Double-yolked eggs are often produced by young hens whose egg production cycles are not yet completely synchronized. They're often produced, too, by hens who are old enough to produce Extra Large eggs. Genetics is a factor, also. Occasionally a hen will produce double-yolked eggs throughout her egg-laying career. It is rare, but not unusual, for a young hen to produce an egg with no yolk at all.

In fertilized eggs, the yolk is the site of embryo formation.

It is the yolk which is responsible for the egg's emulsifying properties.

COMPOSITON OF THE EGG

Fill in the blanks using the following words. Some words may be used more than once.

Air Cell
Chalazae
Germinal Disc

Latebra
Shell
Shell Membrane

Thick Albumen
Thin Albumen
Vitelline Yolk Membrane

Yolk

