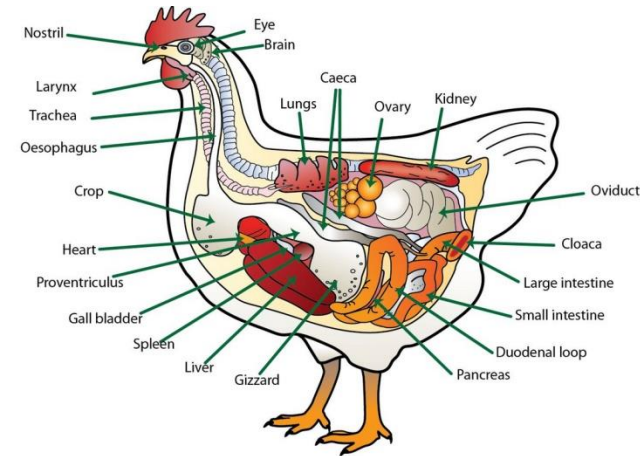
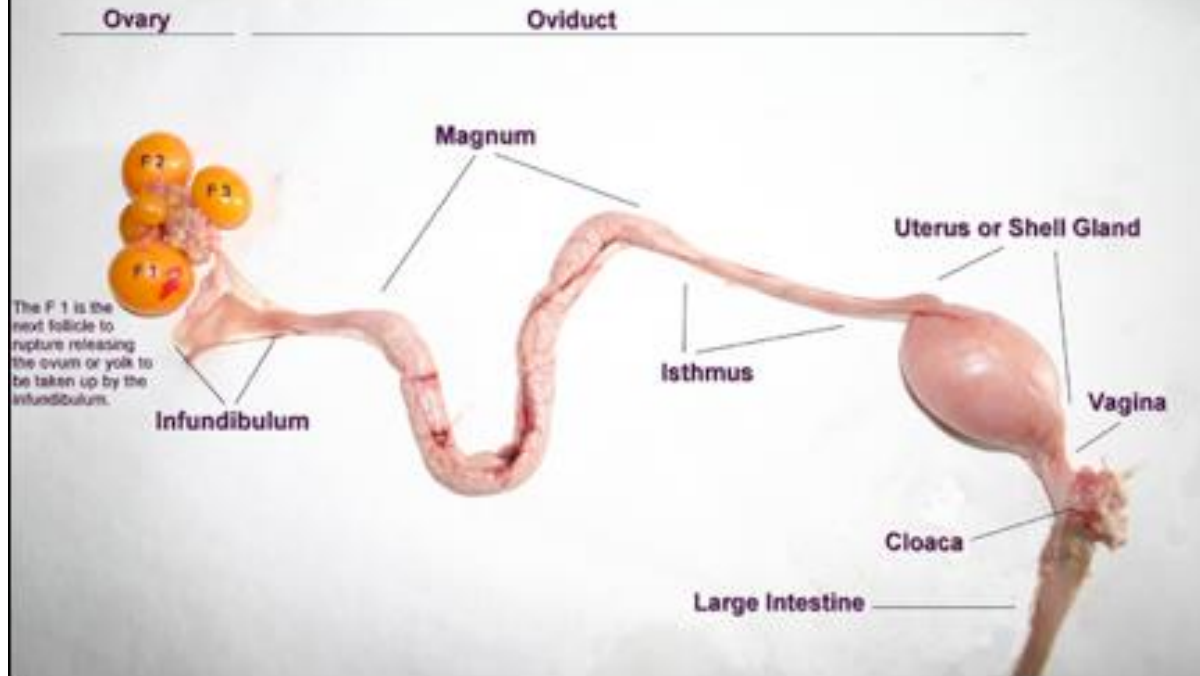


FEMALE REPRODUCTIVE SYSTEM of BIRDS



Reproductive Tract of the Laying Hen



❖ General Features:

- The functional gonad of the hen is the left ovary.
- The ovary of birds is not as compact as those in mammals.
- The ovary consists of finger-like projections, which are suspended pendulously from the abdominal wall by the mesovarium.
- The ovary consists of:
 - A) Cortex (zona parenchymatosa).
 - B) Medulla (zona vasculosa).



A) The cortex (zona parenchymatosa):

a) Ovarian surface epithelium:

- Cuboidal cells or flattened cells.
- Tunica albuginea.

b) Stroma:

Network of numerous collagenous fibers :

- 1) Eosinophils.
- 2) Interstitial cells (medullary and cortical).
- 3) Vascular cells (fat - laden cells).
- 4) Pigments (hemosiderin).

c) Ova:

I- Primary oocytes:

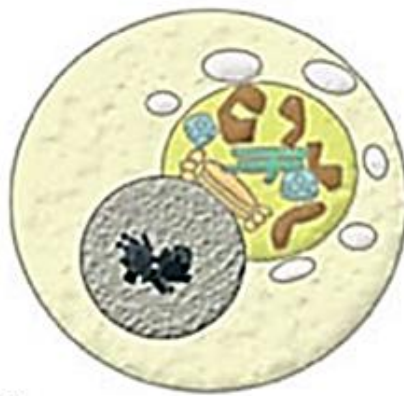
- Central nucleus.
- Granular cytoplasm.
- Balbiani body (yolk spheres, mitochondria, Golgi complex).

II - Maturing ova:

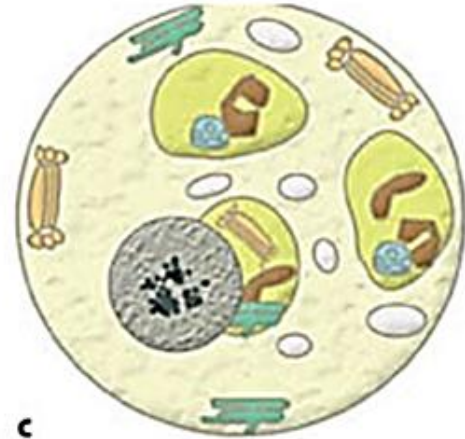
The ova are found within follicles, which project from the surface of the ovary.
The term follicle is misnomer because an antrum does not develop.



a



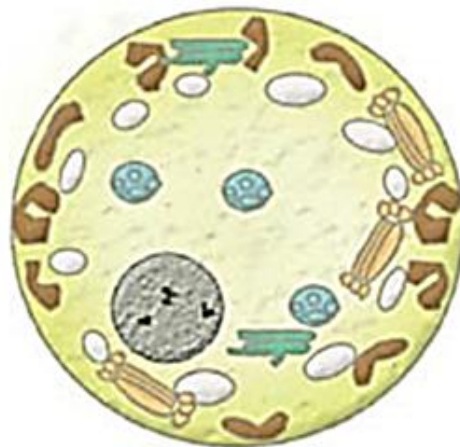
b



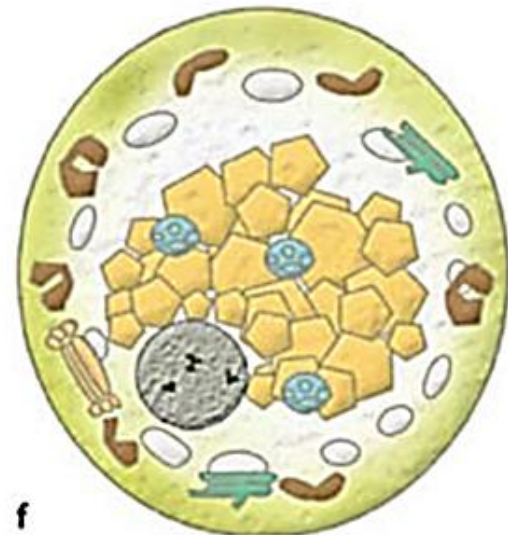
c



d



e



f



Nucleus



Balbiani body



Mitochondria



RER



Golgi



Vesicle



Lipid droplet



Yolk platelet

ooplasm

- **The wall of the mature ovum consists of:**

1 - Zona radiata :

- It is a part of the oocytes.
- Appears as processes from the oocyte.
- Covered by the vitelline.

2 - Perivitelline membrane:

- Non cellular layer.
- Formed by the follicular epithelium.
- Formed of 2 layers:

a- Inner.

b- Outer: develops after ovulation.

3- Follicular epithelium: (membrana granulosa):

- Immediately adjacent to the ovum.
- Simple cuboidal (in the small oocytes).
- Pseudostratified columnar (in the large oocytes).
- They are the yolk forming cells.

4- Basement membrane.

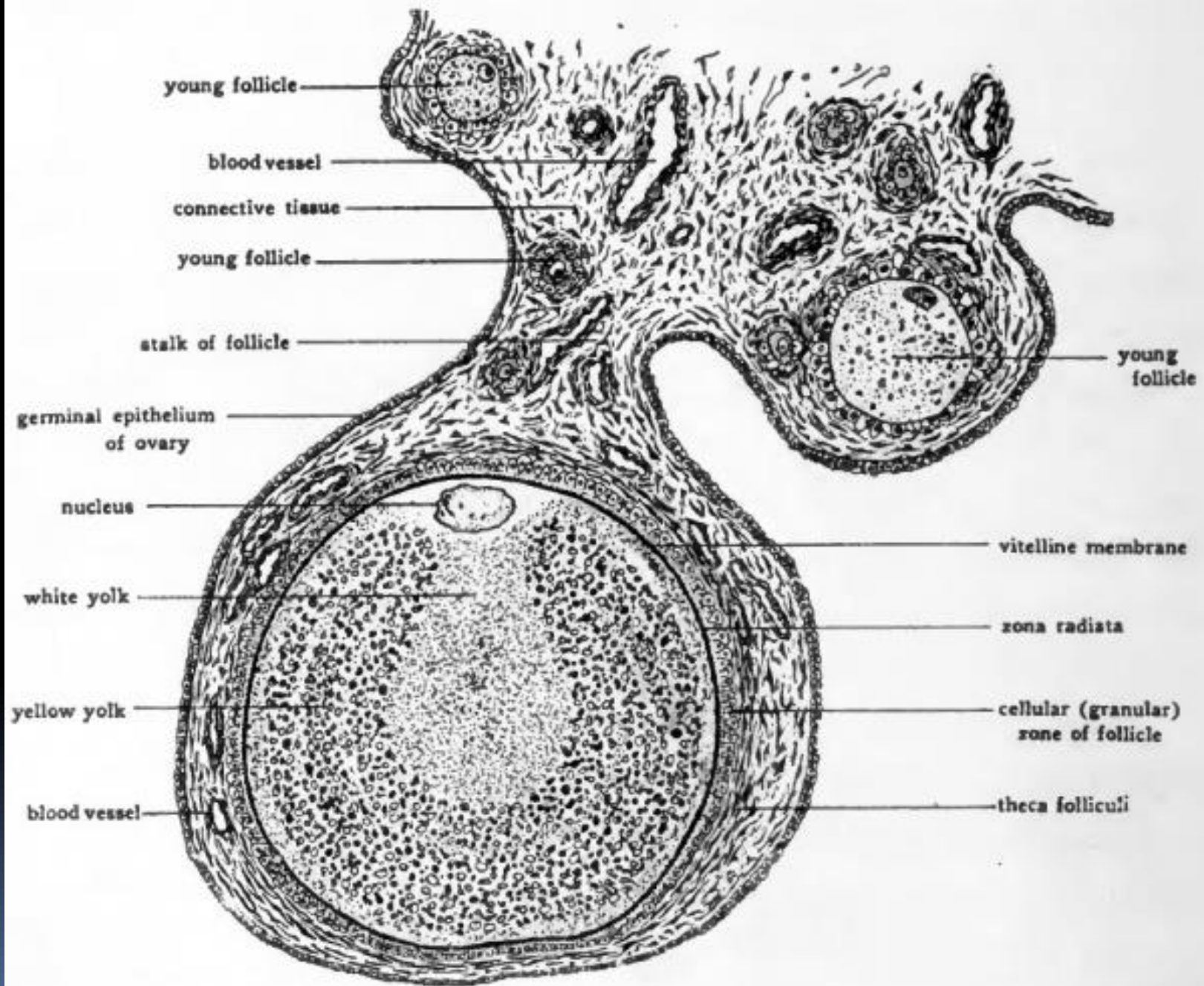
5- Theca interna:

- Spindle cells (fibroblasts).
- Fine collagenous fibers.
- Islets of luteal cells (thecal gland cells).

6- Theca externa:

- Collagenous fibers.
- Fibroblasts.
- Few elastic fibers.
- Smooth muscle fibers.

7- Stigma: (Avascular spot).



THE THECAL GLANDS

- ✓ Islets of epithelial cells (spherical, oval, elongated).
- ✓ Scattered around the follicle within the theca interna (or externa in large follicles).
- ✓ This gland consists of:

a) Steroid-producing cells:

- Irregular in shape - Oval or rounded nucleus.
- With lipid droplets - sER - Golgi apparatus.

b- Enclosing cells:

- Flat in shape - peripherally situated elongated nucleus - cytoplasm contains fibrils.

B) The medulla (zona vasculosa):

- Numerous blood vessels, blood sinuses, and lymph vessels.
- Nerve bundles.
- Smooth muscle bundles.

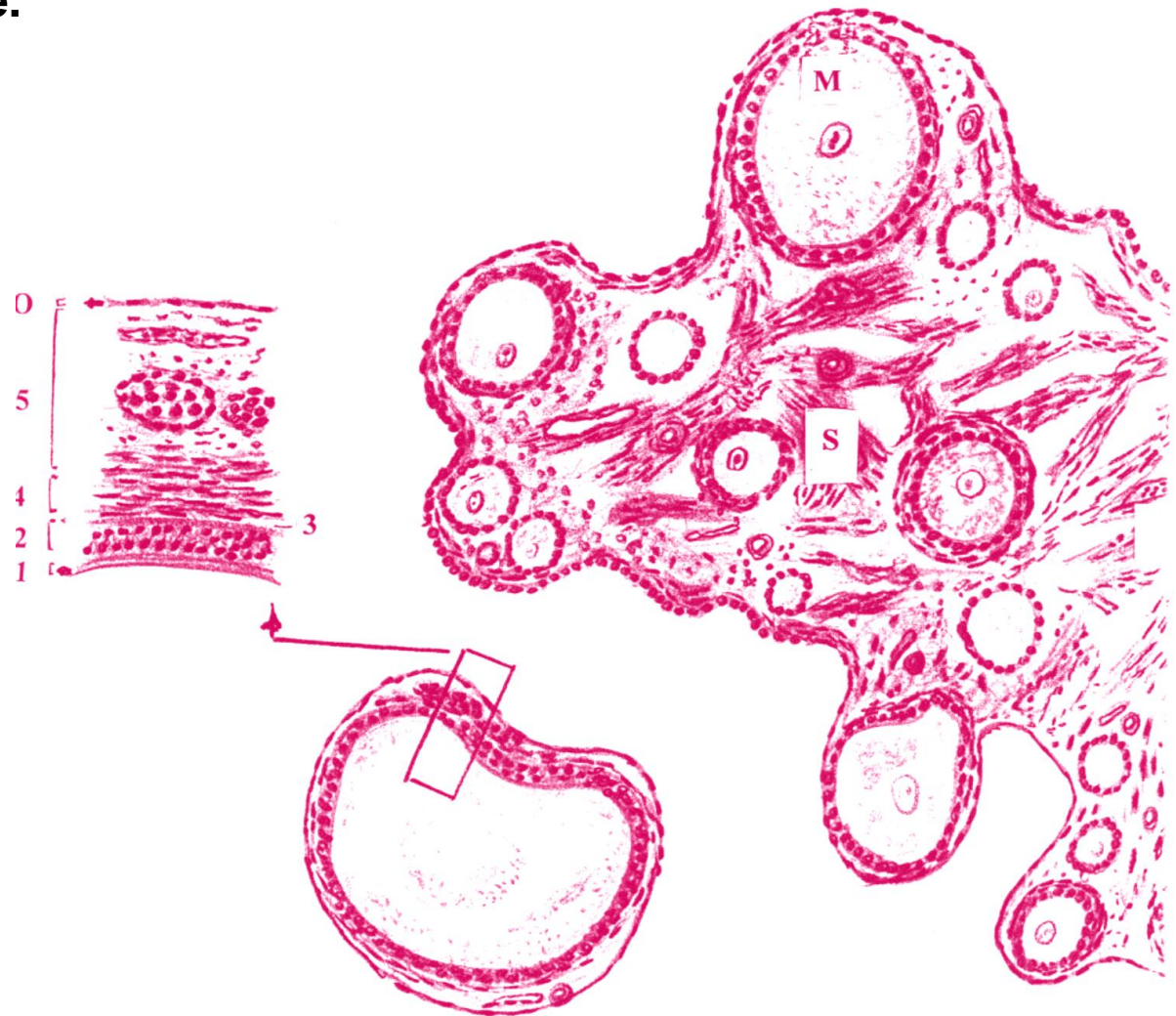
1 - Perivitelline membrane

2- Follicular epithelium: (membrana granulosa):

3- Basement membrane.

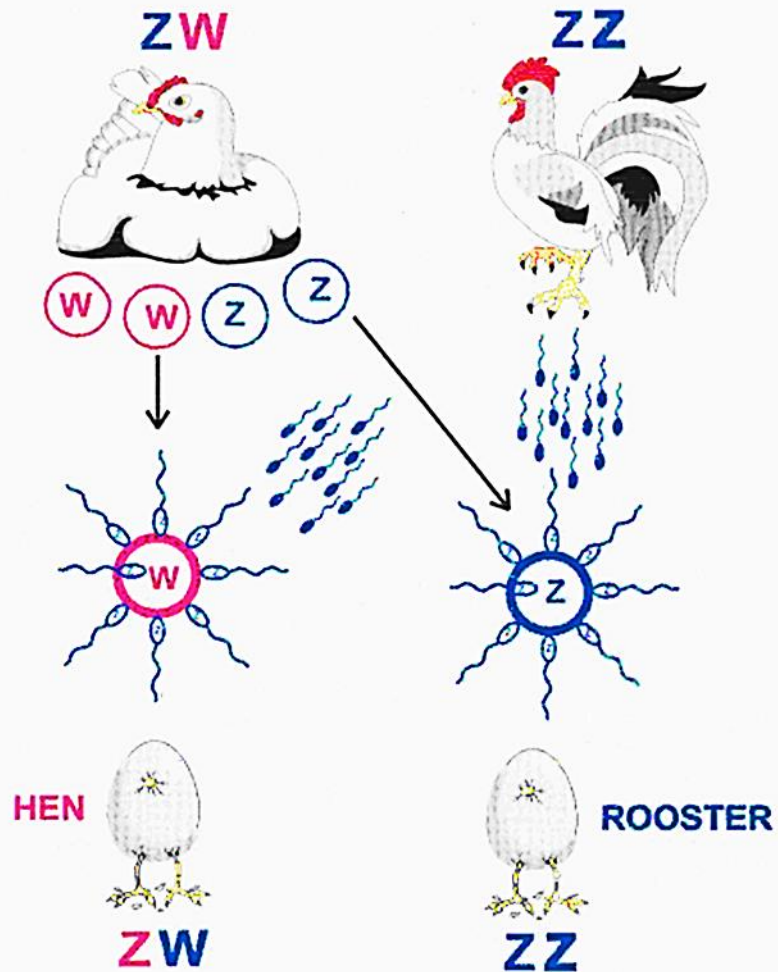
4- Theca interna:

5- Theca externa:





GENDER DETERMINATION IN BIRDS



THE OVIDUCT

Infundibulum

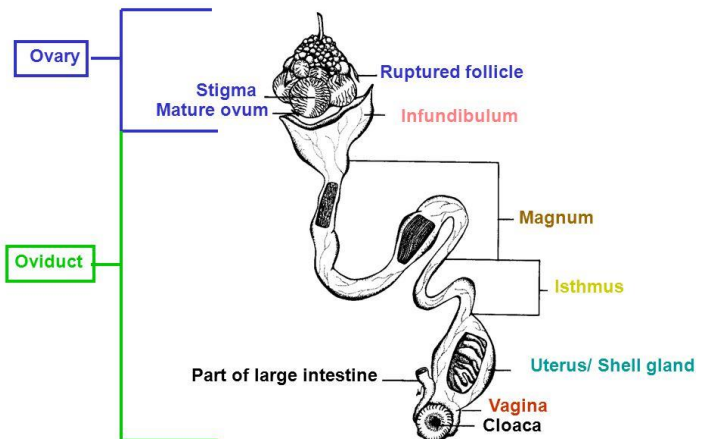
Vagina

Magnum

**Uterus
(the shell gland)**

Isthmus

Avian reproductive tract



1 - The infundibulum:

- Subdivided into:

A] The funnel.

B] The neck.

A] The funnel :

1- Lining epithelium :

Simple columnar ciliated epithelium.

2- Smooth muscles bundles (scattered).

3- C. t. layer.

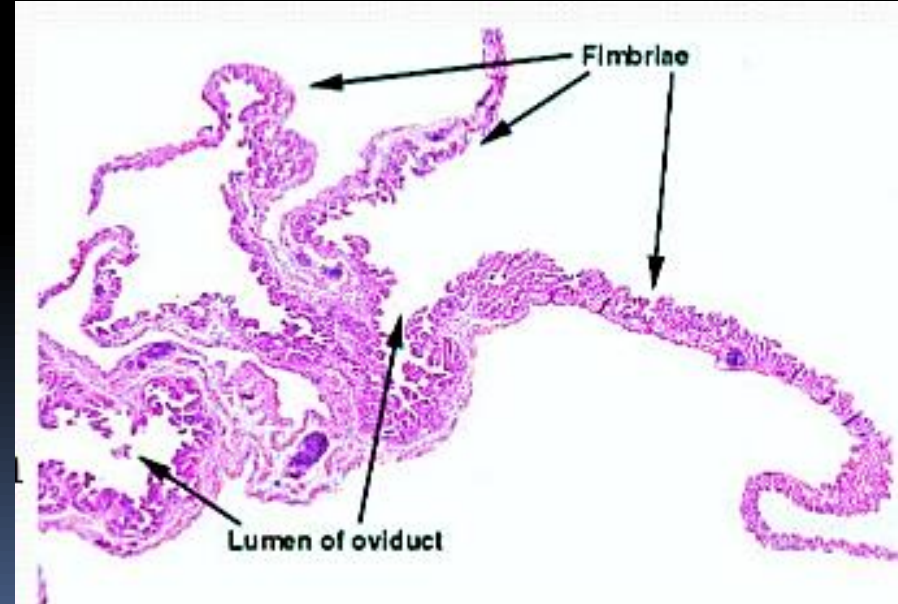
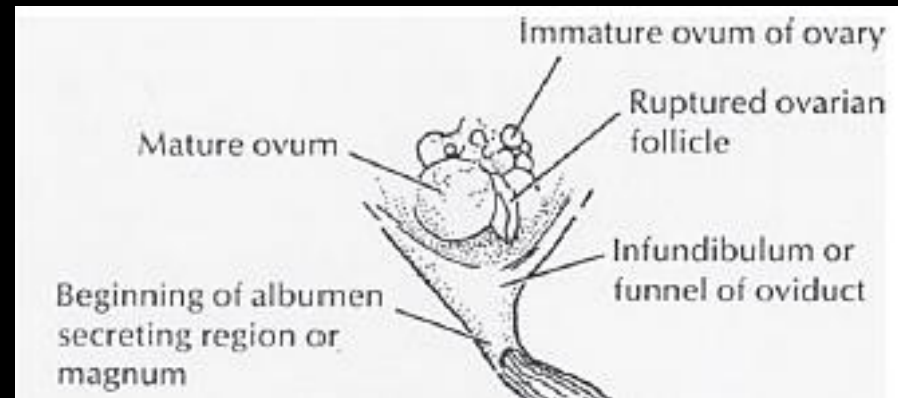
4- Peritoneum (serosa).

B] The neck

a- There are four types of epithelial cells:

1 - Ciliated cells:

- Non glandular.
- Columnar cells.
- Basal oval nucleus.
- Tuft of cilia.



B] The neck

2- Goblet cells.

3- Cuboidal cells (Granular cells):

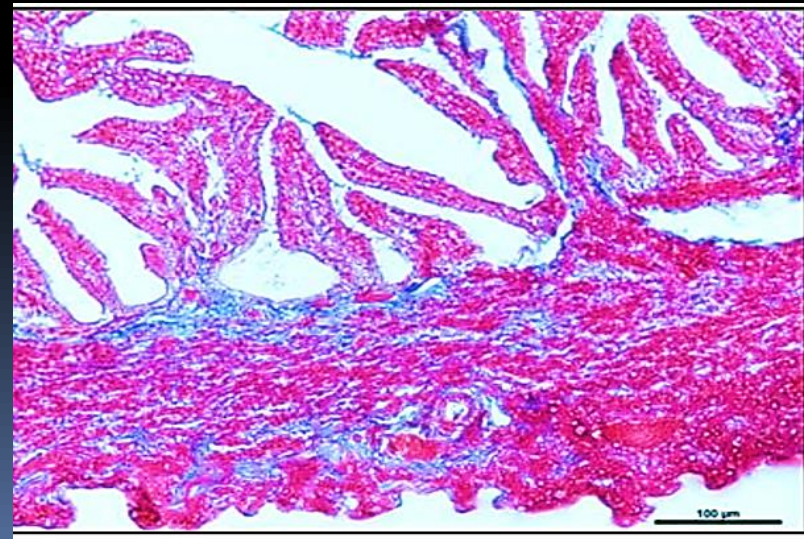
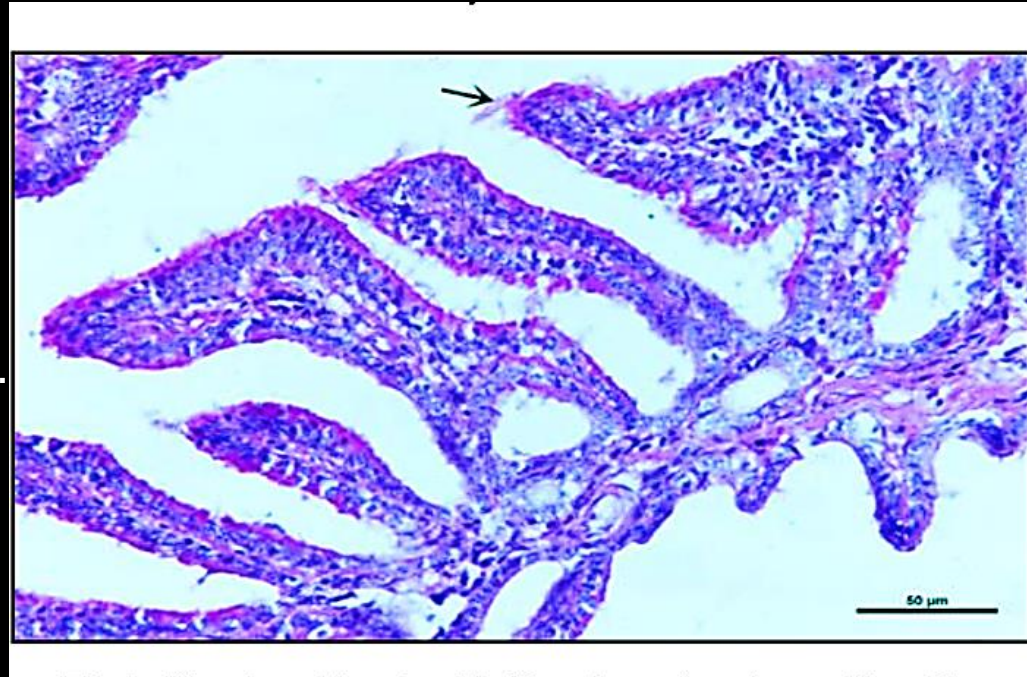
- Secretory.
- Found at the bases of the ridges.
- Large basal nucleus.
- With PAS + ve granules.

4- Tubular gland cells:

- At the caudal portion of the infundibulum.
- Low pyramidal.
- Few or moderate eosinophilic granules.
- Spherical nucleus.

b- The longitudinal epithelial ridges increase in depth and bears small secondary folds.

c- The muscle bundles are arranged into ill-defined longitudinal and circular layers.



II- The magnum: (Long)

1) Mucosa: (numerous high folds).

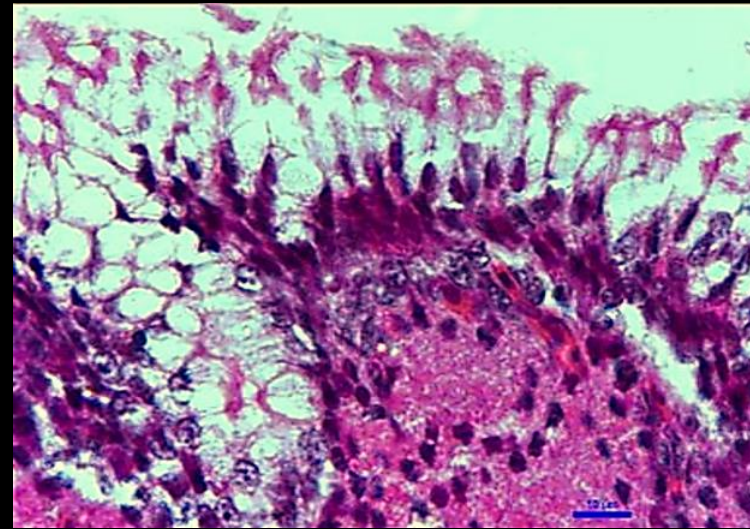
a- Lamina epithelialis:

Simple columnar ciliated epithelium with goblet cells.

b- Lamina propria:

Thick - contains numerous branched tubular glands.

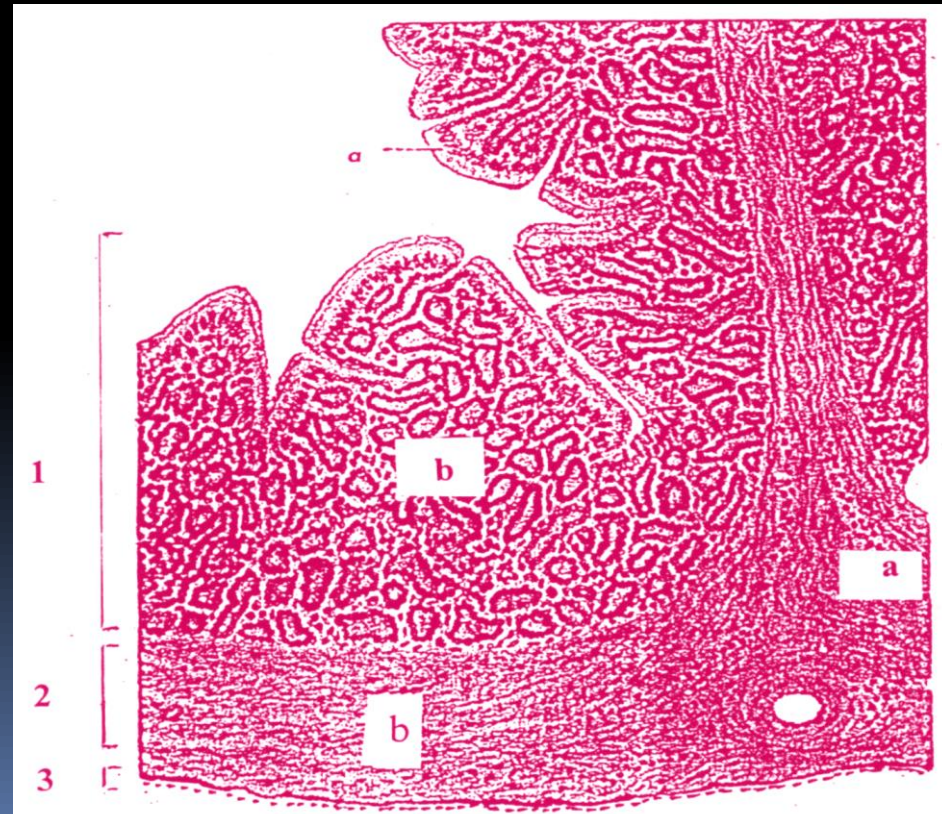
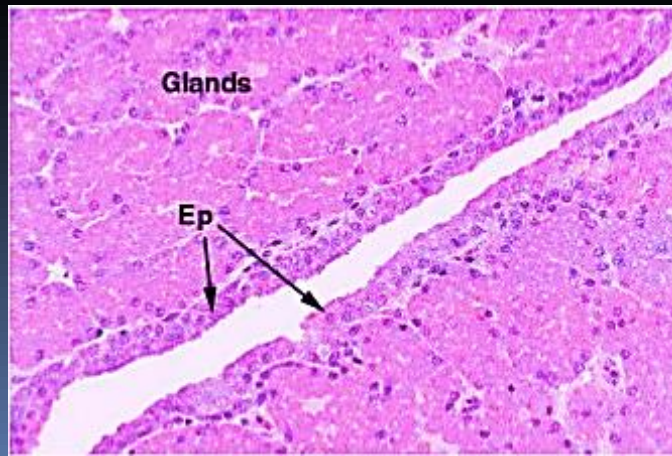
The glandular cells are pyramidal with basal nuclei.



2) Muscular layer: (Thick)

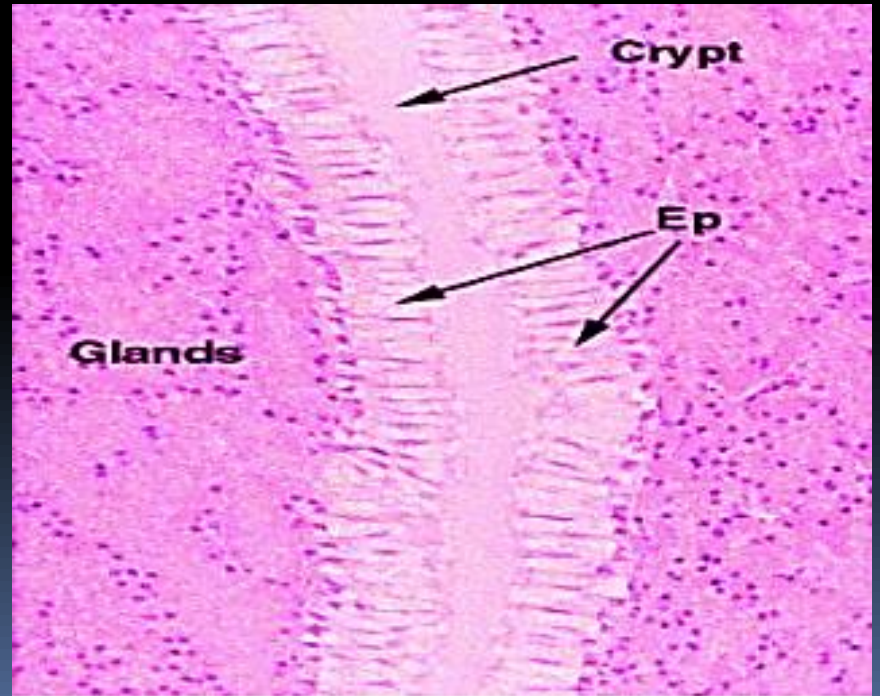
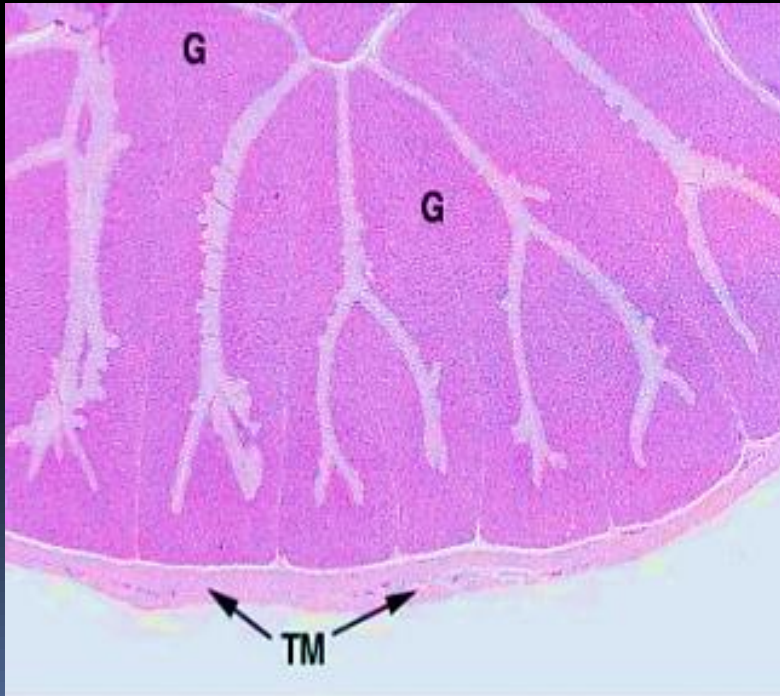
- Smooth muscle fibers:
 - a) Inner circular layer.
 - b) Outer longitudinal layer.

3) Serosa.



III - The isthmus: (Short)

- Similar to magnum but:
 - Surface epithelium is tall.
 - Tubular glands are not well developed.
 - Muscular layer is thick.



IV- The uterus (the shell gland):

A) Mucosa: Leaf shaped folds.

a- Lamina epithelialis:

- Single layer of columnar cells with alternating apical and basal cells.

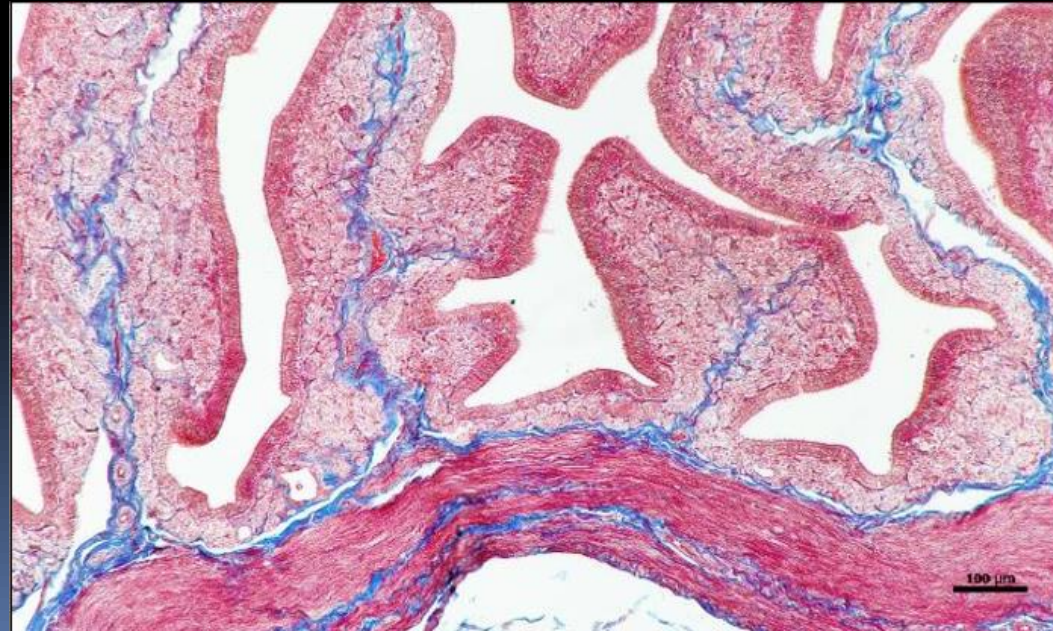
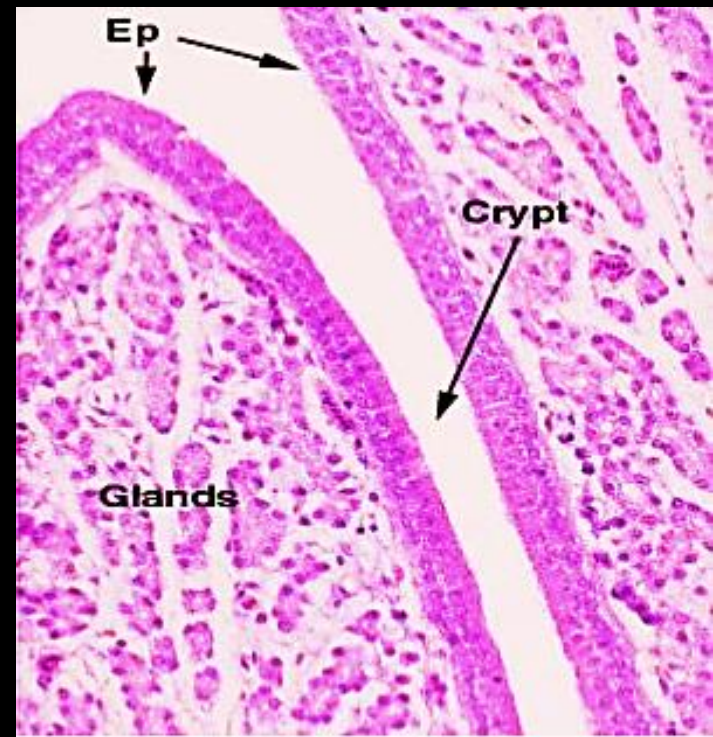
b- Lamina propria:

- Contains coiled tubular gland closely packed together.
- The glandular cells appear vacuolated and present large basal nucleus.

B) Muscular layer:

- a) Inner circular layer.
- b) Outer longitudinal layer.

C) Serosa.

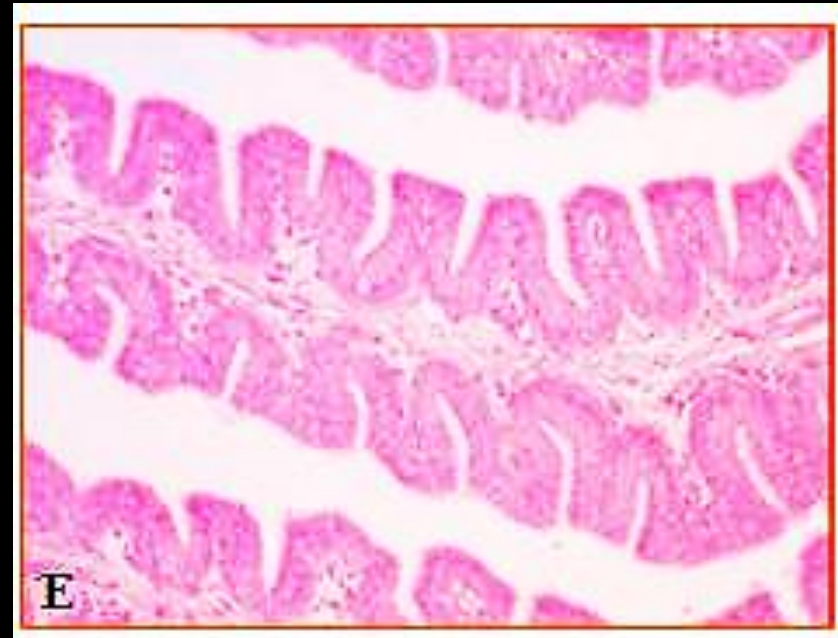


V- The vagina: (Short)

- Narrow duct.

A) Mucosa:

- Long, slender folds with numerous small secondary folds.
- No tubular glands within the corium of these folds.
- Lamina epithelialis is composed of tall (pseudostratified epithelium with columnar shaped):
 - a- Ciliated cells.
 - b- Non-ciliated glandular cells.



B) Muscularis:

The muscular layer consisted of:

- a- Thick inner circular layer.
- b- Thin outer longitudinal layer.

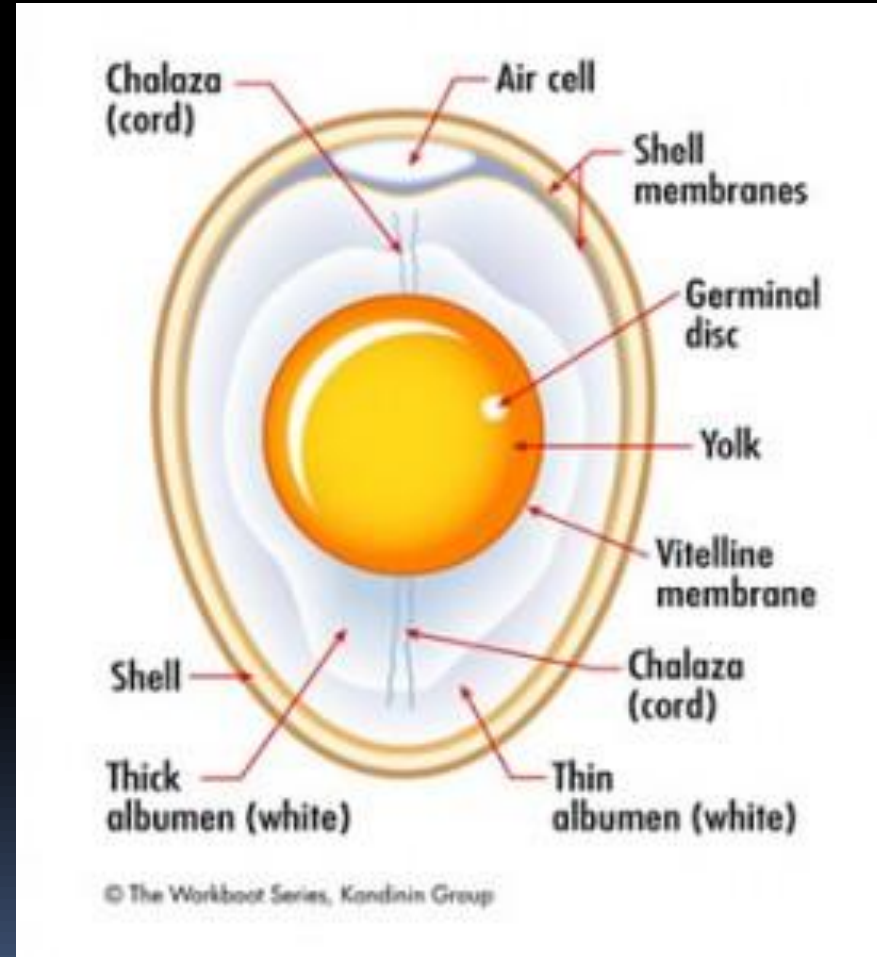
C) Serosa.



THE AVIAN EGG

The egg of birds consists of:

- 1) The fertilized or unfertilized egg cell or sphere of yolk, which is produced by the ovary and already has a thin covering yolk membrane.
 - 2) The sphere of yolk is surrounded by three layers of egg white or albumen; these are of varying viscosity, the outer and inner layers being less viscous than the middle layer, which latter is of much greater volume.
- The chalazae are spirally twisted, cord-like structures, which are suspended in the albumen and tightly attached to the yolk membrane.
 - The double-layered shell membrane between which lies the air chamber at the blunt pole of the egg.
 - The calcium shell and on the outside the cuticula which can be compared to a covering of varnish.



Infundibulum

Ovary

perivitelline membrane

chalazae

albumen

shell membrane

cleaving blastodisc

shell

Oviduct

Shell Gland

Intestine

Right Oviduct

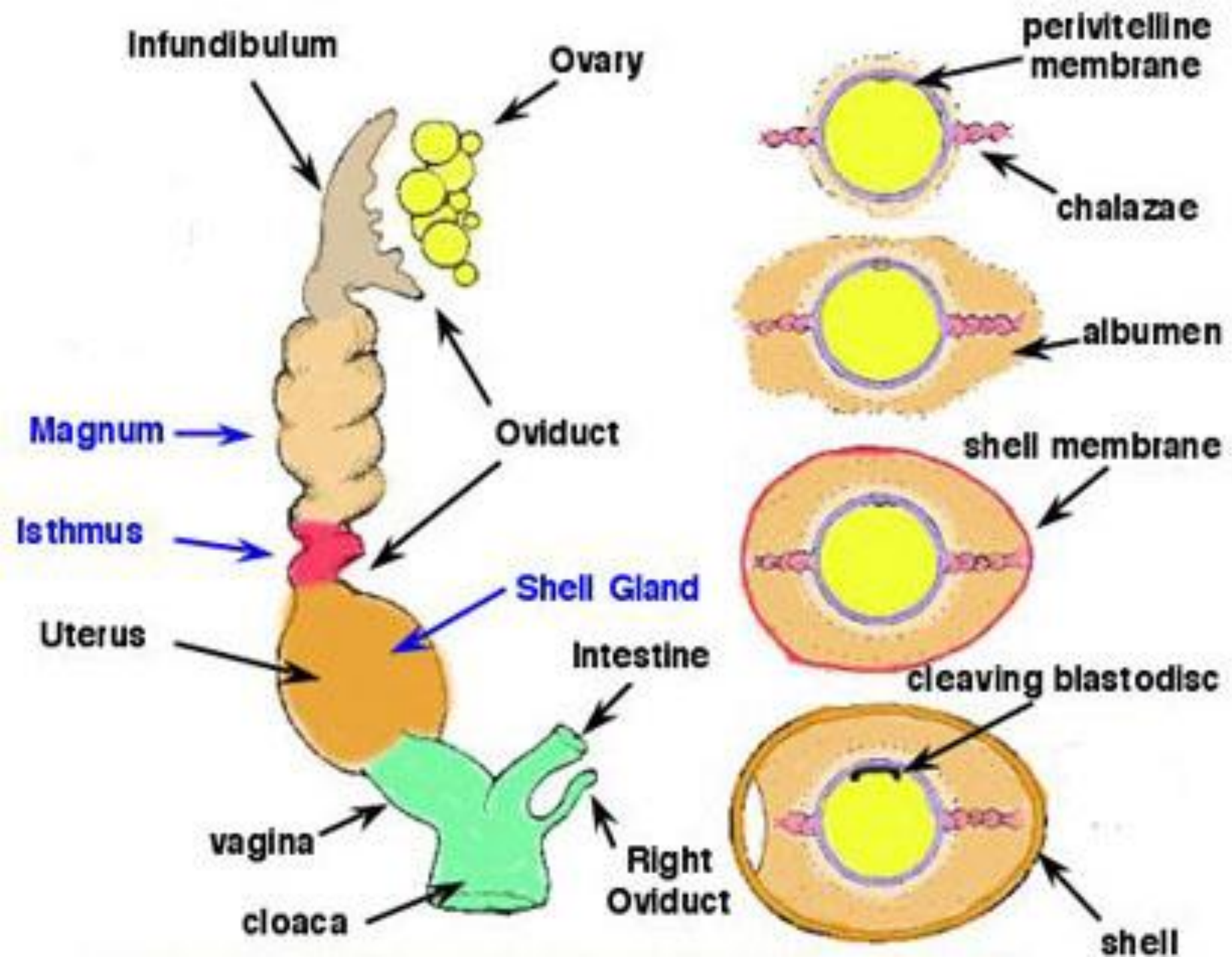
Magnum

Isthmus

Uterus

vagina

cloaca



DISCOVER

How is an egg made?

We know that hens lay eggs, but what is the science behind how that egg is formed? Here's a look at the whole process:

1 Each day ...

The chicken egg starts as an egg yolk inside a hen. A yolk (called an oocyte) is produced by the hen's ovary in a process called ovulation.

2 18 minutes

The oocyte is released into the oviduct (a long, spiraling tube in the hen's reproductive system).

3 2-3 hours

It takes approximately 3 hours for the albumen to be deposited around the yolk. As the albumen is formed, the yolk rotates, twisting the albuminous fibres to form the chalazae.

4 1 hour

Formation of shell membranes takes a little over an hour.

5 16 hours

The egg spends most of the time in the uterus. Initially some water is added, making the outer white thinner. Then the shell material (mainly calcium carbonate) is added. The egg gets its "bloom," a thin coating which helps it pass through the cloaca smoothly, just before the egg is laid.

6 Minutes

A series of small muscle contractions permits the egg through the cloaca. It stretches outward to release the egg.

During formation, the egg moves through the oviduct small end first. Just before laying, it is rotated and laid large end first. A young hen lays small eggs. The size increases as she gets older.

The whole process takes about 24 hours and begins again shortly after an egg is laid.

Farm fresh

Less than 21 days old. Misshapen eggs are used for other purposes e.g. mayonnaise and dried egg produce. The hens are confined to a cage size providing 750 cm² per hen. Perching space is available at 15 cm per bird.

Value added

Obtained by changing the diet of the hen. More vitamins or omega3 produce an egg with a higher rate of vitamins.

Free range

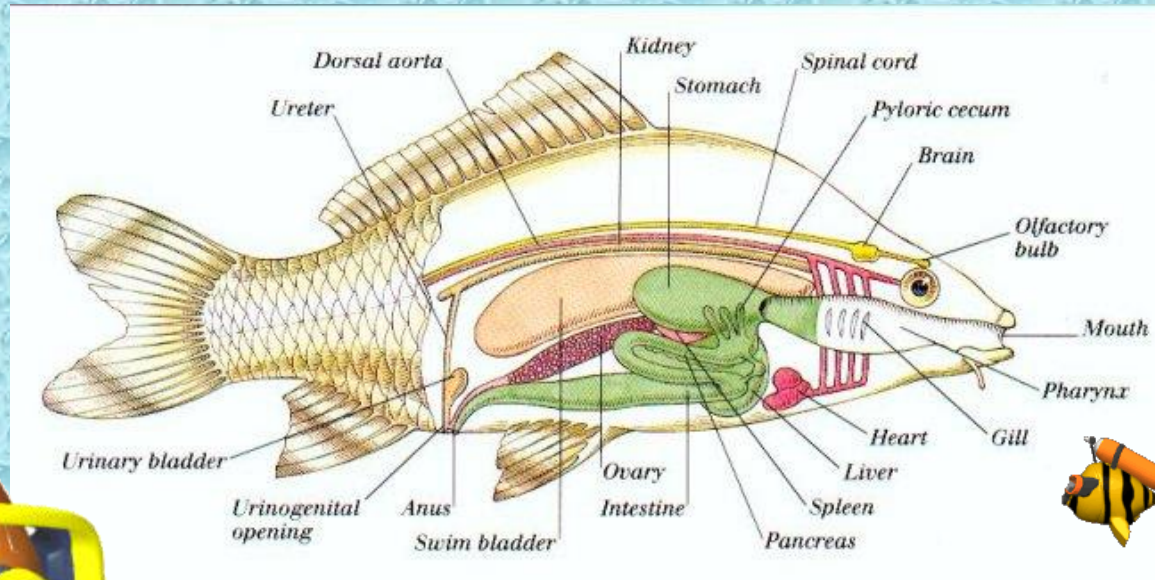
One acre of field for every 400 hens. Hens are free to roam during the daytime. Buildings used to house hens are typically well ventilated with an area of wood shavings and access to food and water.

Organic

From hens kept in a similar environment to free range but are fed on organic produce and roam on land classified as organic. They are not fed antibiotics to promote growth.

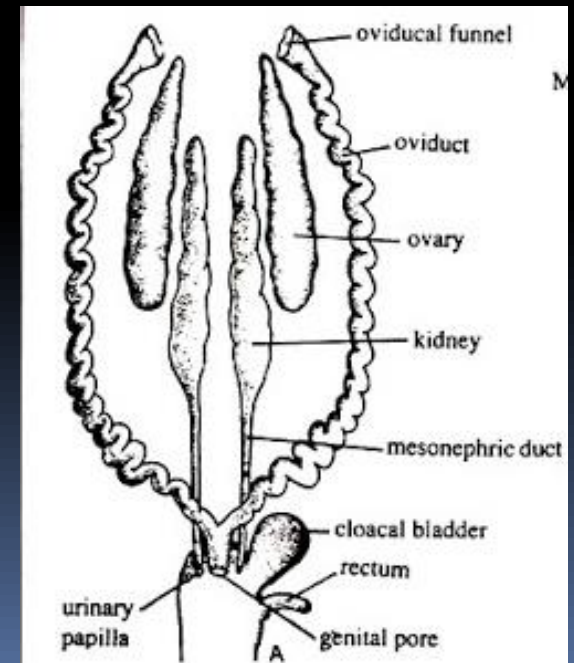
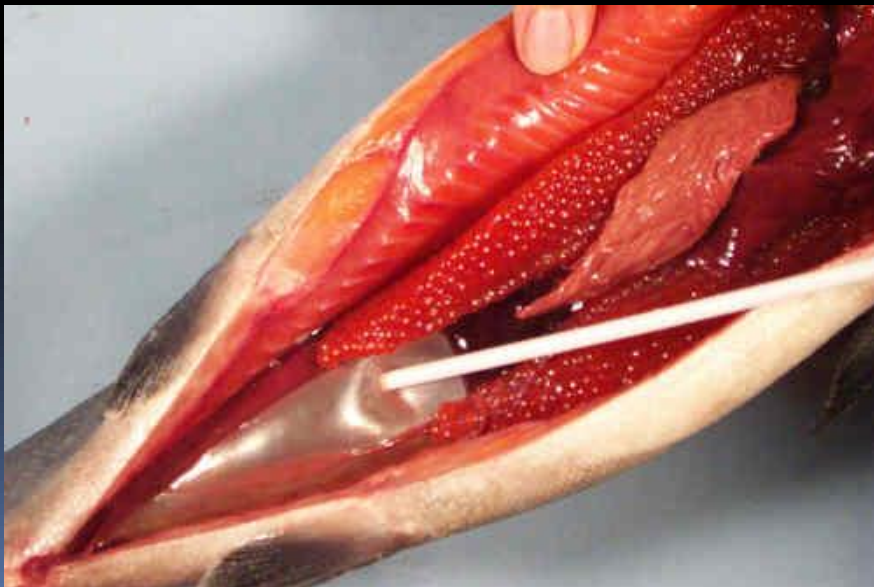


FEMALE REPRODUCTIVE SYSTEM of FISH



THE OVARY

- Generally The ovary of fish is:
 - A pair of sac-shaped organs covered with an ovarian wall
 - Consisting of an ovarian cavity (ovarian lumen) .
 - Numerous ovarian lamellae (ovigerous lamellae) where oogenesis takes place.
- The ovarian cavity connects with the oviduct, and the oviducts from each bilateral ovary join together to lead to the genital pore.

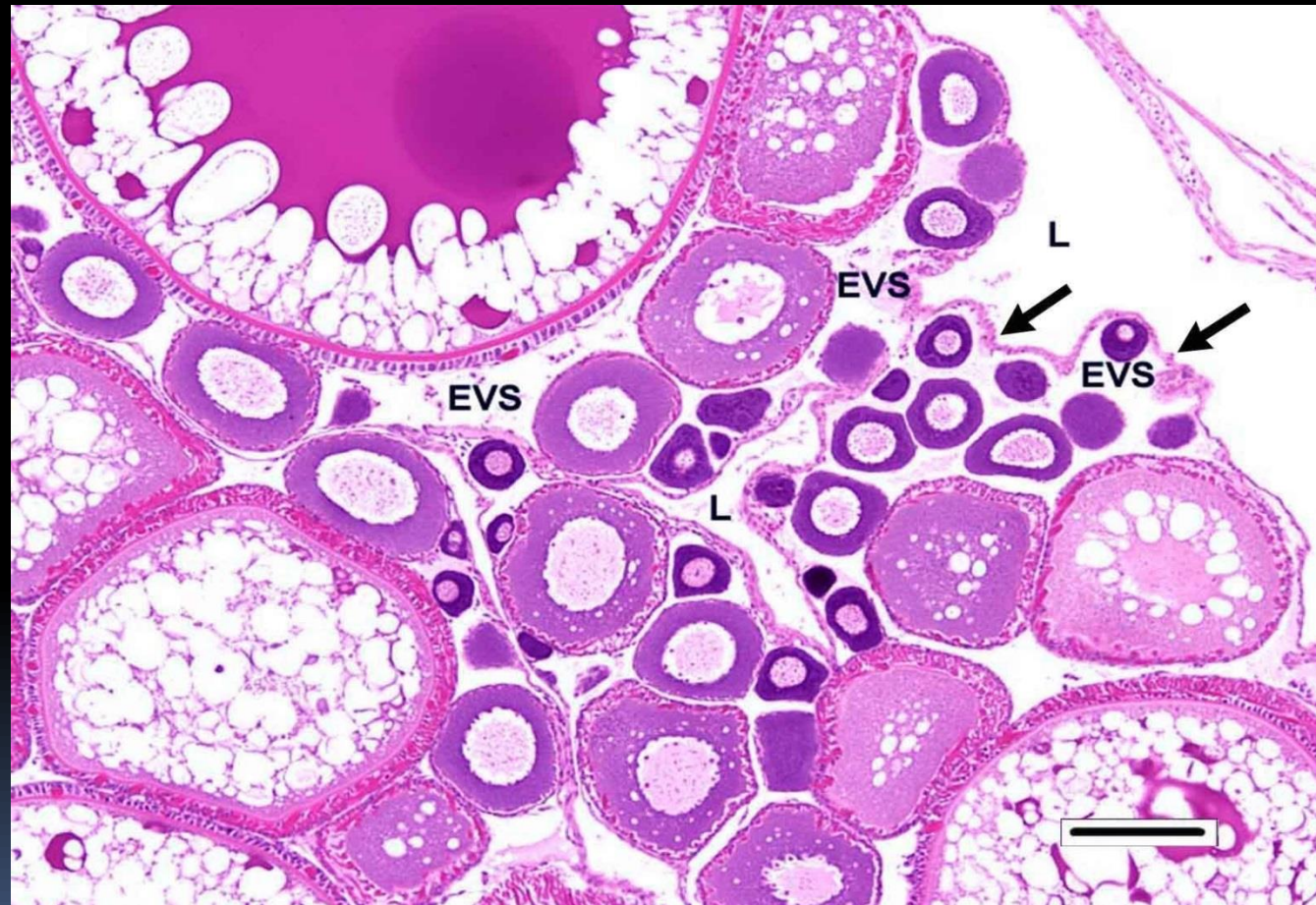


- The ovaries are enclosed in a fibrous connective tissue tunica albuginea which is attached with the mesovaria . The luminal surface of the tunica albuginea folds into ovigerous lamellae oriented perpendicular to the long axes of each ovarian lobe. Lamellar walls are composed of germinal and follicular epithelia supported by a connective tissue stroma.,

The germinal epithelium separates the ovarian lumen from the stroma, the latter of which often contains:

- **Perinucleolar**
- **Cortical alveolar**
- **Vitellogenic**

follicles within a variably-apparent extravascular space (**EVS**)



- ❖ Development of ova (oogenesis) from germinal cell to mature egg is divided into six stages defined according to morphological characteristics of :

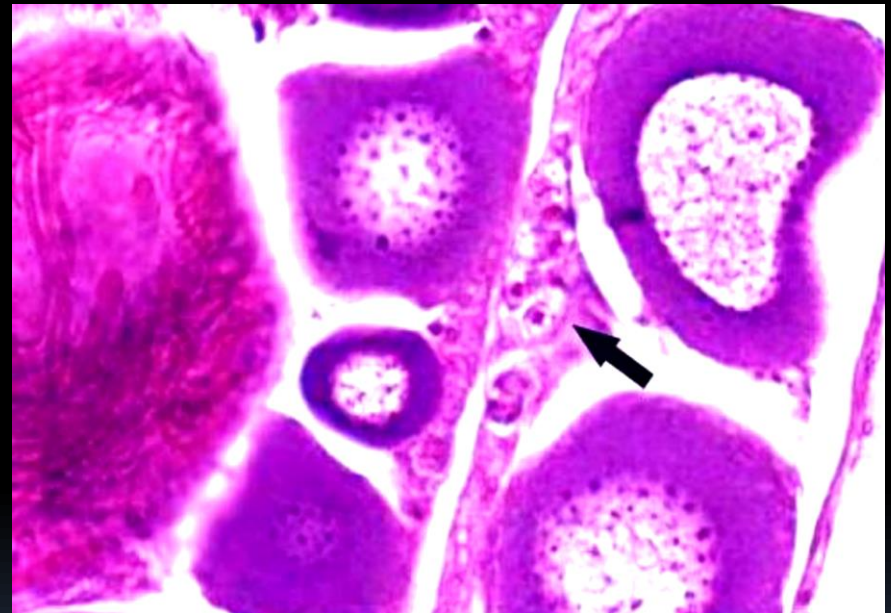
A-Nucleus

B- Oviplasm

C-Follicular wall

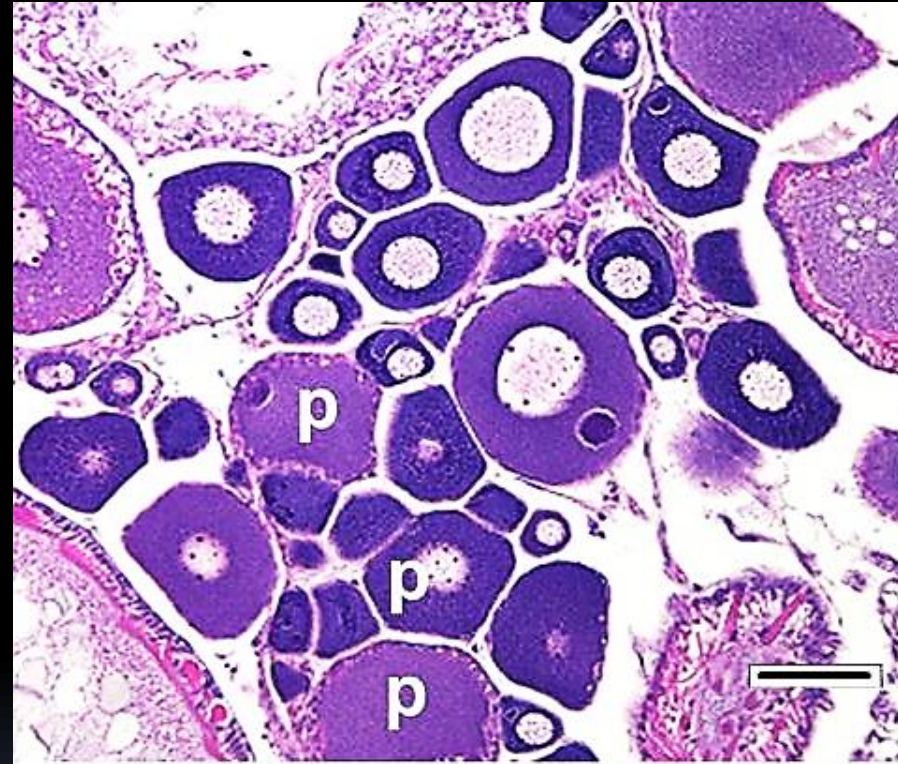
1. Oogonia

- The smallest of the oocytic cells, oogonia reside within the ovarian germinal epithelium
- Low numbers.
- Oogonia are characterized by a relatively large nucleus with small or inapparent nucleolus, and minimal amounts of cytoplasm.



2. Perinucleolar phase oocytes (p).

- Associated with growing of oocyte.
- Nucleus (germinal vesicle) increases in size and multiple nucleoli appear generally at the periphery of the nucleus.
- The cytoplasm stains uniformly dark, although late perinucleolar oocytes may have small clear or amphophilic vacuoles in the cytoplasm.
- These cells tend to be abundant in normal adult ovaries.



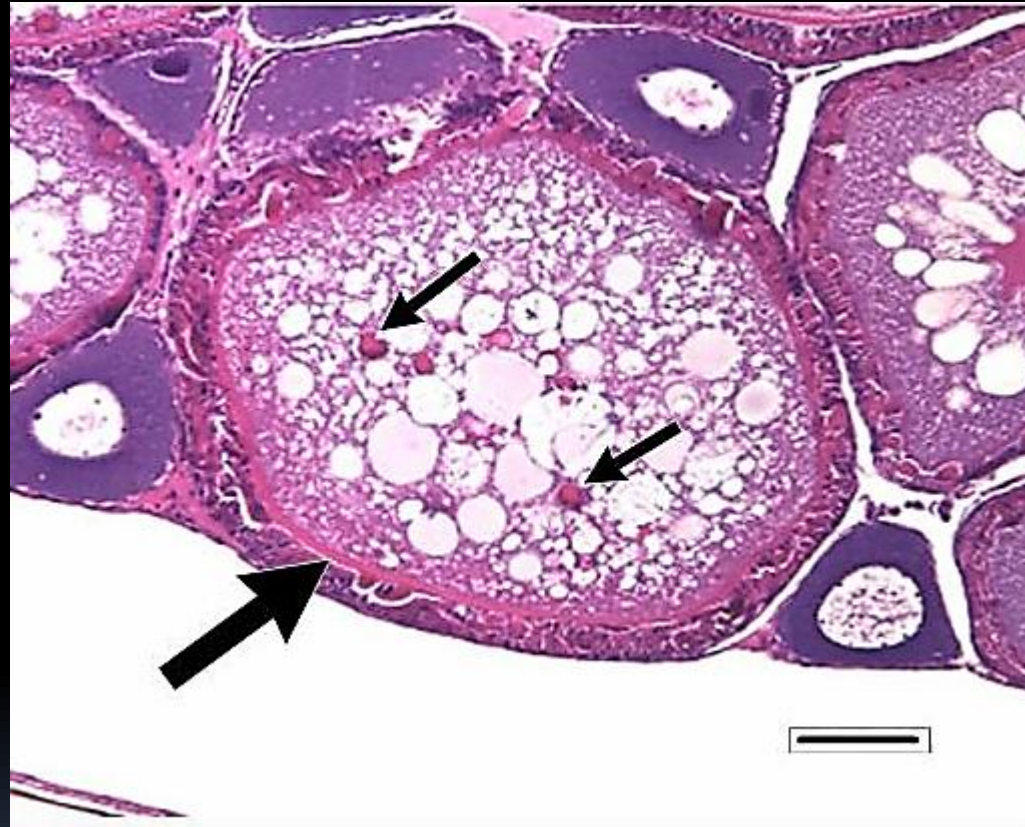
3. Cortical alveolar oocytes

- Generally larger than perinucleolar oocytes.
- characterized by the appearance of cortical alveoli (yolk vesicles) within the ooplasm.
- The chorion becomes distinctly evident in this phase.
- Nucleus becomes reduced.
- The perifollicular cells are more easily visualized.



4. Early vitellogenic oocytes

- Larger than cortical alveolar oocytes.
- Characterized by the centralized appearance of spherical, eosinophilic, vitellogenic yolk granules / globules.
- The nucleus has moved to the periphery of the cell and dissolved.

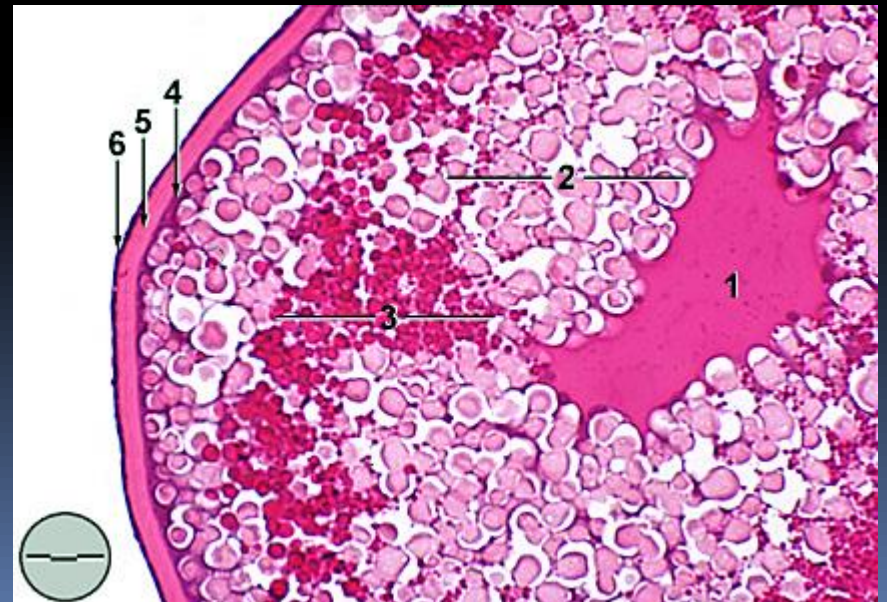


5. Late vitellogenic oocytes.

- These cells are characterized by an increased accumulation of yolk material that fuses into a central liquid mass which displaces the cortical alveolar material to the periphery of the cytoplasm.

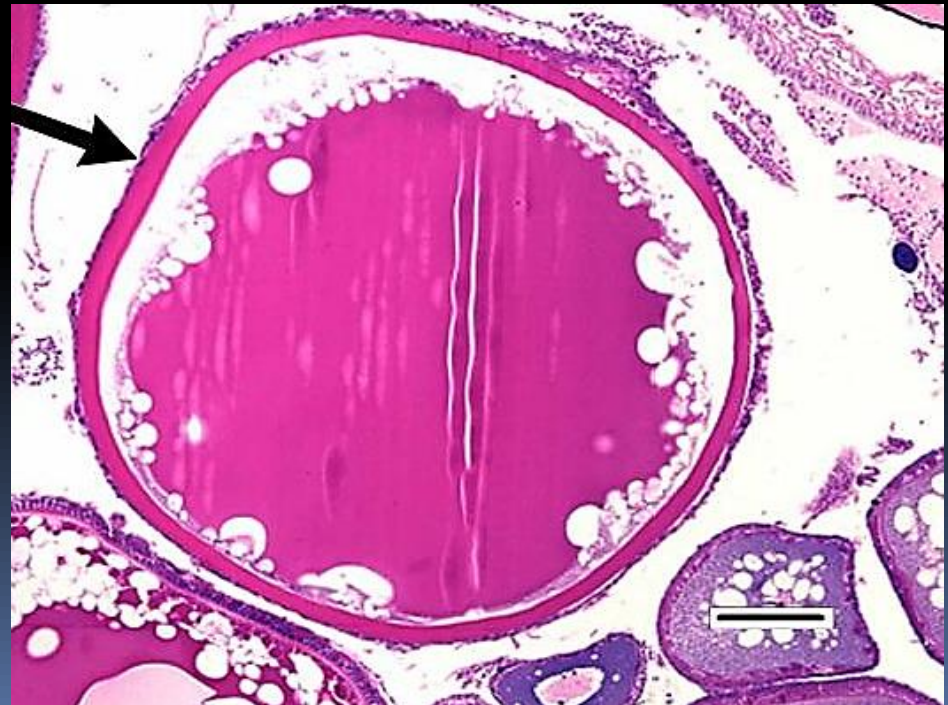


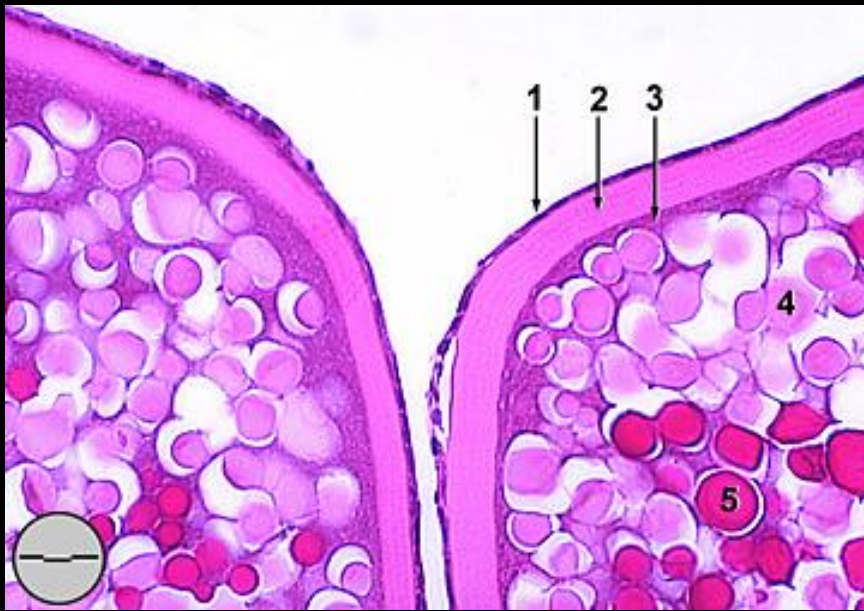
1. germinal vesicle;
2. yolk vacuoles;
3. yolk granules;
4. ooplasm;
5. vitelline envelope (chorion);
6. follicular cell layer.



6. Mature spawning follicle.

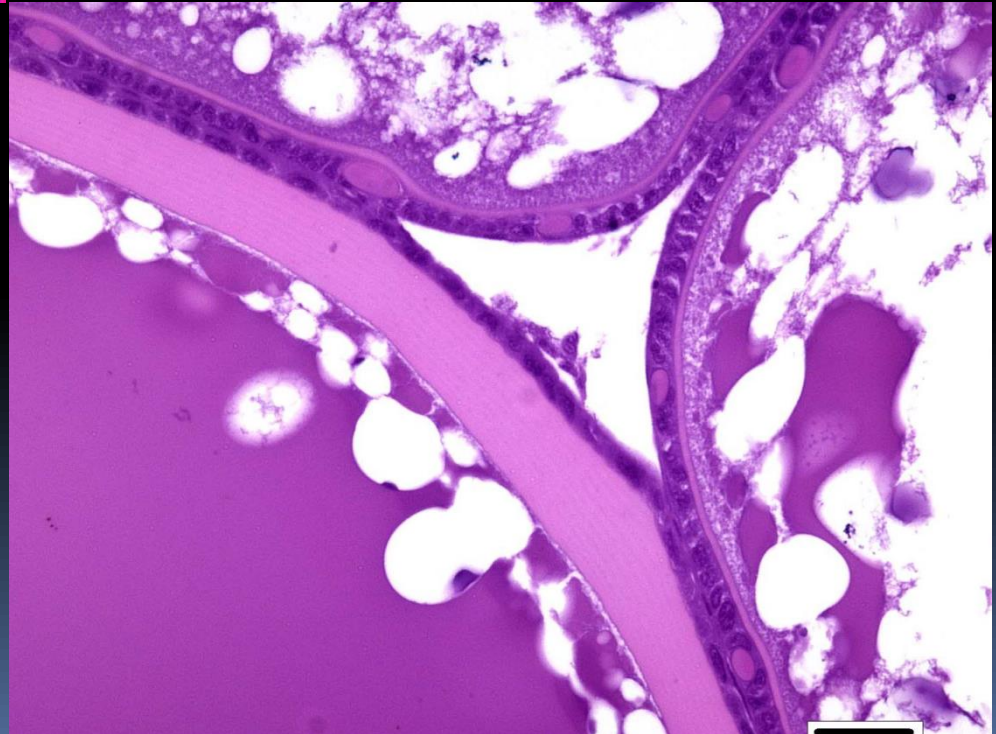
In this phase of development, vitellogenesis has reached its peak, the cell has become larger and more hydrated, and ooplasm consists almost entirely of yolk.





- **Detail of the follicular wall**

1. follicular cell layer;
2. vitelline envelope (chorion);
3. oviplasm;
4. yolk vacuoles;
5. yolk granules.

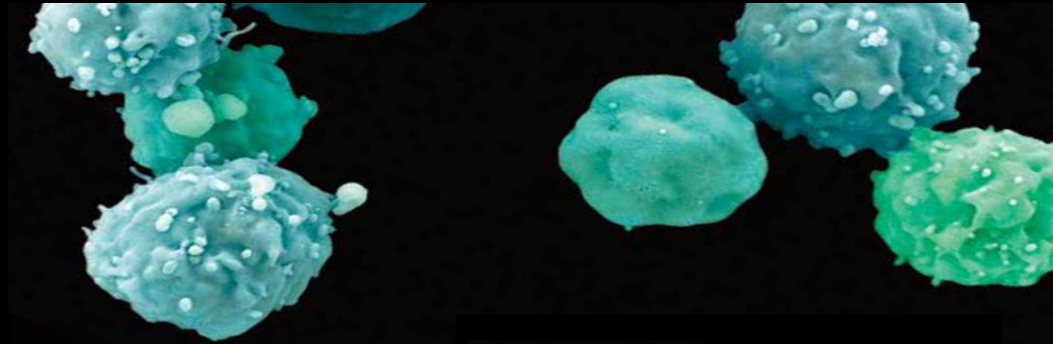


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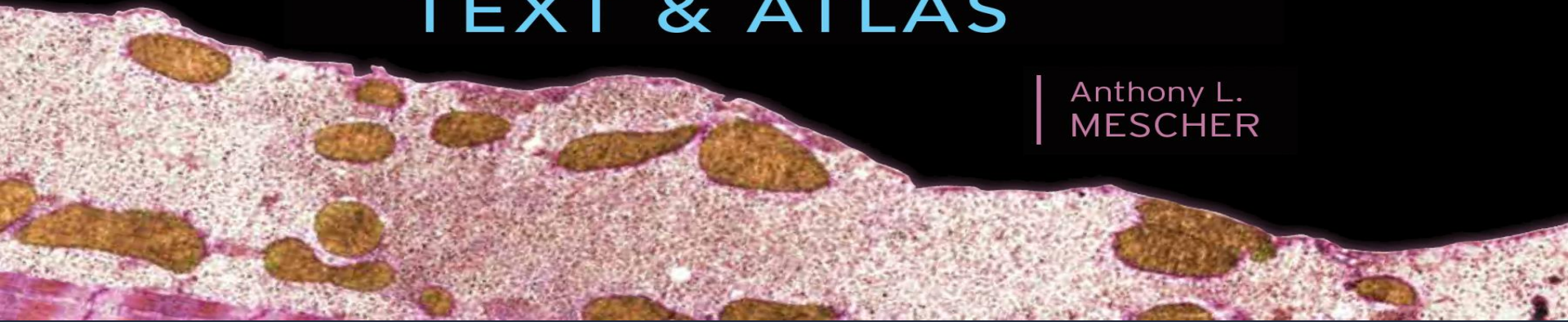
REFERENCE

13TH
EDITION



Junqueira's Basic Histology TEXT & ATLAS

Anthony L.
MESCHER



Junqueira's Basic Histology Text and Atlas, Anthony L. Mescher

The 13th edition of this landmark text contains 600 state-of-the-art photomicrographs and other illustrations which have also been compiled on CD-ROM using presentation software that allows creation of personalized notes and other customizable study aids.

1. <https://presentationtube.com/watch/?v=o60FcvoPp15>
2. <https://presentationtube.com/watch/?v=3m4zX5VwnkKht>
3. <https://presentationtube.com/watch/?v=peQxVEHl5xu>



QUESTION

