

# Unit D: Egg Production

## Lesson 3: Incubation Management

# Terms

- Allantois
- Amnion
- Brooding
- Chorion
- Egg candler
- Fertility
- Gastrulation
- Hatchability
- Hatcher
- Setter

I. Cell division begins in the fertilized egg soon after fertilization.

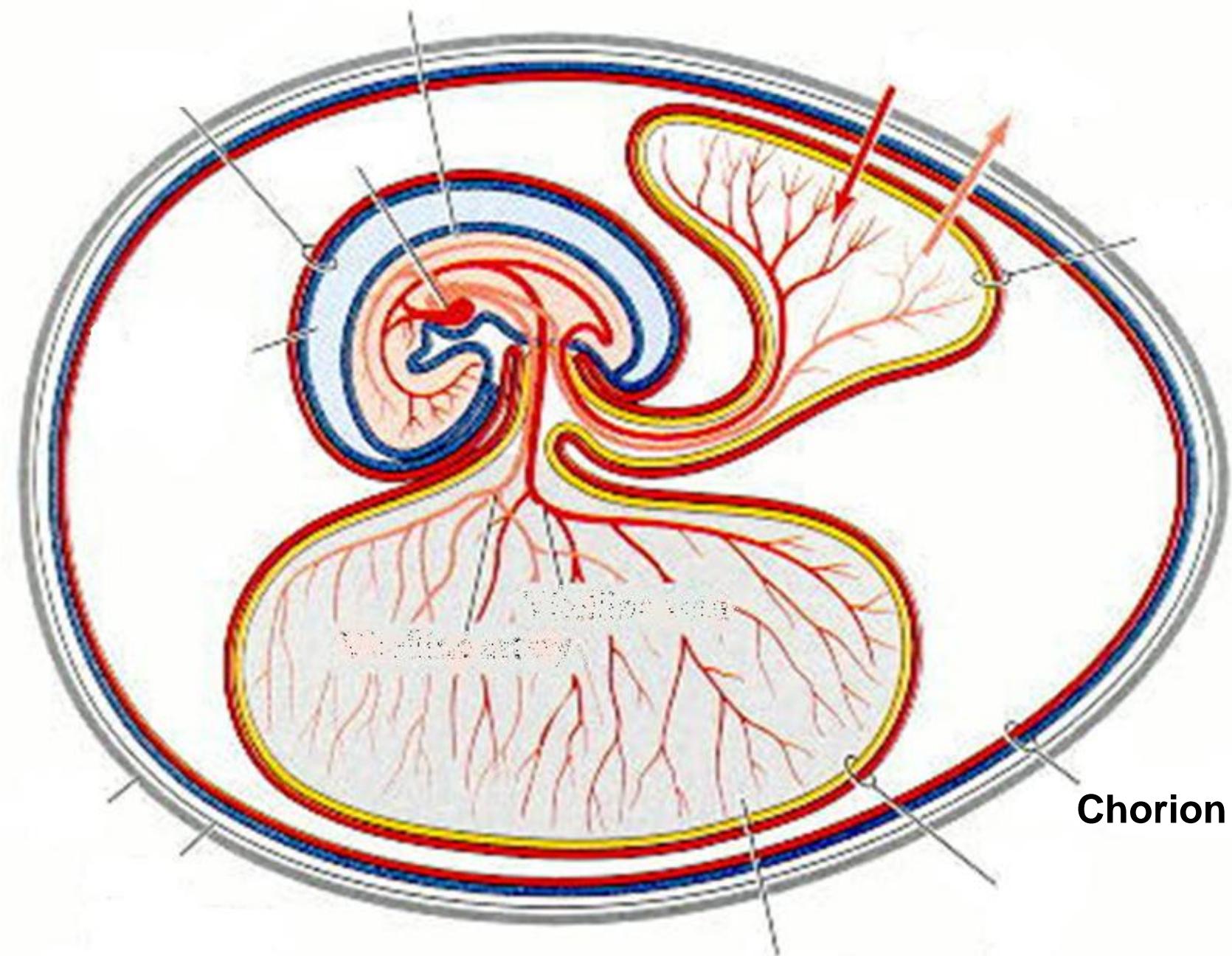
A. The blastoderm spreads over the yolk.

1. The blastoderm differentiates into two layers, known as the ectoderm and entoderm, by a process known as **gastrulation**.
2. The ectoderm, forming first, creates the skin, feathers, beak, claws, nervous system, eye lens and retina, and linings of both mouth and vent.

3. The entoderm, forming second, creates the linings of the digestive tract, as well as the respiratory and secretory organs.
4. A third layer, the mesoderm, finally gives rise to bones, muscles, blood, and reproductive and excretory organs.

B. Membranes cover the developing embryo for protection and aid in development.

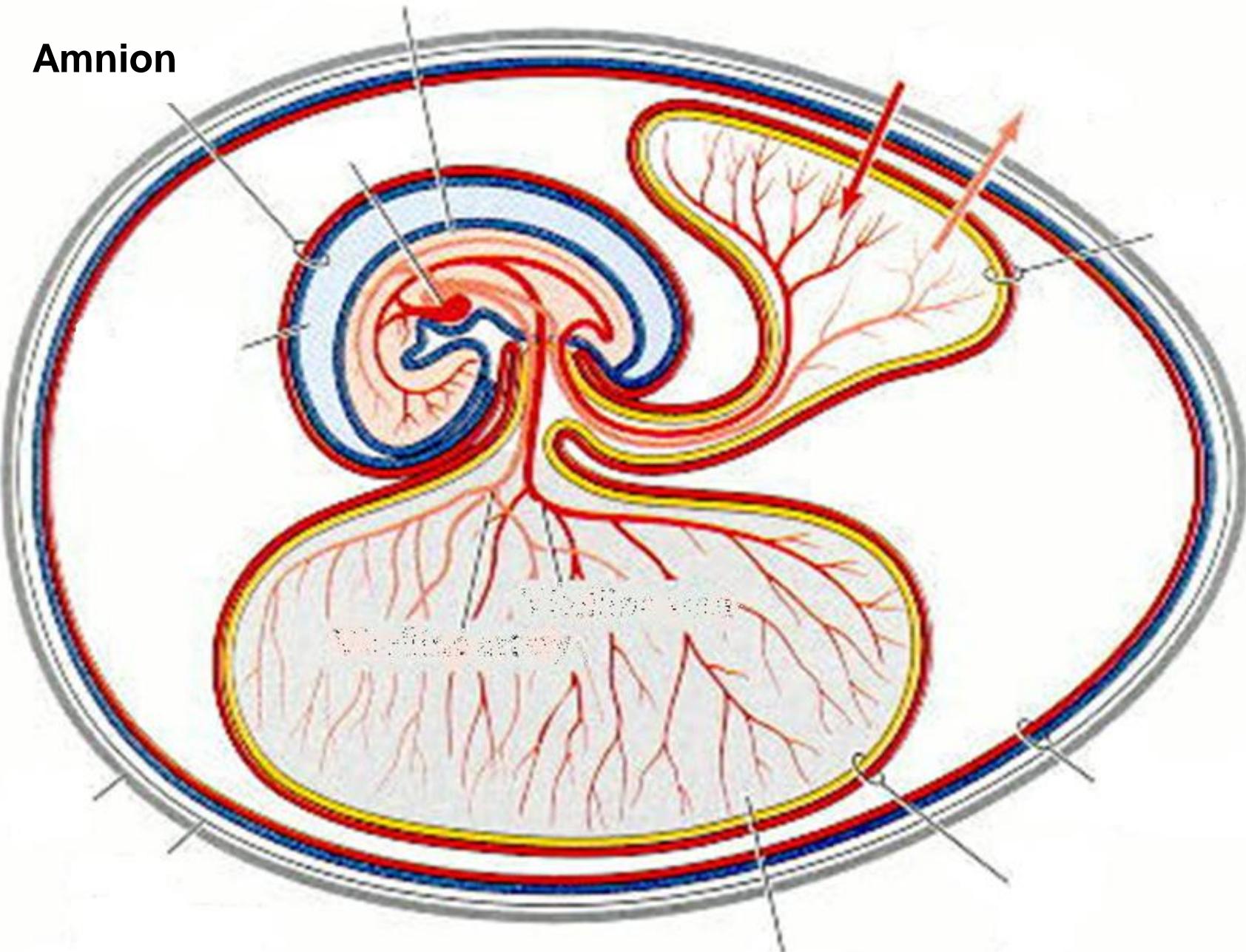
1. The **chorion** is a membrane that surrounds the yolk sac and amnion during chick development.



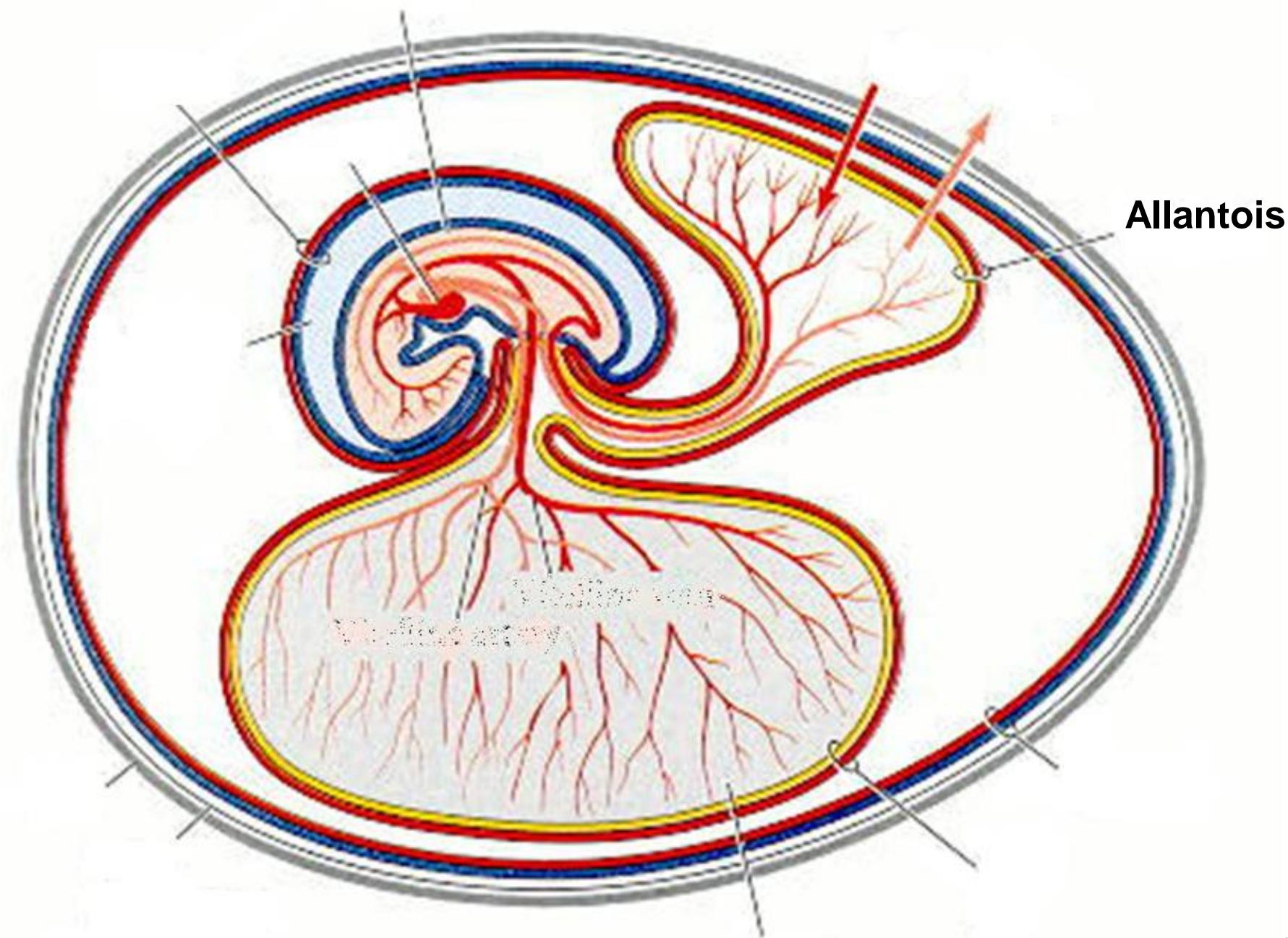
**Chorion**

2.A transparent sac, known as the **amnion**, is full of colorless liquid that surrounds the embryo. The amnion serves as a cushion and provides protection for the developing embryo.

## Amnion



3. The allantois is a sac connected to the abdomen of the developing chick that makes respiration possible it stores excretions, absorbs albumen for food, and gets calcium from the shell for the structural needs of the embryo.



Day 1

Blastoderm

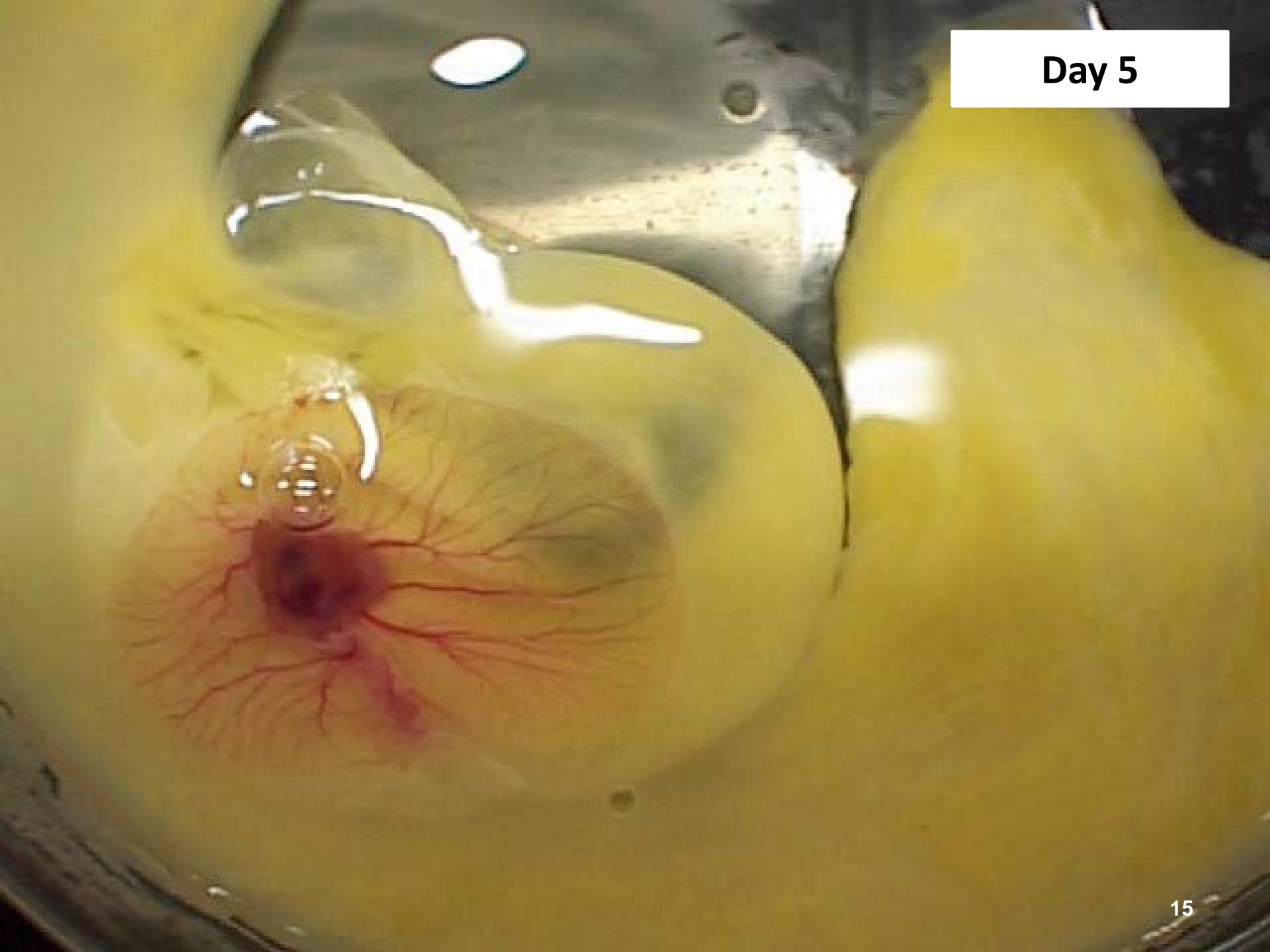


Day 2

Day 3

A close-up, top-down view of a small, pale yellowish-brown embryo in a petri dish. The embryo has a distinct, dark red, branching vascular network visible on its surface, particularly on the left side. The surrounding medium is clear and slightly viscous. The petri dish is held by a metal frame, and the background is a dark, neutral-colored surface.

**Day 4**

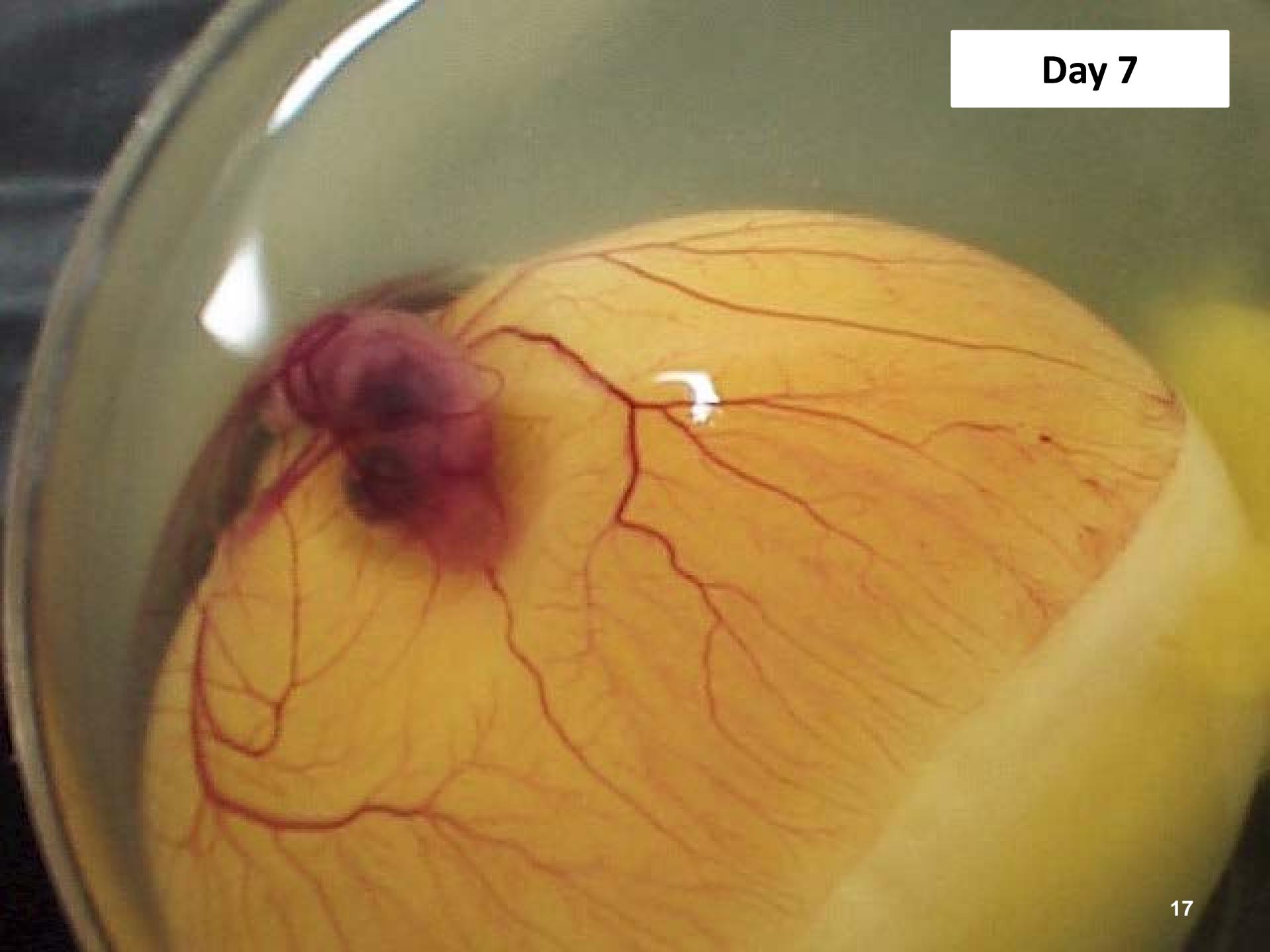


Day 5

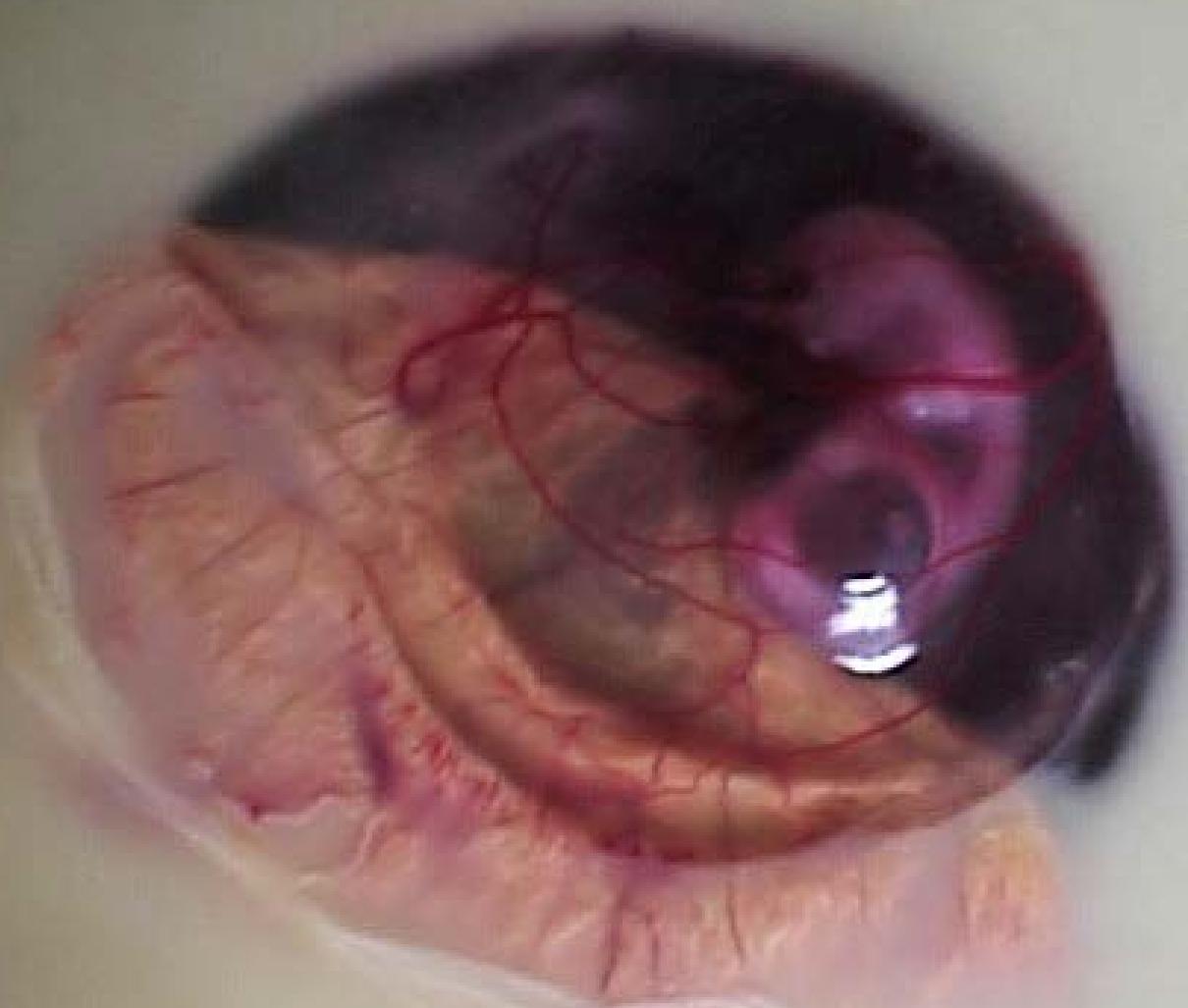
Day 6



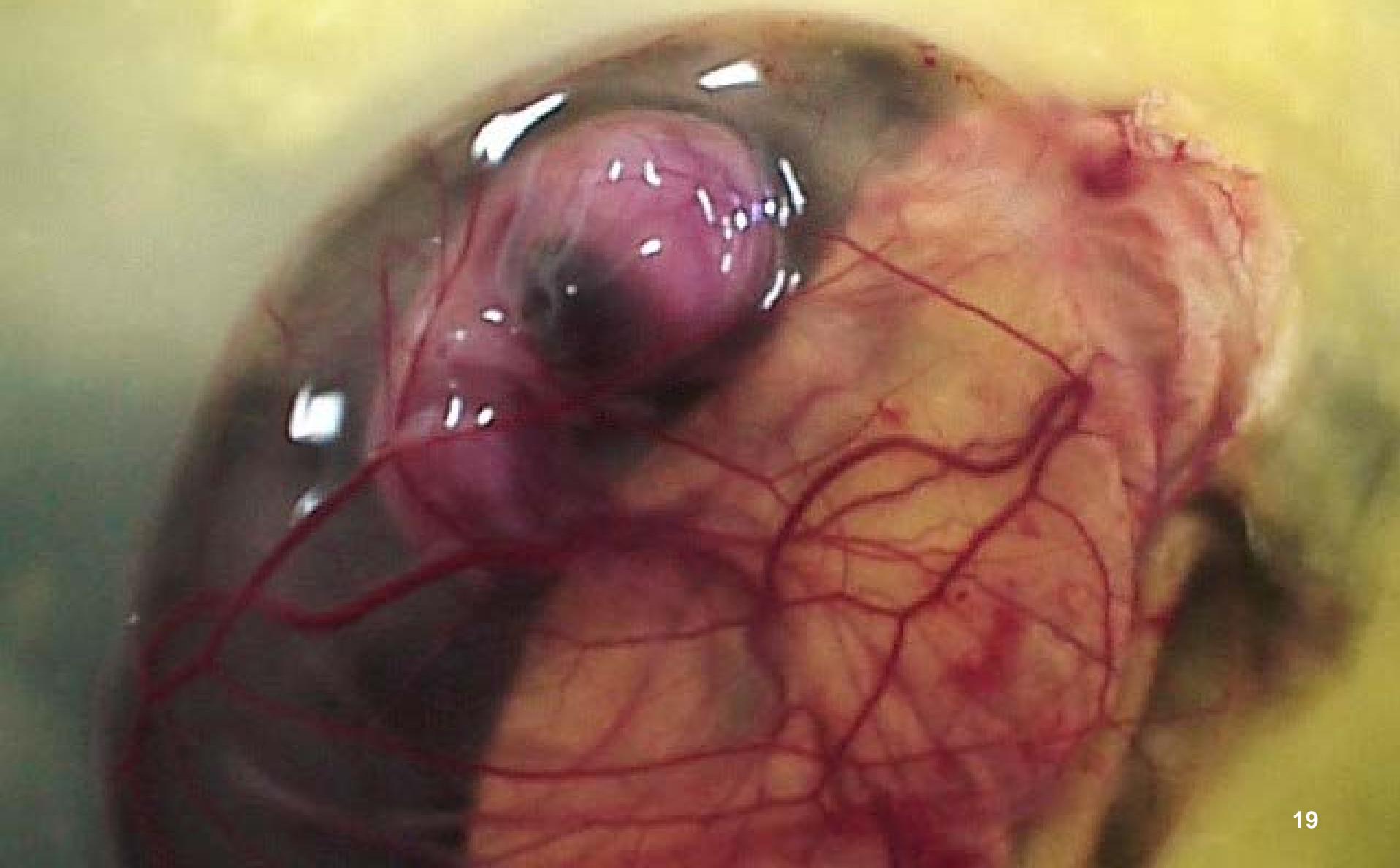
**Day 7**



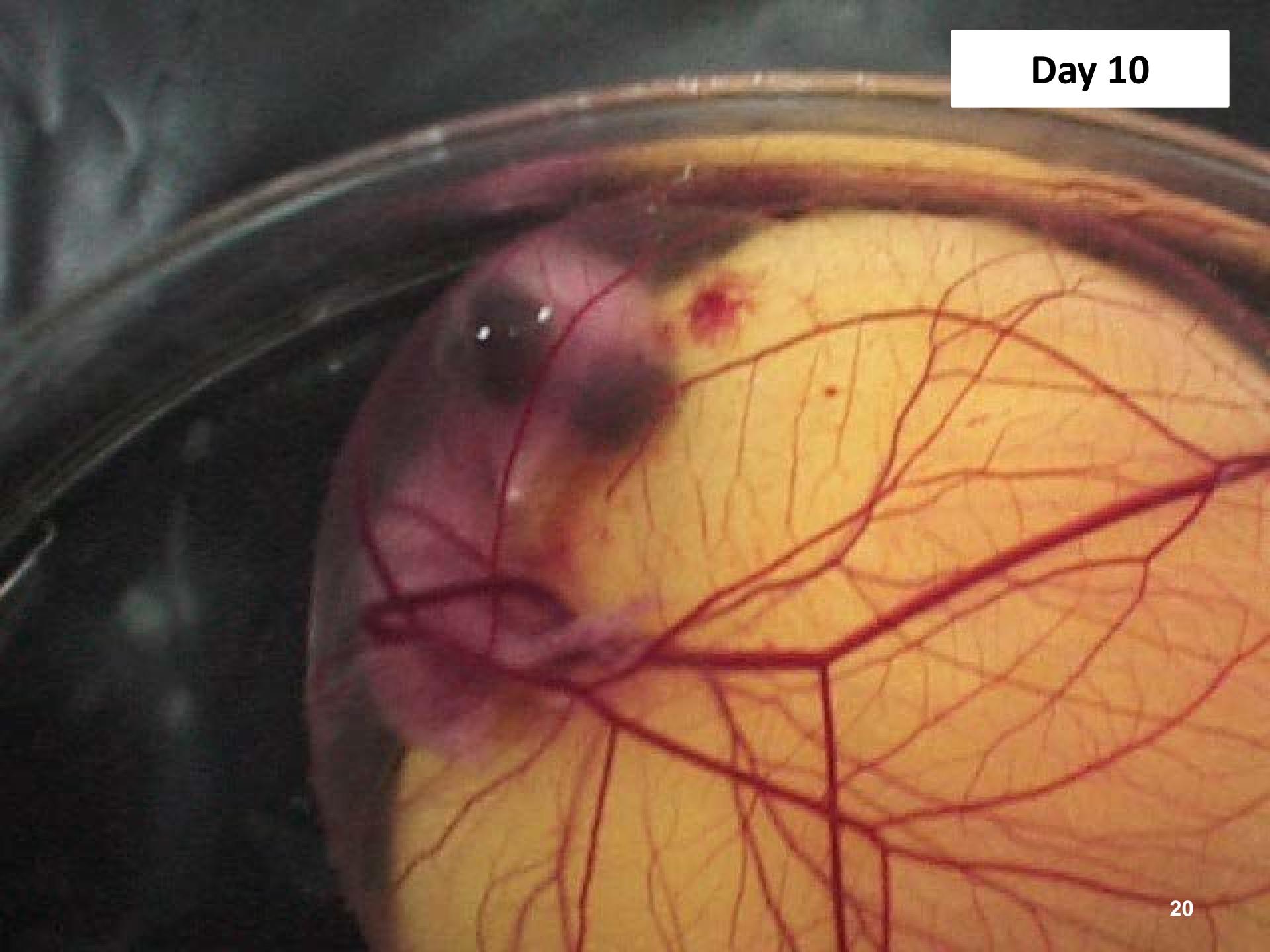
**Day 8**



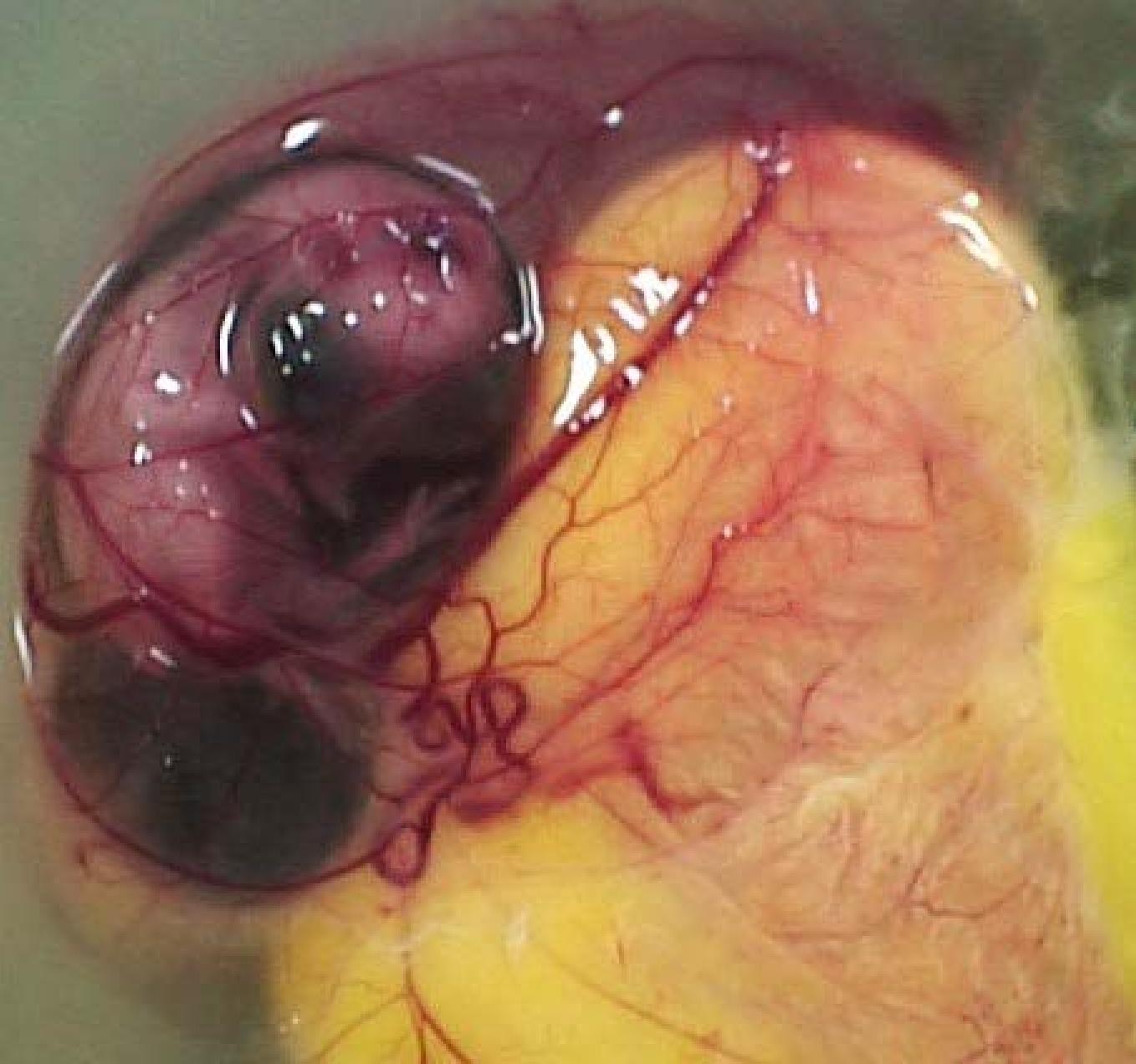
**Day 9**



Day 10

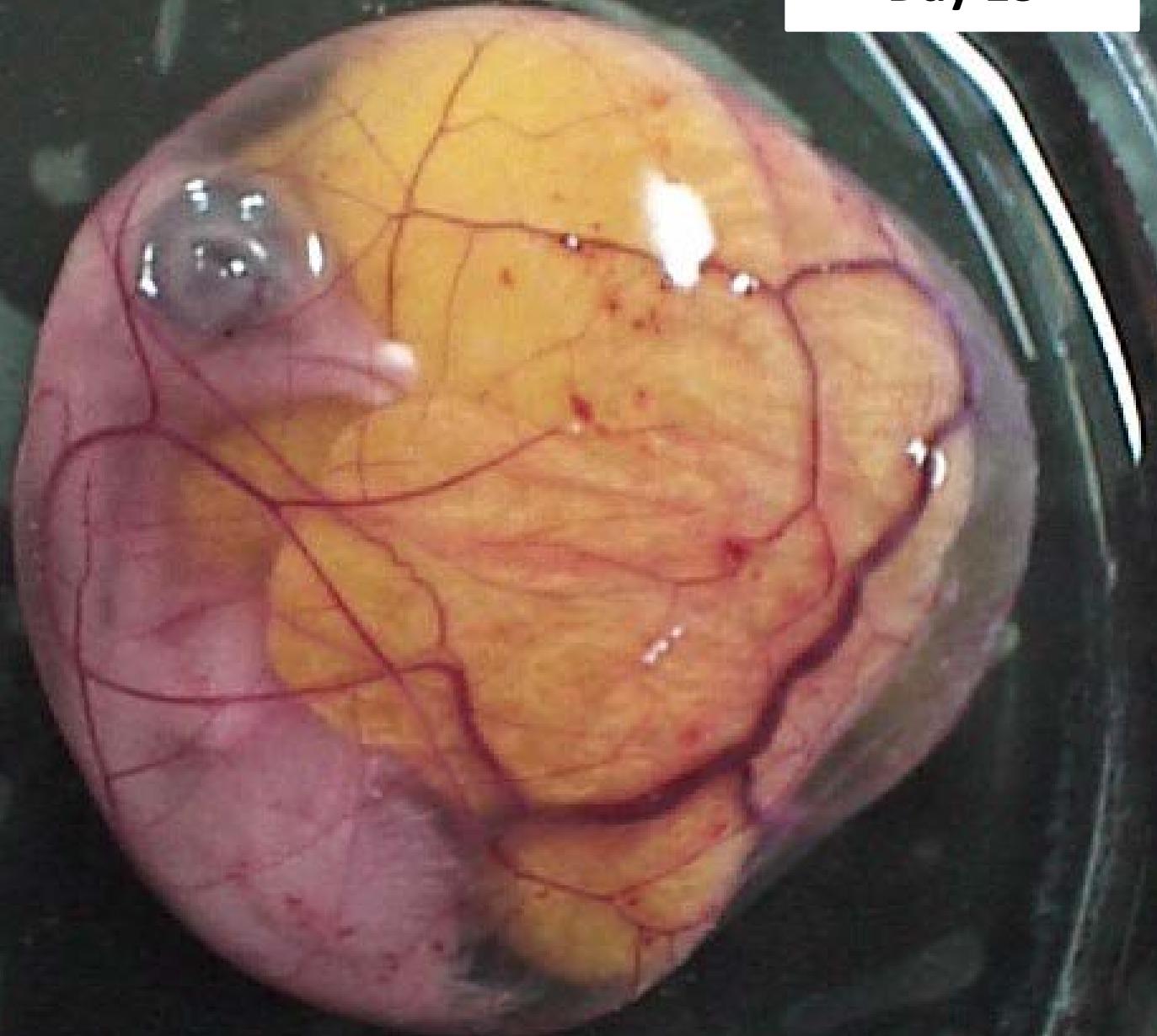


Day 11



**Day 12**

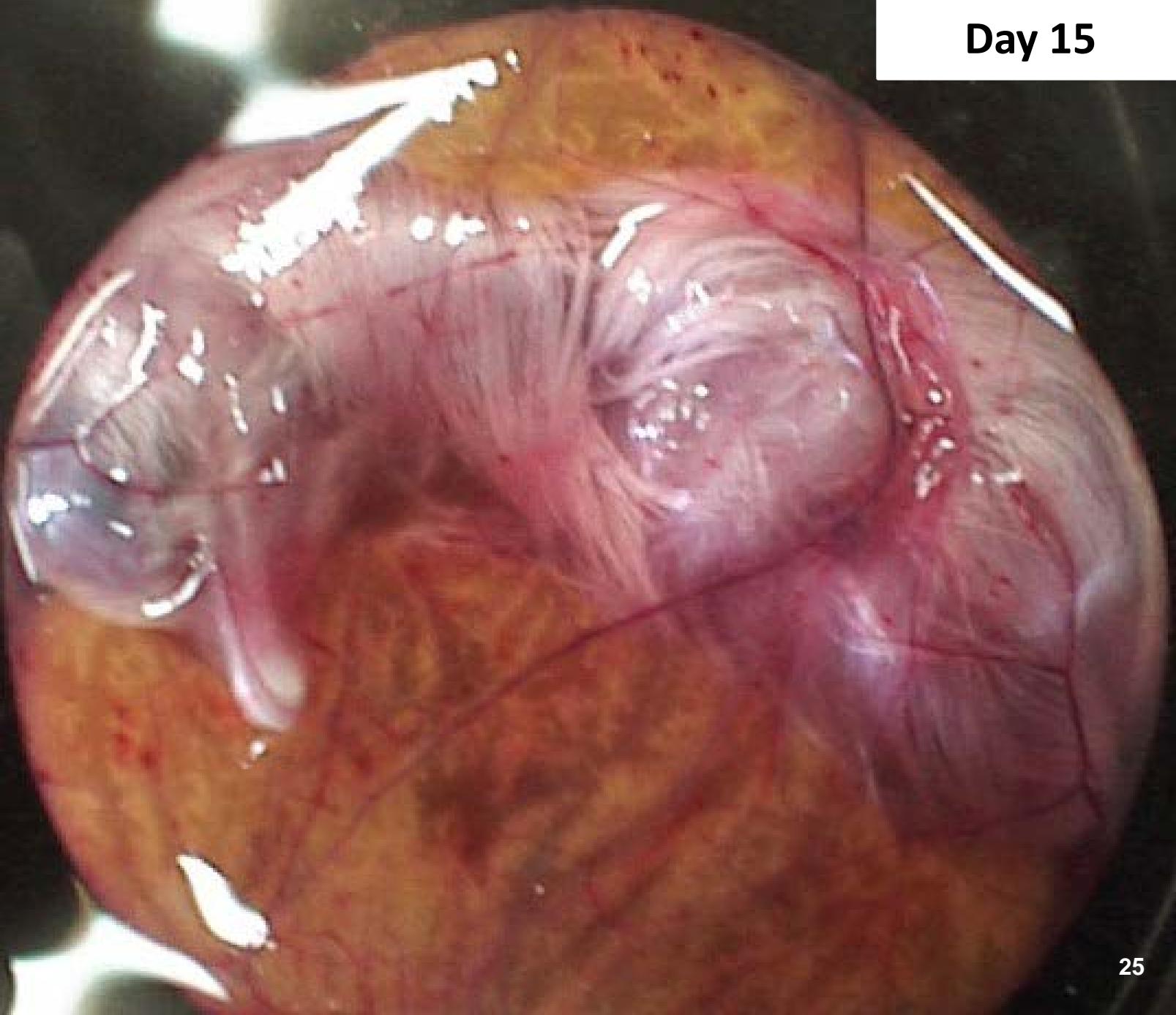
Day 13



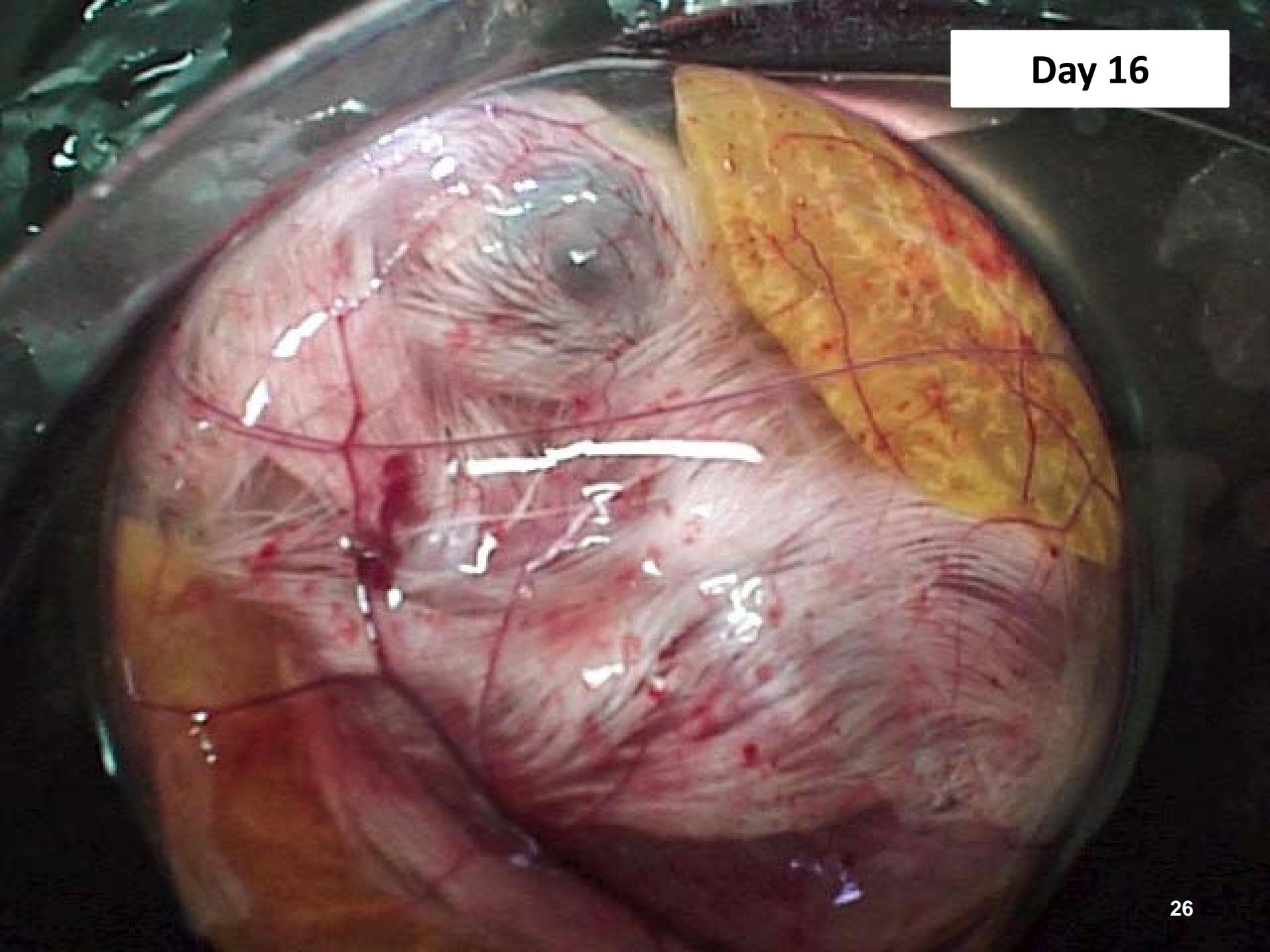
Day 14



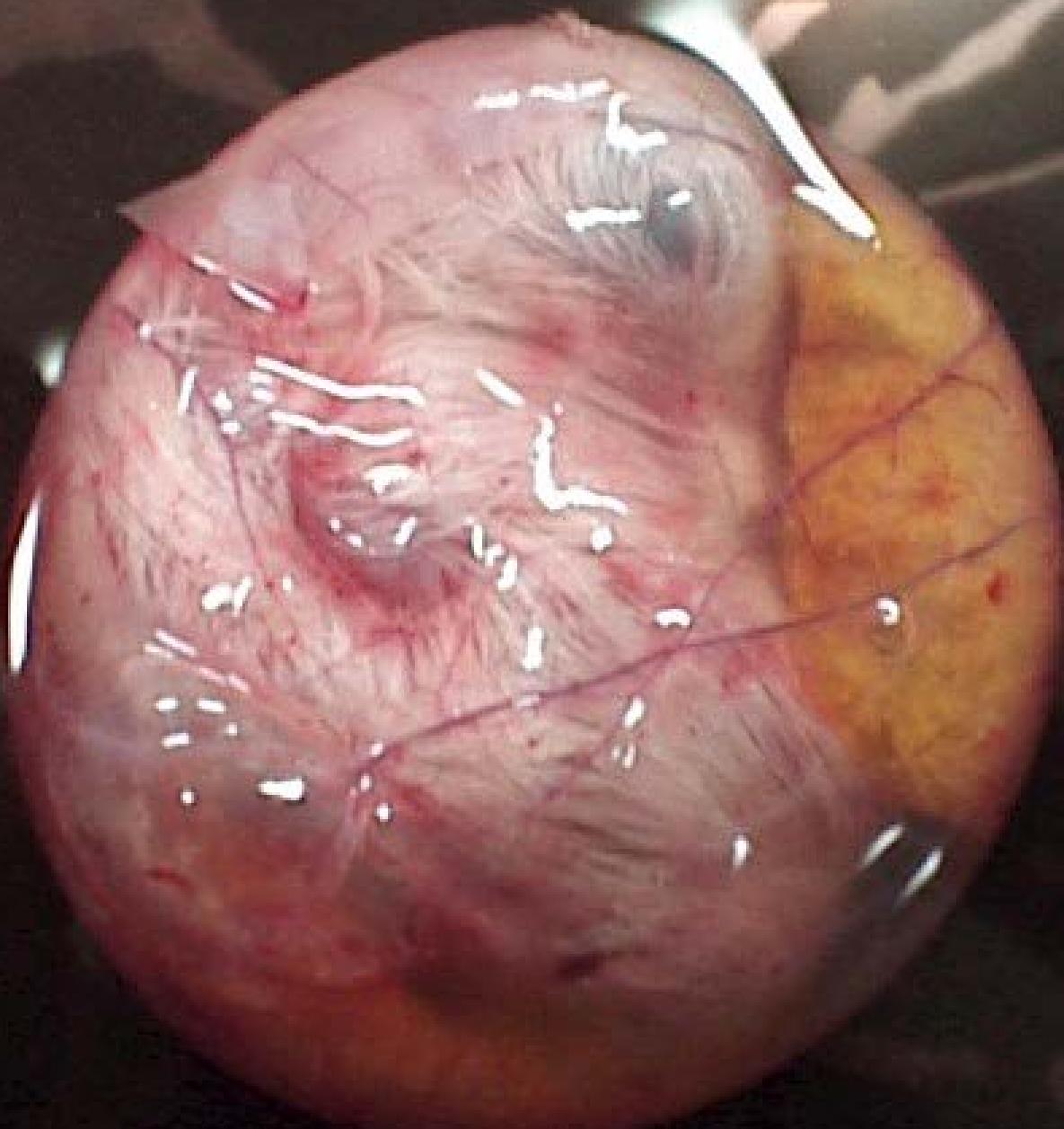
Day 15



Day 16



Day 17



Day 18



Day 19



**Day 21**



**II. Hatchability** refers to the percentage of fertilized eggs that hatch.

A. Factors that affect hatchability include:

- 1. Fertility**, the capacity to reproduce, is affected by:
  - a. number of females mated to a single male.
  - b. age of breeding animals.
  - c. length of time between breedings.
  - d. management practices.

2. Genetics, or genetic makeup of the bird, is affected by:

- a. inbreeding
- b. crossbreeding
- c. lethal genes
- d. heritable traits (ex. egg production)

3.Nutrients, available to the developing chick, are affected by:

- a.rations fed to breeding hens.
- b.amount of vitamins and minerals in hen rations.

4. Diseases of breeding stock.
5. Egg Selection. Certain physical characteristics can affect hatchability.
  - a. Size. Extremely large or small eggs do not hatch well.
  - b. Shape. Unnaturally shaped eggs do not hatch well.
  - c. Shell quality. Strong shells hatch better than weak shells.
  - d. Interior quality. Upon candling, better interior quality eggs tend to hatch better.

## 6. Handling of fertilized eggs.

Good management practices include:

- a. Gathering eggs frequently.
- b. Clean soiled eggs.
- c. Sanitizing eggs.
- d. Hold, or prolong start of incubation, for a minimum amount of time.

- e. Hold eggs at a temperature of 18.3° C.
- f. Keep eggs at a relative humidity of 75 to 80%.
- g. Position eggs with large end up.
- h. Turn eggs if they are held for more than 7 days.

III. Fertile eggs will hatch if placed in an incubator with the correct environmental conditions.

A. Temperature.

1. Optimum temperature for hatching chickens is between 37.2 to 37.8° C.

## B.Humidity.

1. Eggs lose moisture during development and low humidity causes an increased loss.
2. High humidity can prevent the correct evaporation of water.
3. Humidity levels should be around 60% for the first 18 days, followed by 70% for the remaining days.

# C.Ventilation.

1. Proper circulation is critical to assure a fresh supply of oxygen and removal of carbon dioxide.

## D. Position and turning of eggs.

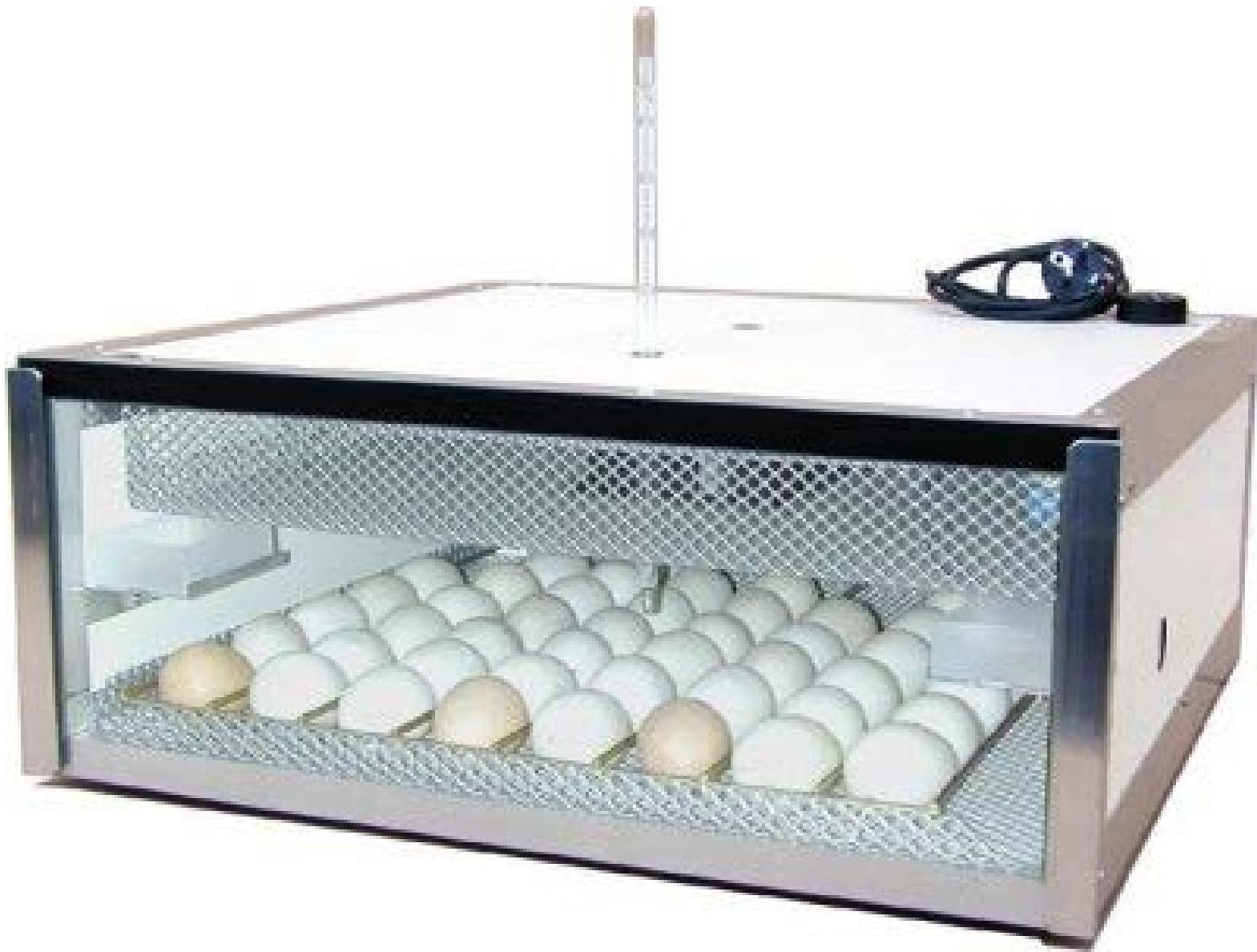
1. The head of the chick must face the large end of the egg for proper hatching.
2. Eggs should be incubated large end up, and turned three to five times daily to prevent the developing embryo from attaching to the shell membrane.



## IV. Fertility of eggs can be determined by a process known as candling.

- A. Eggs held up to an **egg candler**, a device for shining a light beam into an egg.
  - 1. Eggs will look different depending on fertilization or lack of fertilization.
  - 2. Fertile eggs will appear darker as the developing embryo begins to form.
  - 3. Infertile eggs can be detected after 15 to 18 hours of incubation.
  - 4. A second fertility test can be made 14 to 16 days after incubation.

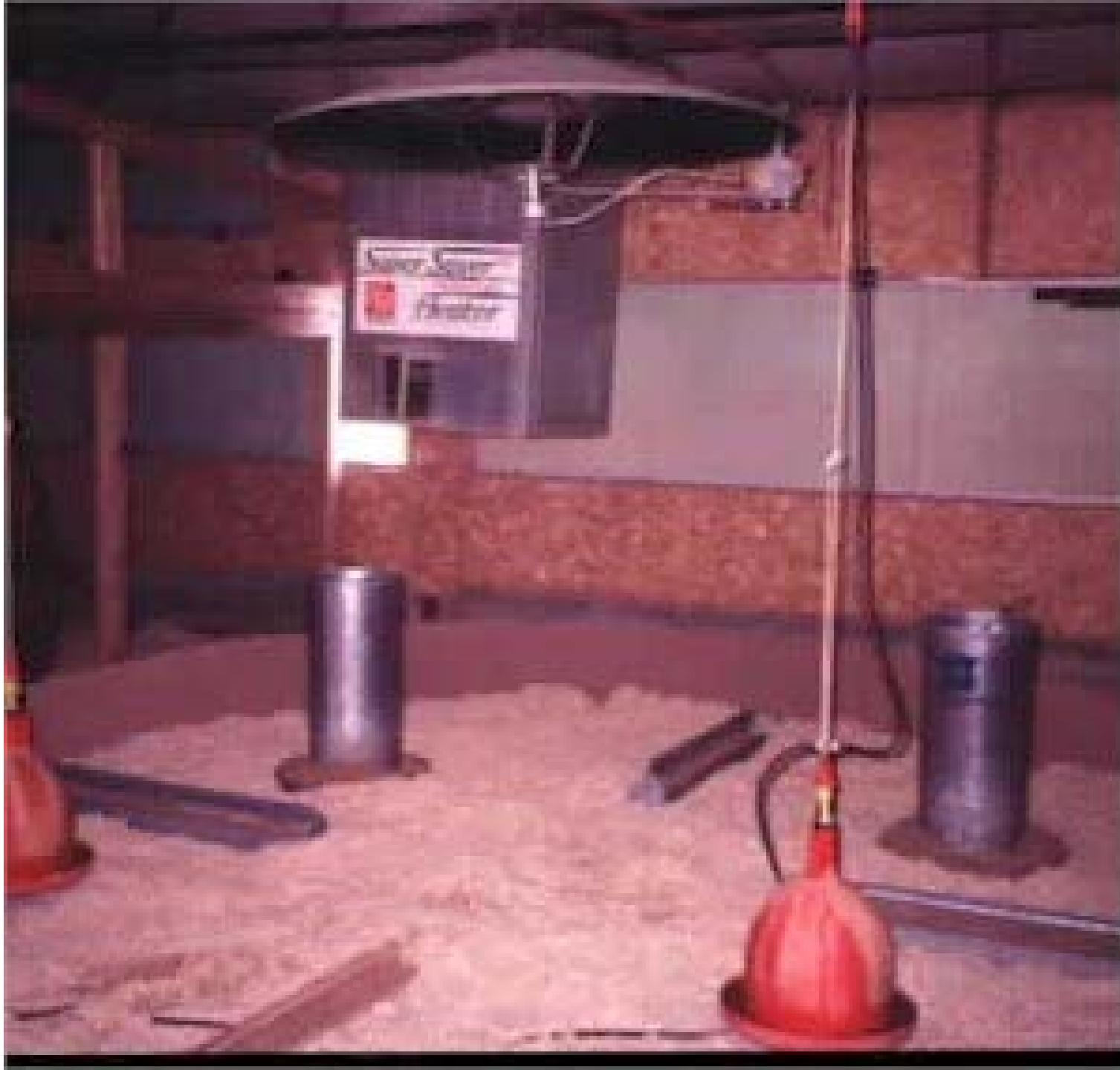
- B. A 75 watt bulb is recommended for use in an egg candler.
- C. In commercial hatcheries, two separate incubators are used for hatching.
  - 1. Incubation of the chick from day 1 through day 19 is done in an incubator known as the **setter**. The setter has the environmental conditions discussed earlier.
  - 2. Days 19 through 21 are usually spent in an incubator known as the **hatcher**.
    - a. The hatchers have slightly lower temperatures ( $36.7^{\circ} \text{ C}$ ) and have chick holding trays that cut down on the debris from hatching eggs that may cause disturbances to other eggs.
  - 3. Incubation times depend on the species of bird being hatched.



**D. Brooding** refers to the care of young poultry from the time of hatching through eight to ten weeks of age.

1. Certain environmental conditions are needed for proper brooding.
  - a. Temperature—When chicks are one day old, the temperature should be between 32.2 and 35 ° C.
    - i. The temperature is generally lowered five degrees per week until a temperature of 21.1 to 23.8° C is reached, or until the chicks are fully feathered.

- b. Ventilation—Proper ventilation provides fresh oxygen, removes carbon dioxide, carbon monoxide, ammonia, and keeps bedding dry.
- c. Moisture—50 to 60% relative humidity is recommended for good feathering.
- d. Space requirements—Each chick needs 17.8 to 25 centimeters of space under the brooder.
  - i. More brooder space may be required during colder weather.



# Review/Summary

1. Describe the embryonic development of a chicken
2. What factors affect hatchability of eggs?
3. What is the ideal environment for incubating eggs artificially?
4. What should be done to eggs for hatching?
5. What should be done to care for young birds during brooding?