

Unit D: Egg Production

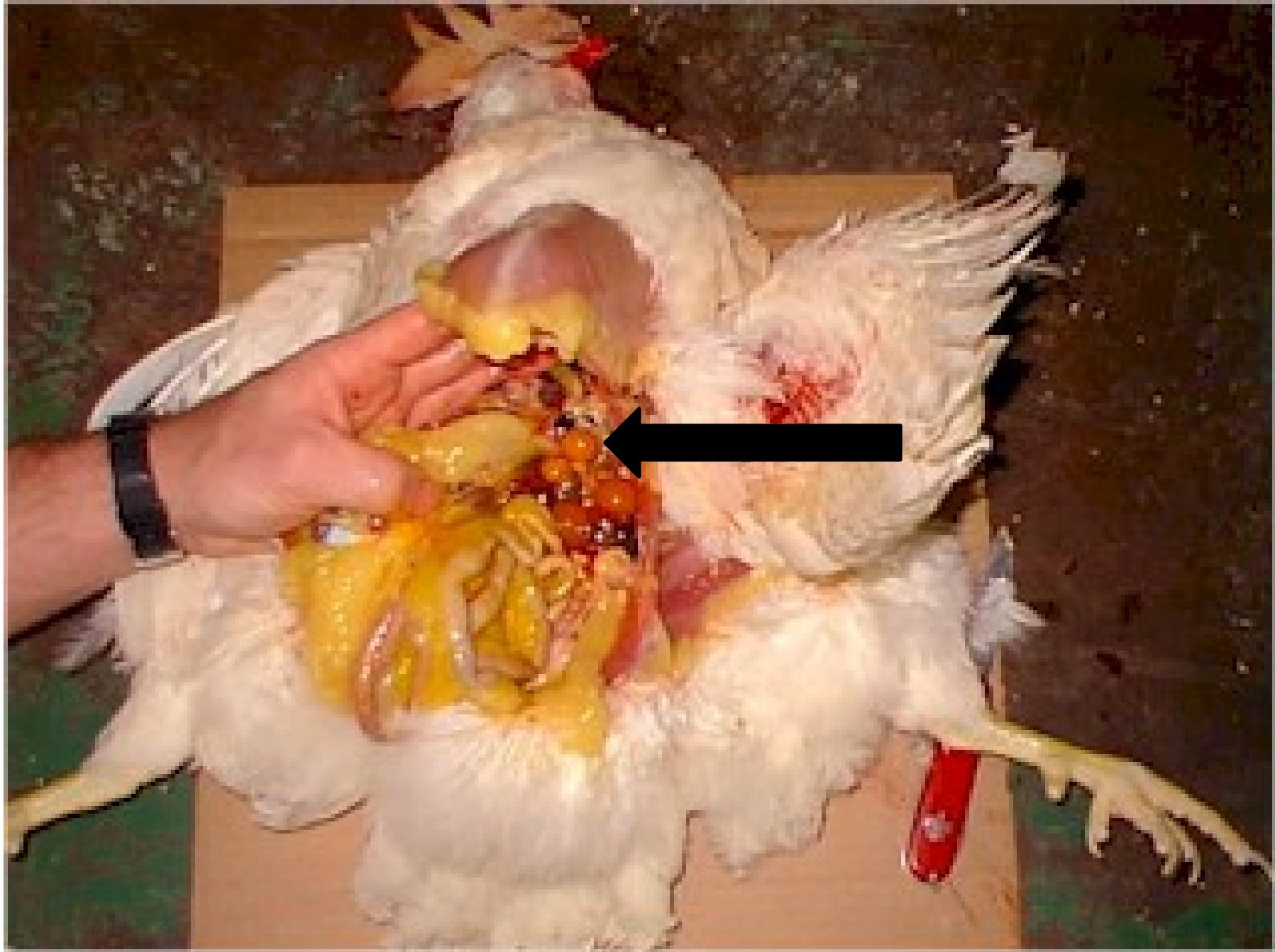
Lesson 2: Egg Production

Terms

- Air cell
- Albumen
- Calcite
- Candling
- Chalazae
- Cloaca
- Follicles
- Germinal disc
- Infundibulum
- Isthmus
- Magnum
- Oiling
- Shell
- Shell gland
- Vitelline membrane
- Yolk

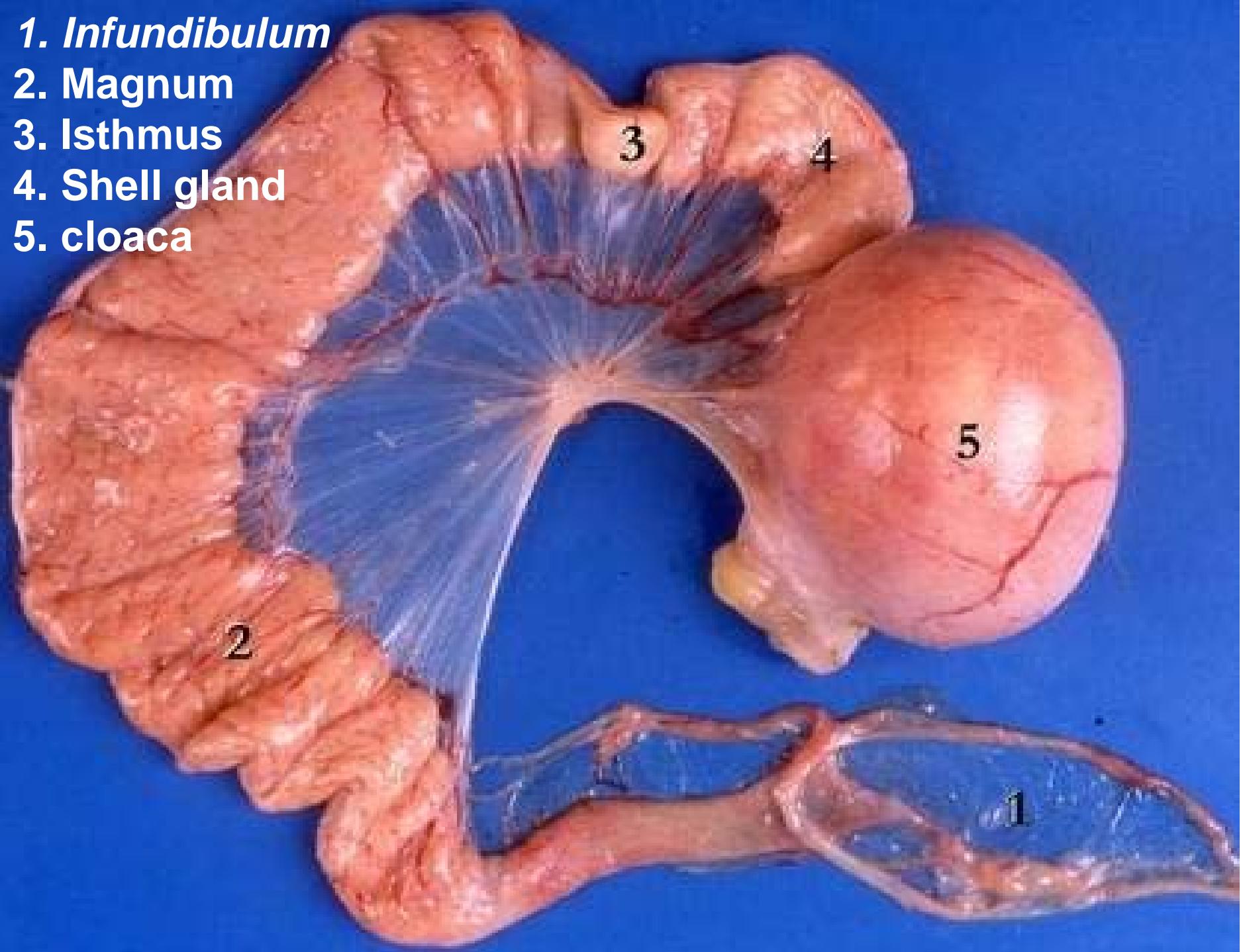
I. Egg production begins inside the hen's body.

- A. A hen has two ovaries and an oviduct inside her body but only the left side is functional.
 - 1. The ovary has **follicles**, which look like tiny clusters of grapes.
 - 2. Each one of these follicles can turn into an egg if it is fertilized with sperm.
 - 3. When the follicle is fertilized, it separates from the ovary and goes down the oviduct.



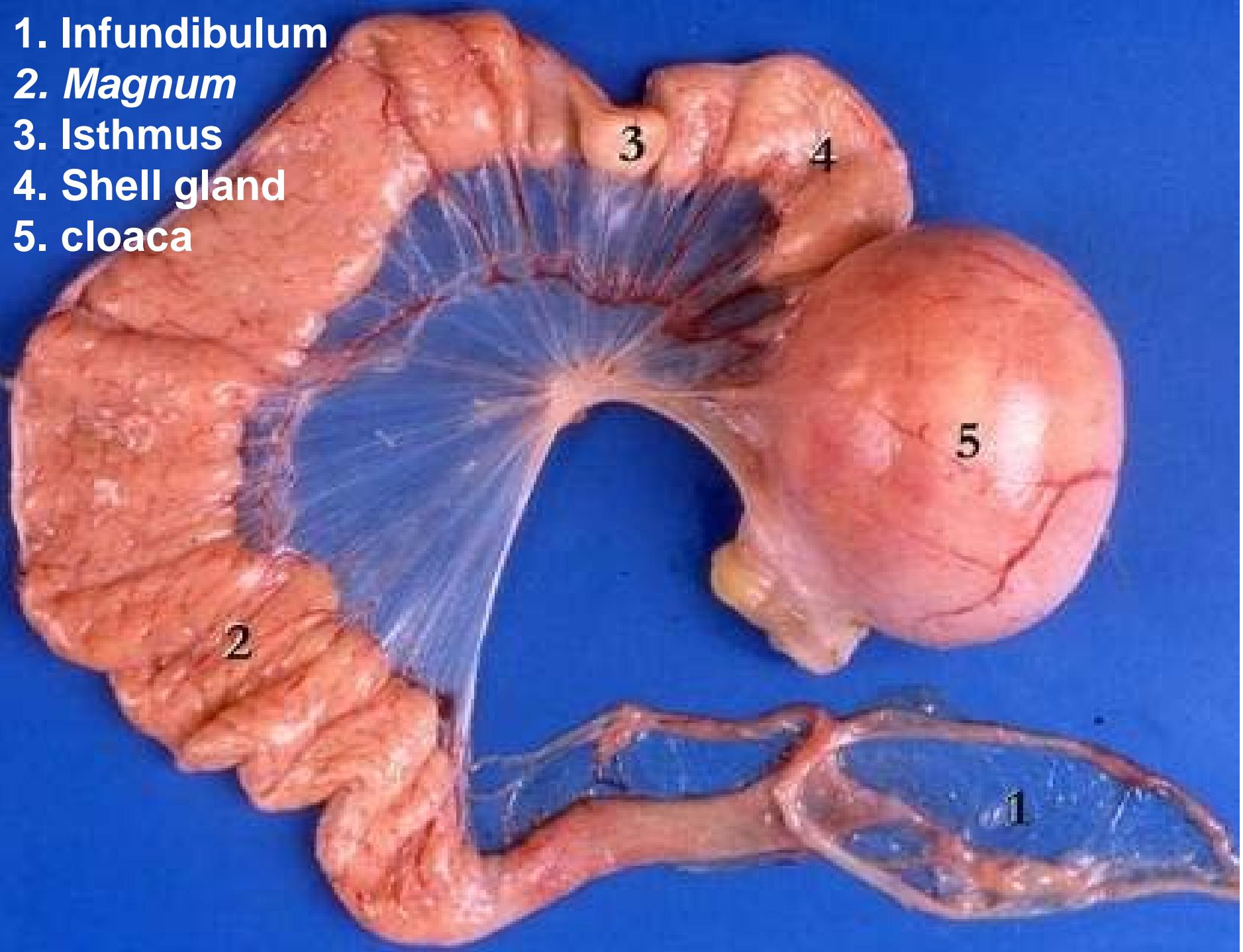
B. The oviduct is about 80 cm and has 5 distinct areas serving a specific function in the egg formation.

1. The **infundibulum** is the first part of the oviduct.
 - a. This receives the yolk which has separated from the ovary.
 - b. The “egg” will spend about 15 minutes in here.

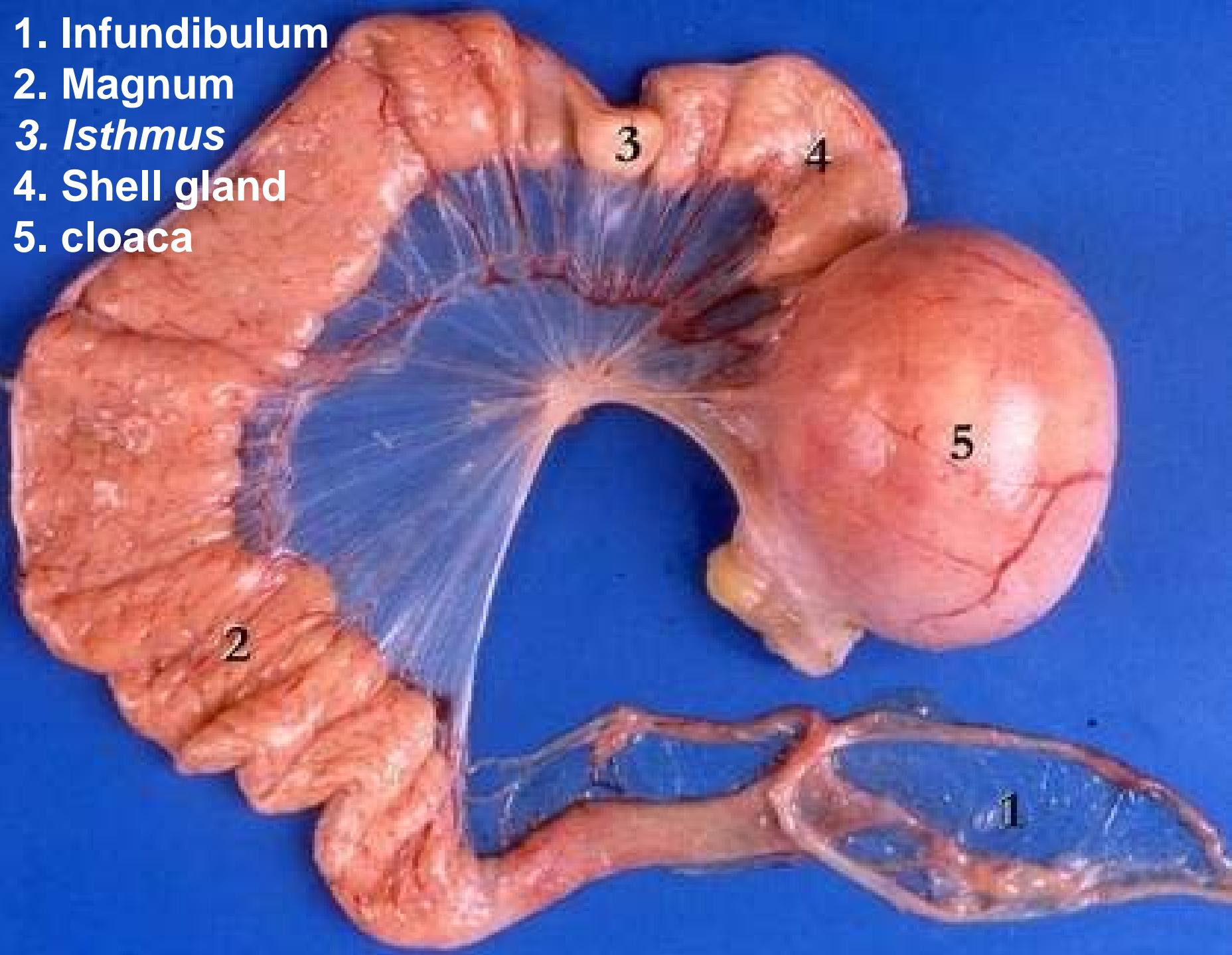


2. The second section of the oviduct is called the **magnum**.

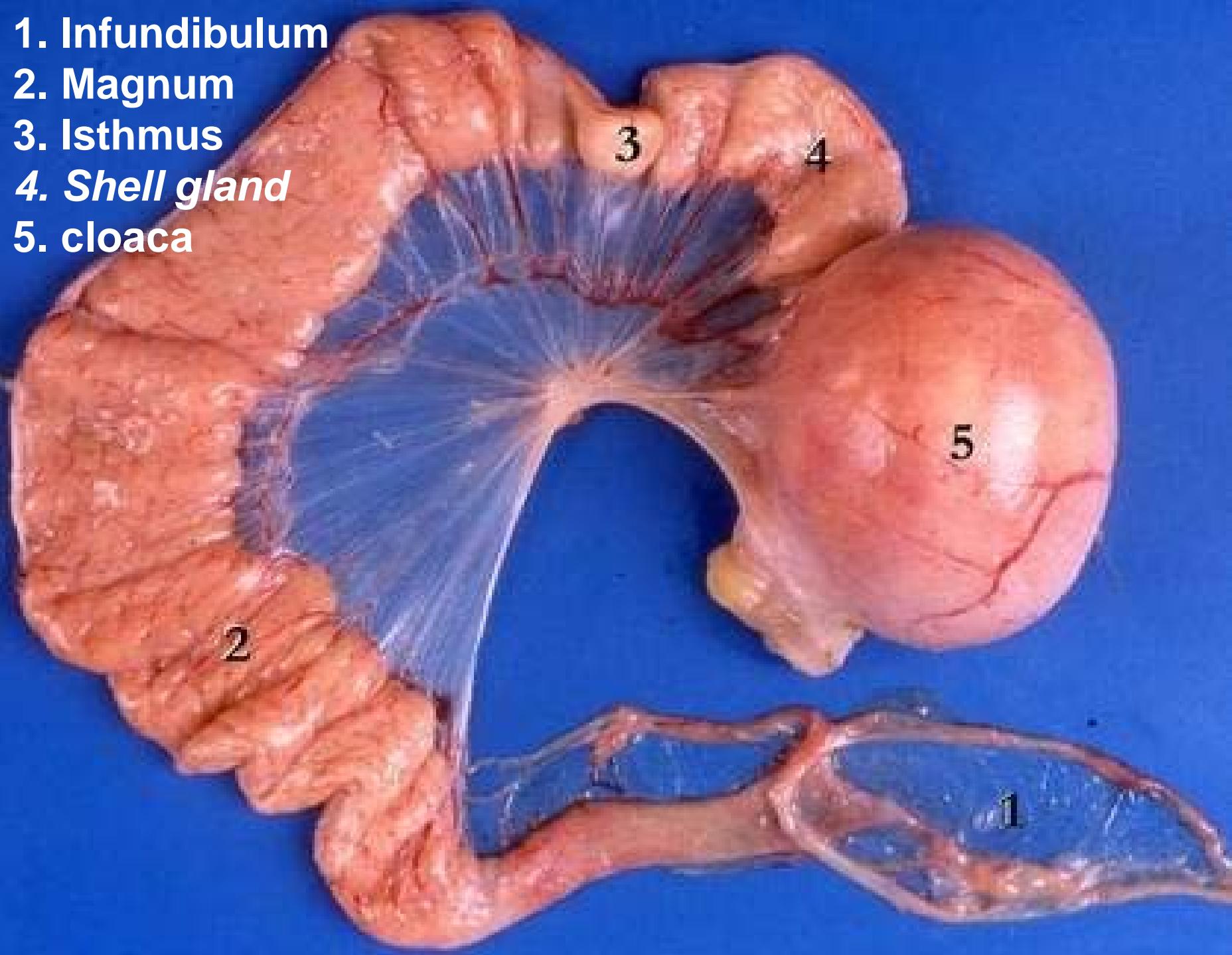
- a. In here the inner and outer shell membranes are added.
- b. Also added are some minerals and water.
- c. The “egg” will spend about 3 hours in here.



3. The third section is called the **isthmus**.
 - a. In here, the albumen and Vitelline membrane will form.
 - b. The “egg” will spend about 1 hour here.



4. The fourth section of the oviduct is called the **shell gland**.
 - a. On the vitelline membrane that is now surrounding the yolk and albumen inside the hen, there are evenly spaced points where columns of **calcite** form.
 - b. **Calcite** is a form of calcium carbonate.
 - c. The columns of calcite form side by side and eventually make the shell of the egg.
 - d. The calcite is floating in solution around the egg, and then it attaches itself to the membrane to form a shell.
 - e. The “egg” spends about 21 hours here.

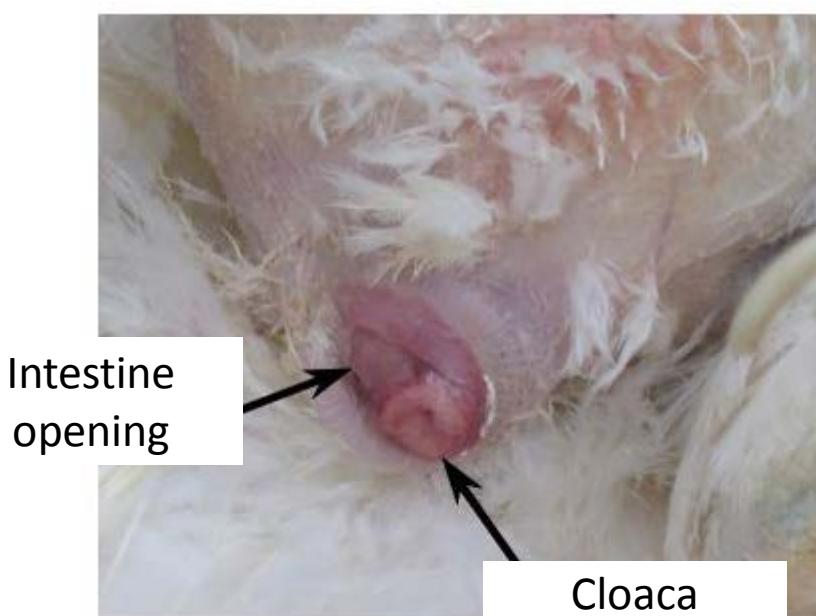


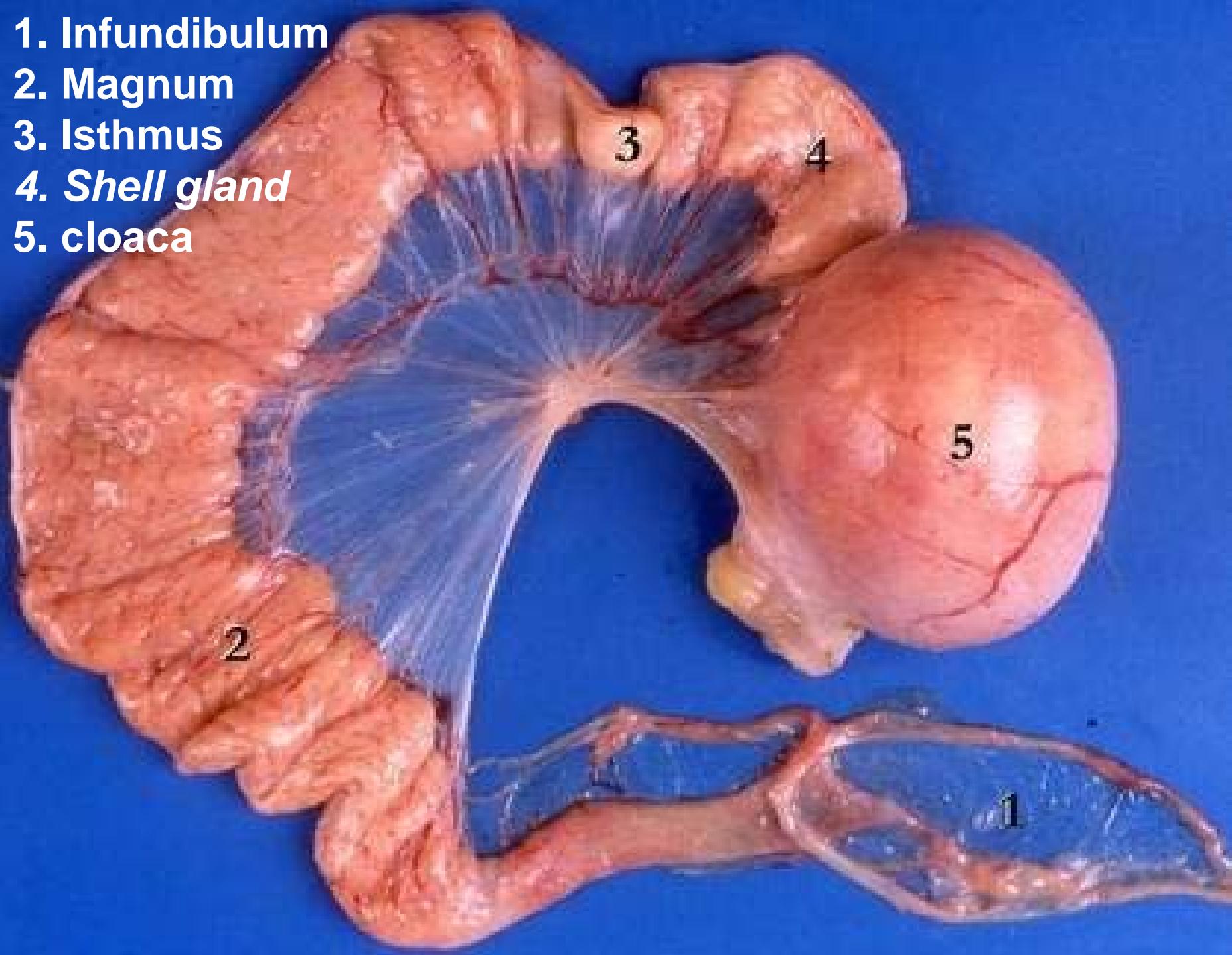


KarthikS2008

5. The last and final section is the cloaca.

- a. Here, the shell will become hard when it reaches air close to the opening.
- b. The egg is complete at this point and will spend less than a minute here.





C. A malnourished hen may lay soft eggs because she is not getting the proper vitamins and minerals.

D. This process for a hen to form and lay an egg takes about 24 hours.

1. Eggs will be formed whether it is fertilized or not.
2. When she lays her egg, the next egg starts forming inside of her.

II. Eggs may look simple but they actually have many parts that all work together to form a perfect egg.

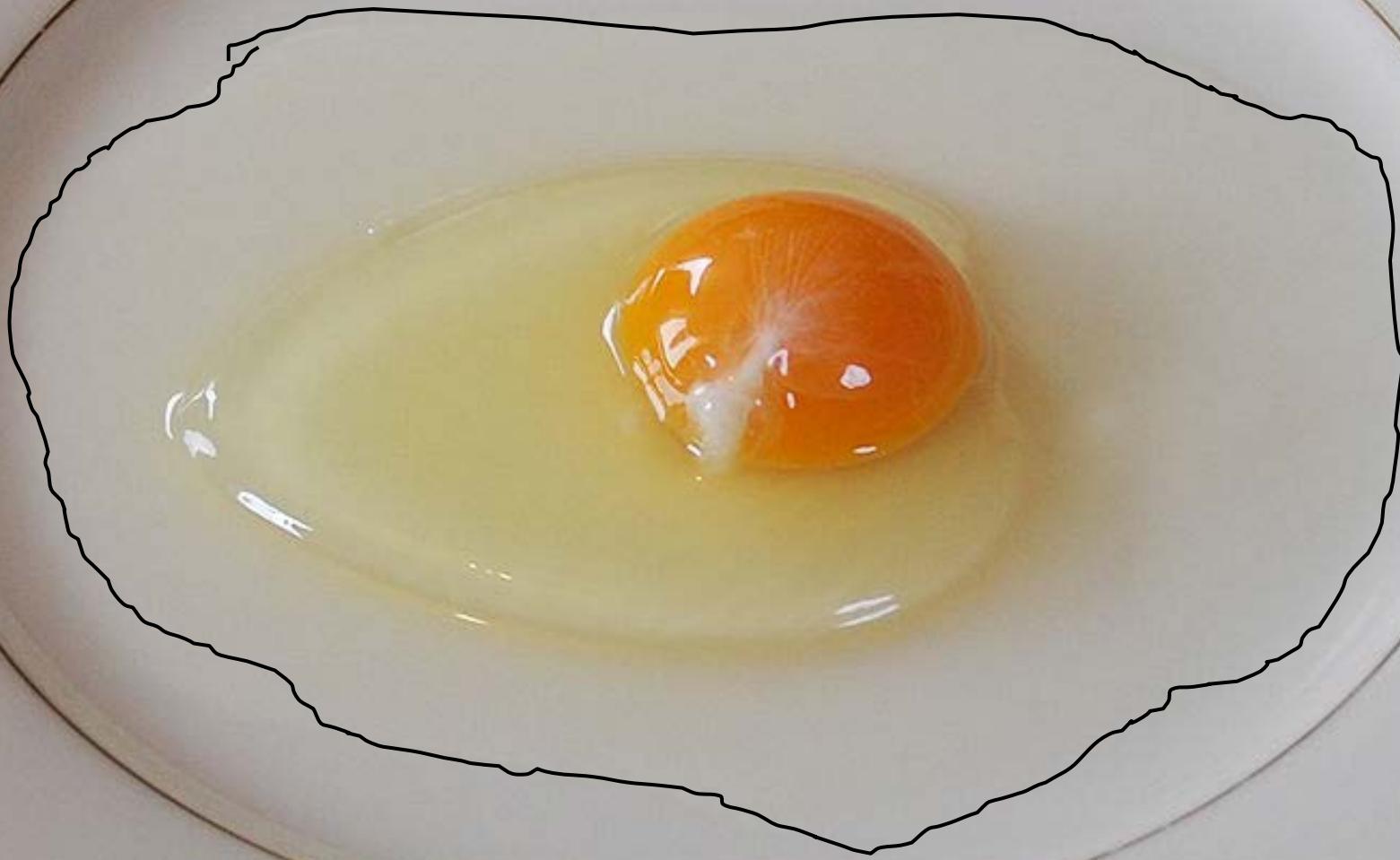
A. Shell—The outside covering of the egg.

1. The shell may come in many colors but it typically is white.
2. It is composed primarily of calcium carbonate, which is similar to limestone.



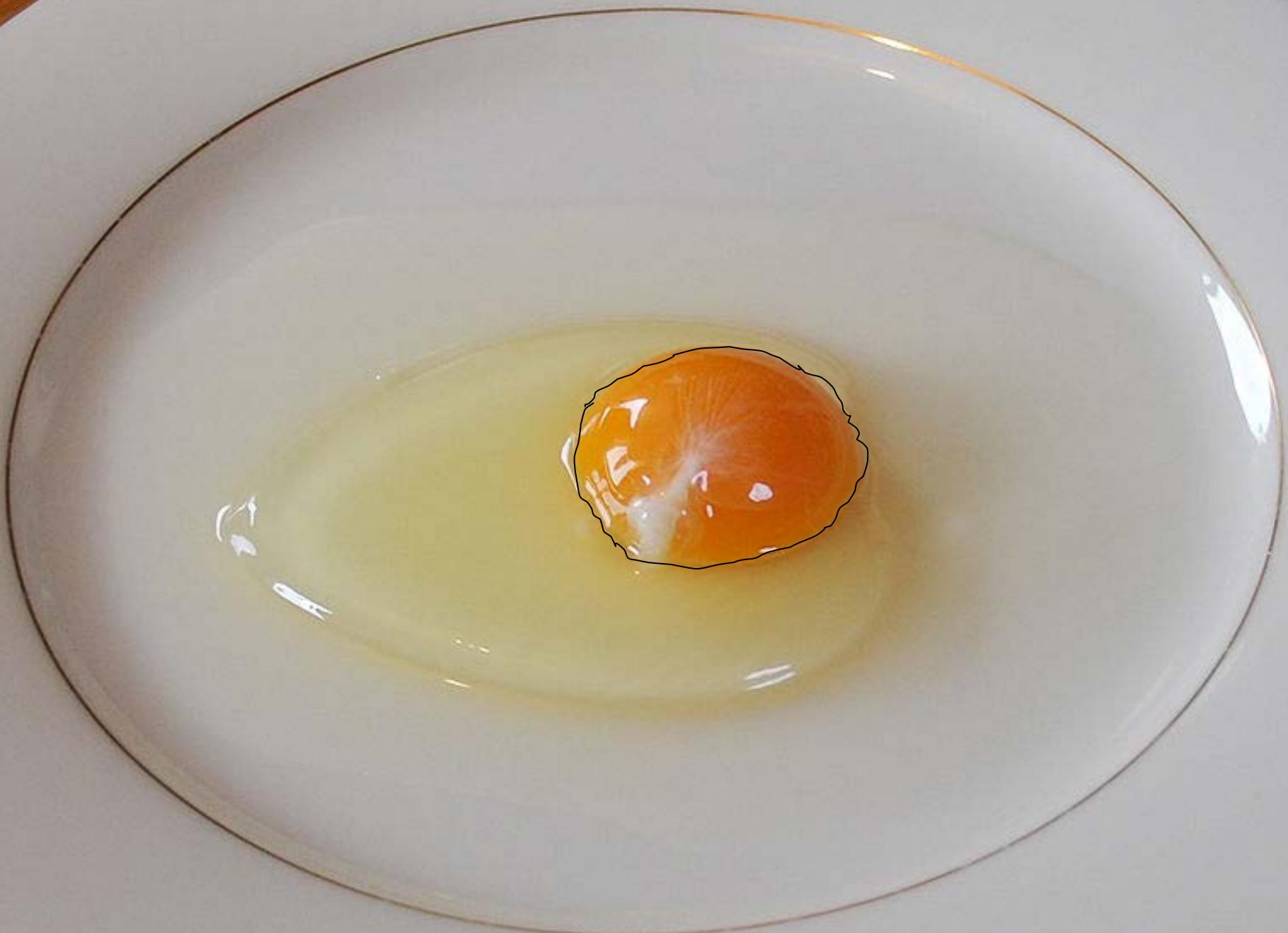
B. Albumen The white of the egg.

1. In raw eggs, albumen is clear.
2. It becomes white when it is cooked.

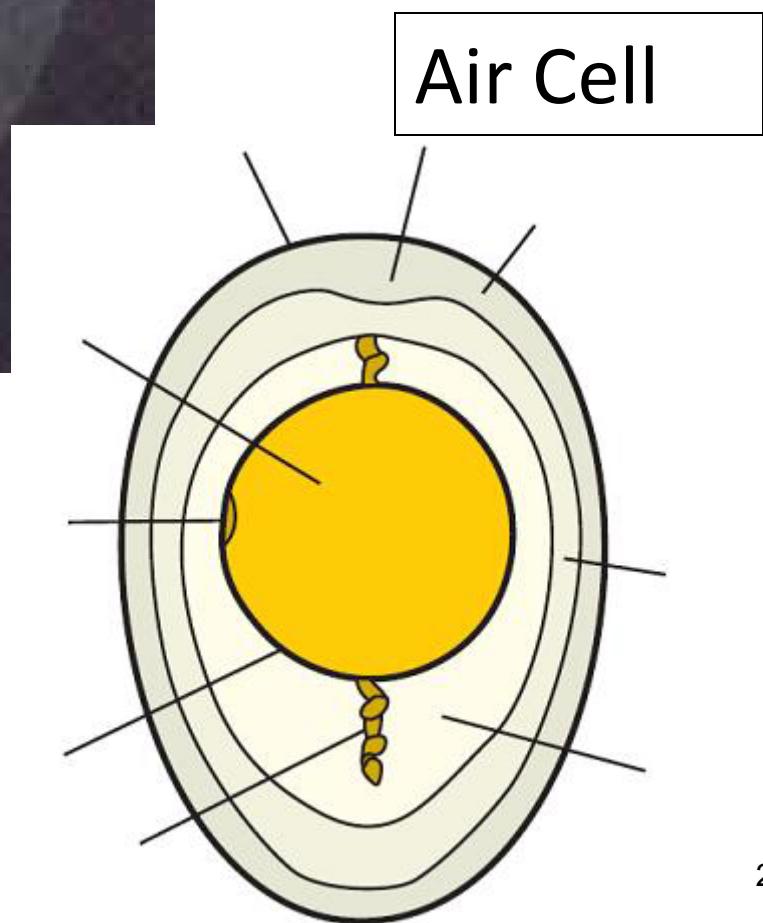
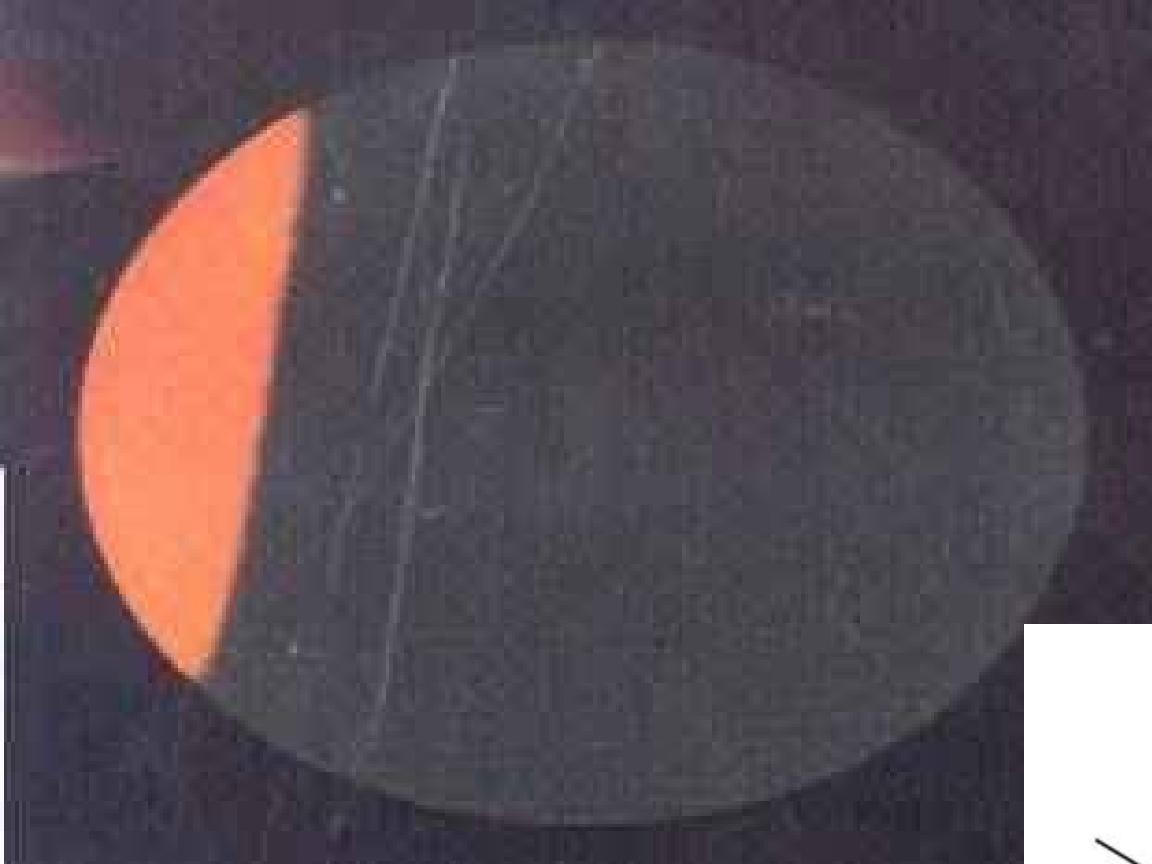


C. Yolk—The center part of the egg.

1. In a fertilized egg, this becomes the embryo for a baby chick.

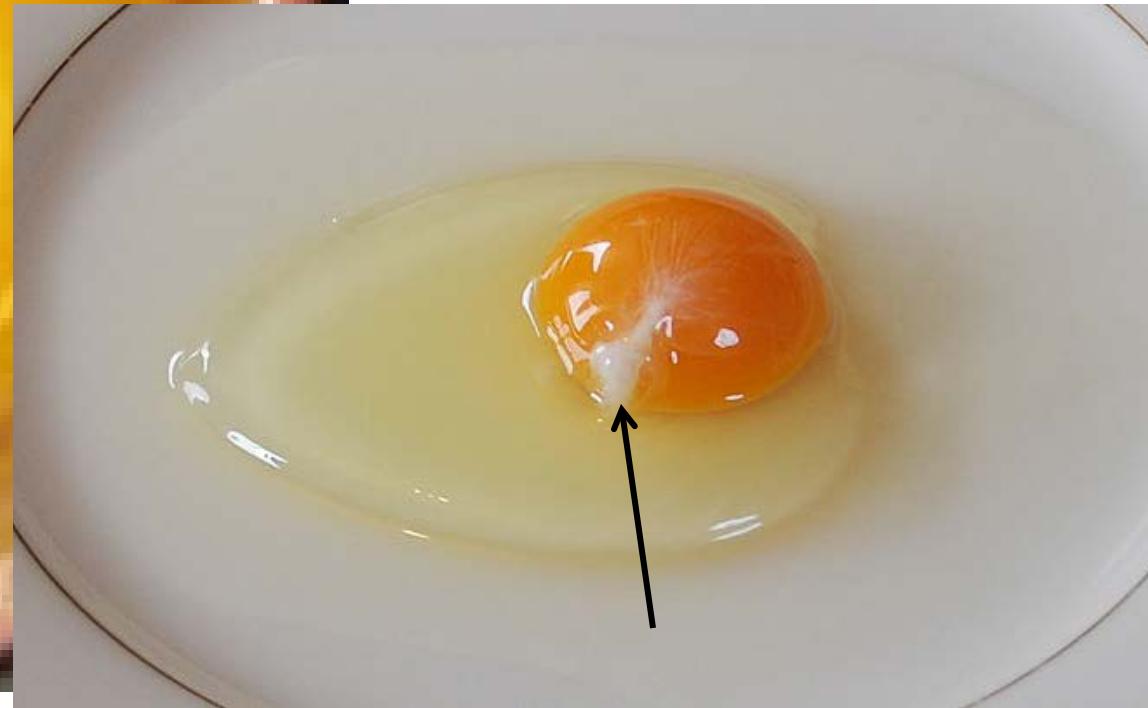


D. Air cell—This pocket forms as the egg cools and the inner and outer membranes separate.



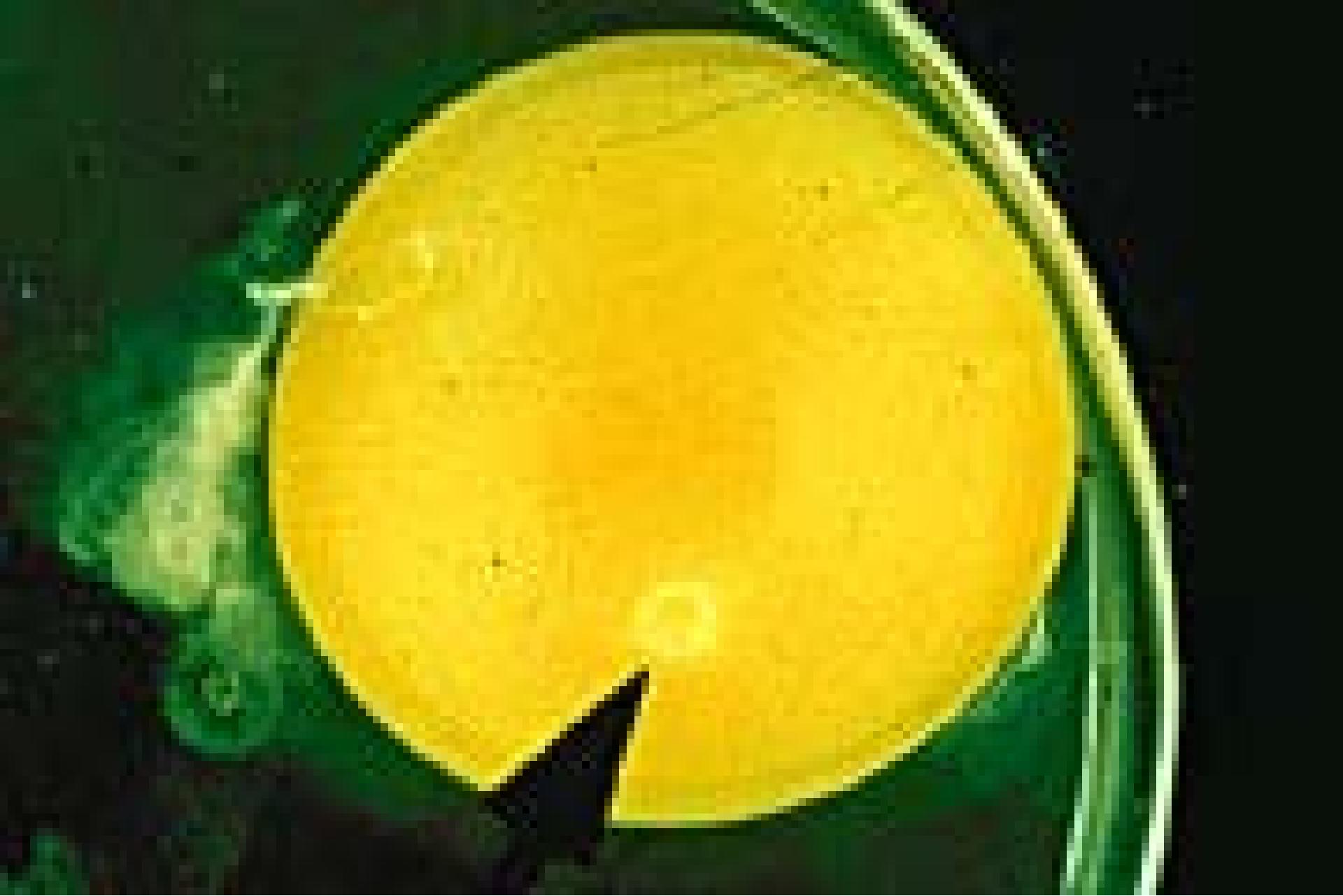
E. Chalazae—Ropy strands of egg white that anchor the yolk in place.

1. The more prominent the chalazae, the fresher the egg is.

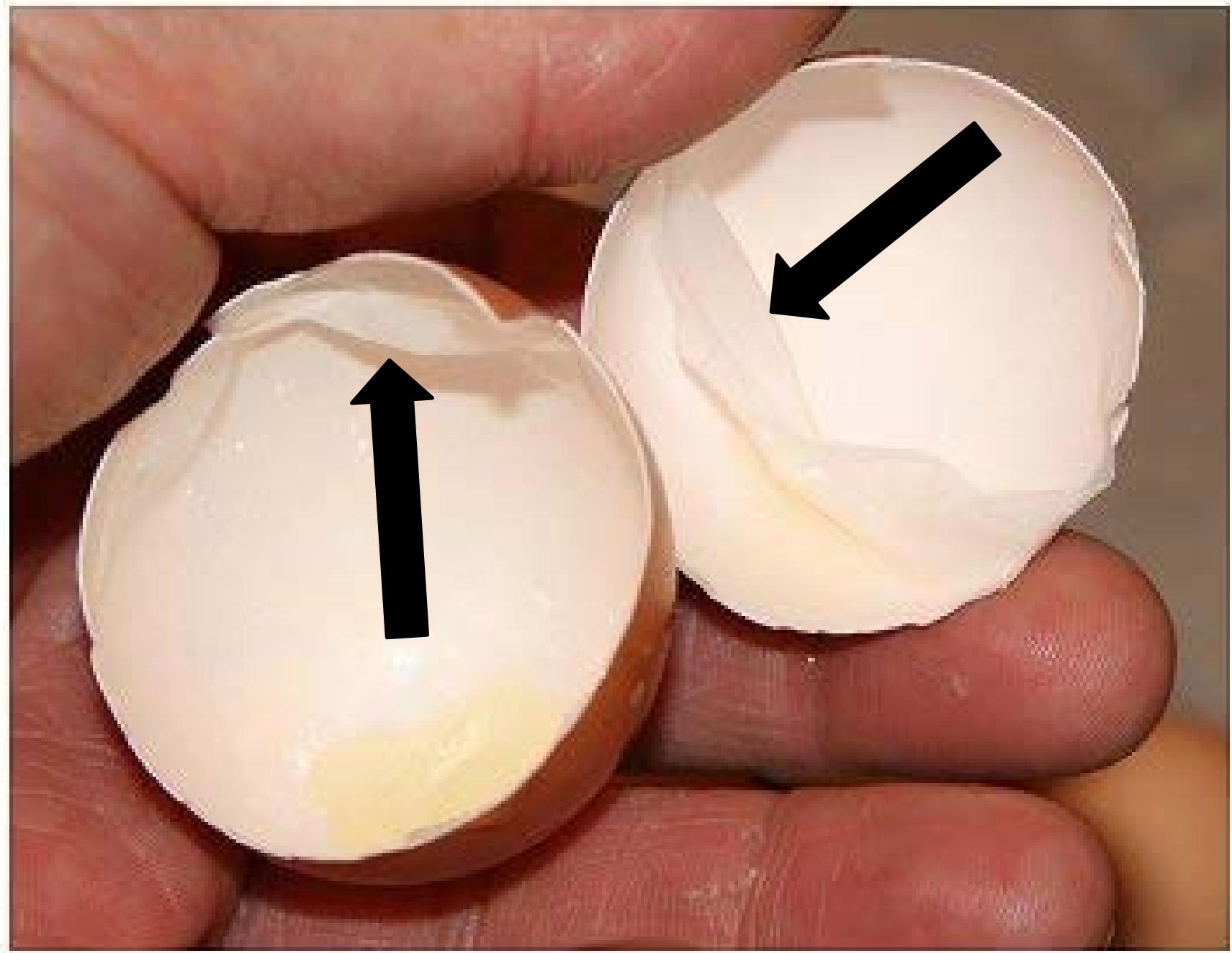


F. Germinal disc—Channel leading to the center of the egg.

1. When the egg is fertilized, sperm enter through the germinal disc of the blastoderm and travel to the center of the yolk.

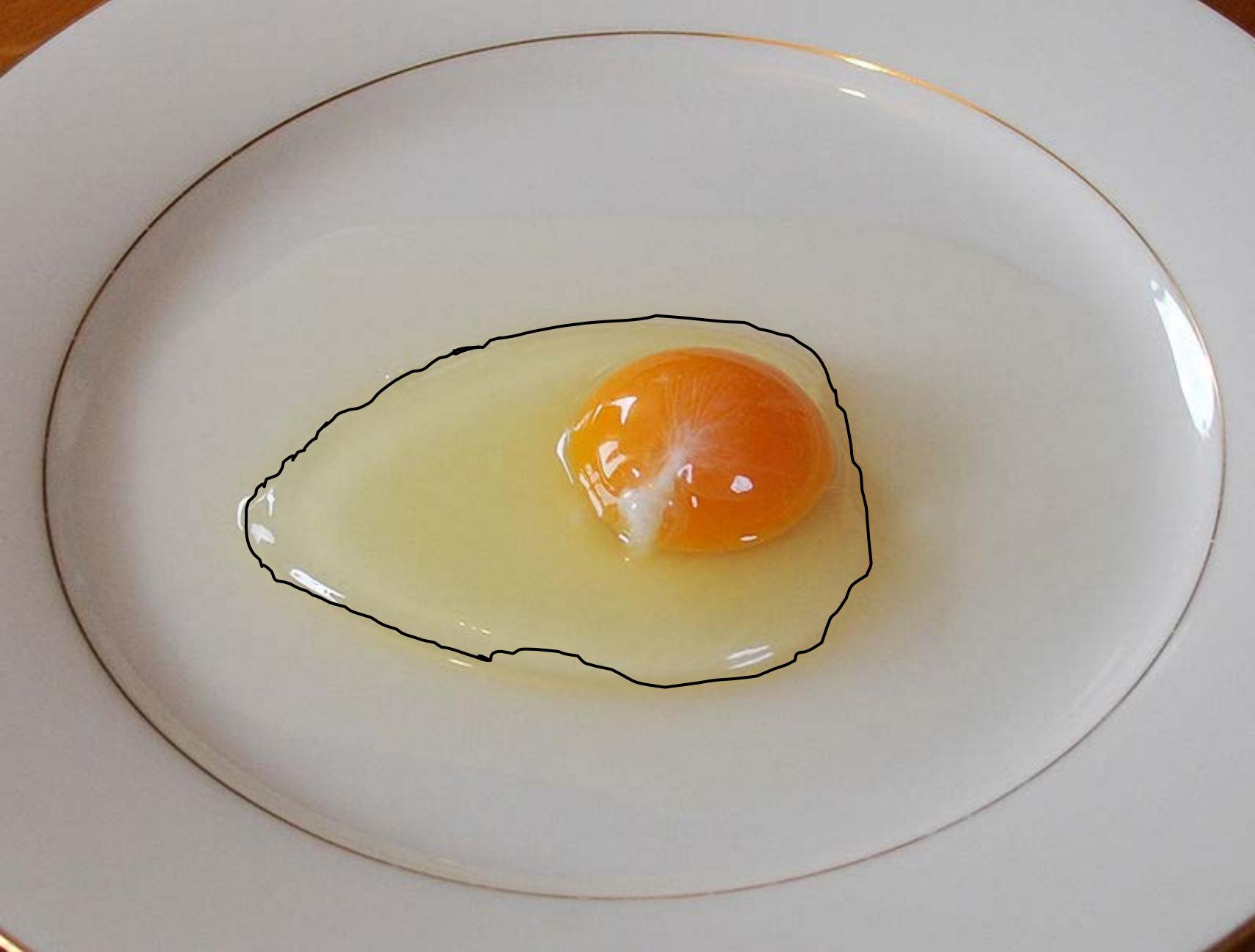


G. Membranes—Inner
and outer membranes
between the shell wall
and the albumen
protect the egg.



H. The **vitelline membrane** is the covering of the yolk.

1. Its strength protects the yolk from breaking.



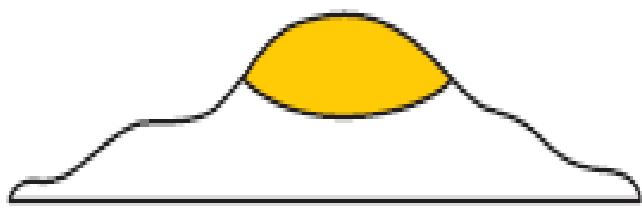
III. For optimal egg production, all environmental conditions inside of an egg-laying facility are carefully controlled.

- A. A hen will produce between 250 and 300 eggs per year.
- B. Grading is determined by considering both the internal and external characteristics of the egg.

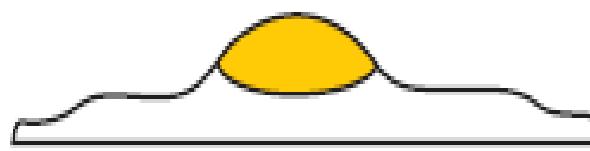
- C. Grades are designated by the letters AA, A, or B.
1. No nutritive value exists between the different grades.
 2. Due to the speed at which eggs reach the consumer, minimal quality differences exist between grades AA and A.
 3. Grade B eggs rarely reach the grocery store; they are typically used by food processors to make other products.

4. Grade AA eggs tend to stand up taller when cracked onto a surface.
 - a. They also have a larger proportion of thick white versus thin white. Grade A eggs do not stand up quite as tall, but still cover a small surface area.
5. Grade B eggs tend to spread out more when they are cracked.
6. There is about as much thin and thick white in Grade B eggs.

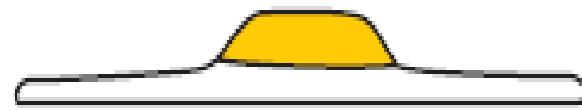
- D. Eggs are also sorted by size.
 - 1. Size and grades are not related.
 - 2. The graded egg is weighed, determining its size.
 - a. It is grouped with other eggs of similar size to make up a specific minimum weight per dozen.



AA



A



B

3. Weights are as follows:

Size	Weight (in grams)
Jumbo	850 or more
Extra	765
Large	680
Medium	595
Small	510
Peewee	425

- E. Eggs can be stored at -1°C for up to six months in the shell and even longer out of the shell.
- F. The inside of the egg shell is generally considered sterile.
 - 1. However, a strain of salmonella has been found in some eggs.
 - 2. This occurs very rarely, but there is a potential risk.

IV. After an egg is laid, it is not ready to be sold in the grocery store.

- A. It must go through a series of processes before it can be marketed.
- B. These processes include various steps.

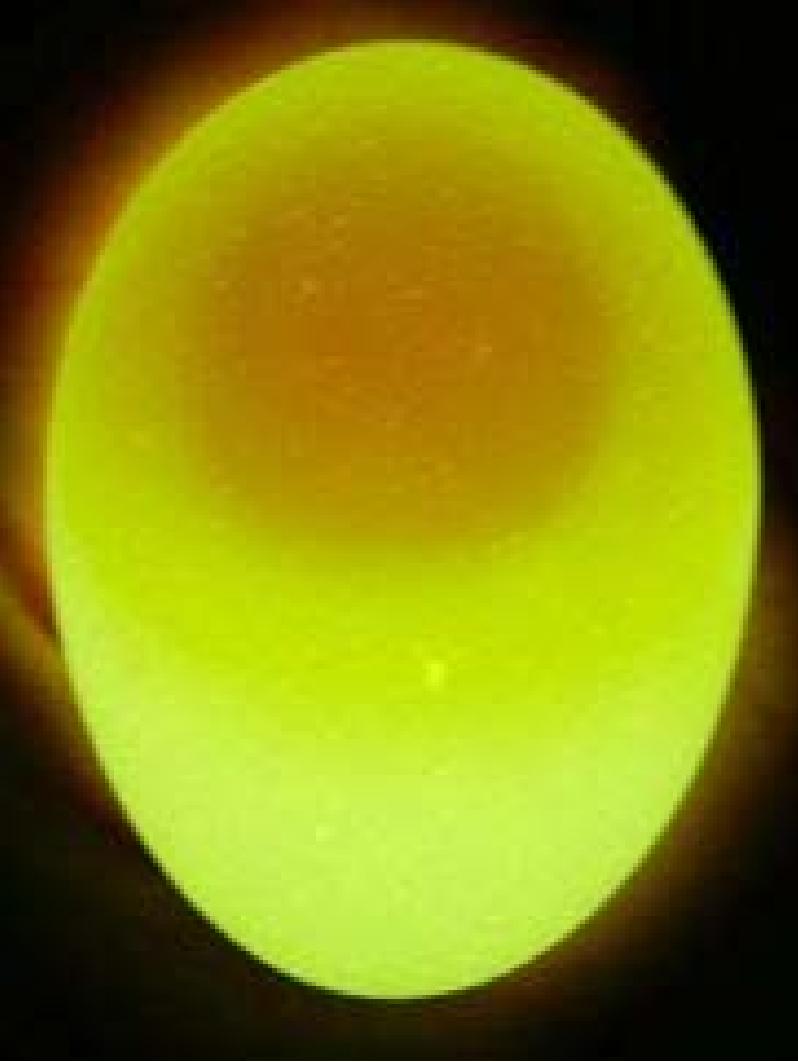
1. Collection at a modern egg farm, the egg either drops automatically from the hen's cage to a conveyor belt below or it is mechanically collected from a special nest.



2. Washing—After collection, the egg is washed and sanitized to remove any dirt.



- 3. Oiling**—The washed and sanitized egg is lightly coated with a harmless, invisible oil to seal the shell pores, slow down aging, and prevent bacteria from entering the shell pores.
- 4. Candling**—After oiling, the egg passes over an intense light and is rotated mechanically so its contents can be examined without cracking its shell.
 - a. A candler checks the condition of each egg's shell, albumen, and yolk.
 - b. If the egg does not meet grade requirements for AA, A, or B, it is removed.



5. Grading—As discussed earlier, each egg is graded AA, A, or B.
6. Sizing—The next step is to weigh the egg and put into one of the size categories.
 - a. Sizing is done by the dozen.

7. Packing—To minimize breakage and maintain freshness, eggs are packed in specially designed cartons marked with their grade and size.



8. Cooling—After packing, the eggs are placed in a cooling room with a temperature of 7°C to lower their temperature and maintain their quality.

9. Sales—To maintain freshness, the eggs should be kept in a refrigerated display case.
 - a. Eggs are considered fresh if eaten within four or five weeks of their packing date or three or four weeks after being purchased by the consumer, as long as they are properly stored at home.

Review/Summary

1. How are eggs formed?
2. What are the parts of an egg?
3. How are eggs graded?
4. What practices are used in processing an egg?