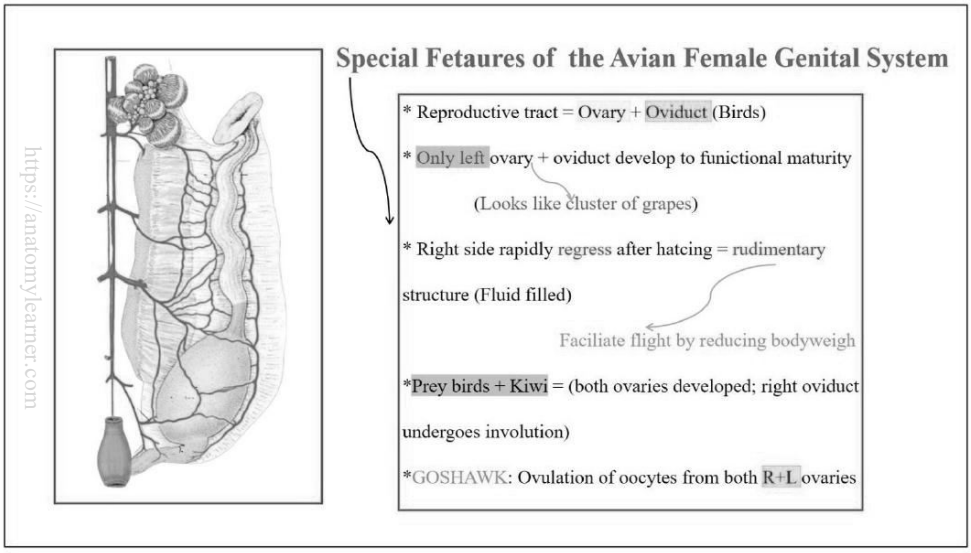
Female genital system (Avian)

The female reproductive tract are comprised of the

- ✓ Ovary and
- ✓ Oviduct

Special features of the avian female genital system:

- ❖ Although paired symmetrically positioned ovaries and oviducts are present during embryonic development, only the left ovary and oviduct develop to functional maturity in most avian species.
- ❖ Those on the right side of the body rapidly regress after hatching, remaining throughout life as rudimentary structures that may be filled with fluid.
- ❖ This one-sided development presumably represents an adaptation that serves to facilitate flight by reducing body-weight.
- ❖ In several birds of prey and in the kiwi, only the right oviduct undergoes involution, while both ovaries develop fully.
- ❖ Complete development of both ovaries and oviducts has also been reported in some species.
- ❖ To date, however, definitive evidence for ovulation of oocytes from both the left and right ovaries has only been obtained in the female goshawk.



Ovary:

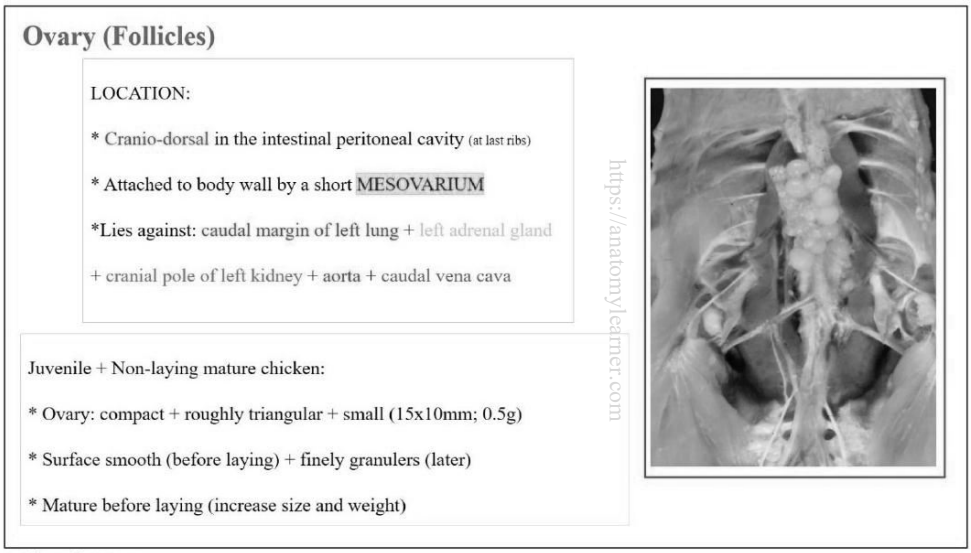
Location

The ovary is located craniodorsally in the intestinal peritoneal cavity. It is attached to the body wall by a short mesovarium and lies against the caudal margin of the left lung, the left adrenal gland, the cranial pole of the left kidney, the aorta and the caudal vena cava.

Size

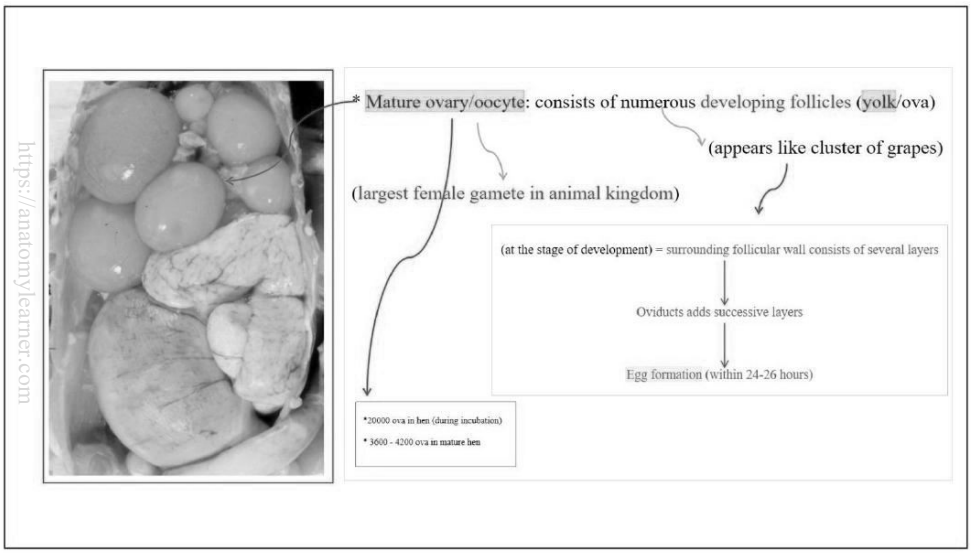
In the juvenile and non-laying mature female chicken, the ovary is a compact, roughly triangular structure, measuring approximately 15–20mm by 10mm and weighing around 0.5g. Its surface has a finely granular appearance.

As the ovarian follicles mature prior to laying, the ovary increases in just a few days to a size of 110mm by 70mm, reaching a weight of more than 60g.



Other features

The mature oocyte of birds is the largest female gamete in the animal kingdom. At this stage of development, the surrounding follicular wall consists of several layers.



Oviduct (oviductus):

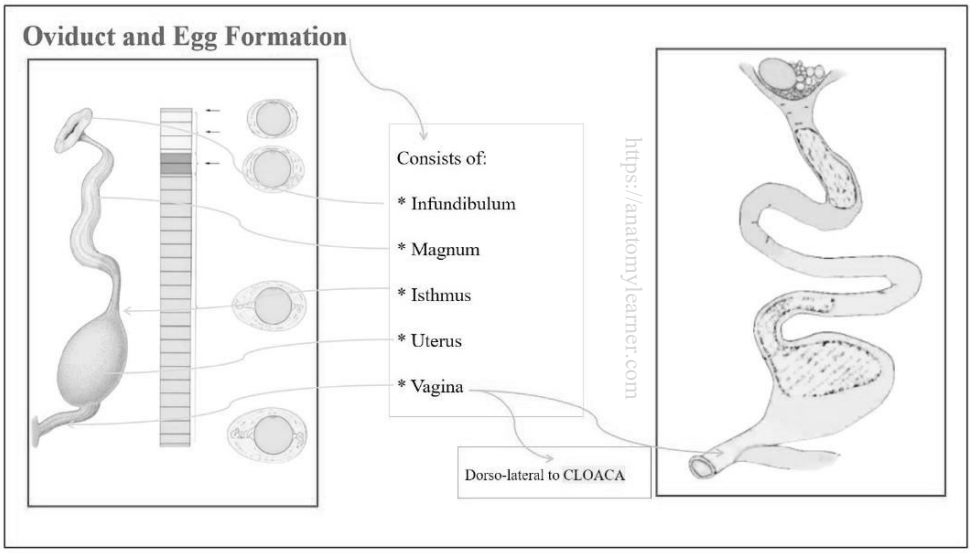
The oviduct of birds consists of the:

- ✓ infundibulum,
- ✓ magnum,
- ✓ isthmus,
- ✓ uterus and
- ✓ vagina.

Infundibulum

The infundibulum of the oviduct extends to the caudal end of the ovary. It consists of a funnel-shaped proximal section and a tubular distal portion. Its opening is approximately 80mm wide in the chicken. In contrast to mammals, the infundibular opening is surrounded by relatively few fimbriae.

The thin wall of the funnel is thrown into shallow primary and secondary folds, the latter being particularly pronounced in chickens. Fertilization of the oocyte by the spermatozoa occurs in this segment.



Magnum

In all bird species, the magnum is the longest and broadest segment of the female genital tract. In the chicken it reaches a length of 34cm. The mucosa is arranged in substantial folds that are richly endowed with coiled branched tubular glands.

The glands produce ovalbumin, ovotransferrin and ovomucoid. These hygroscopic proteins form the main component of the albumen, to which water is added in the uterus. The time spent by the oocyte (or zygote) in the magnum is approximately three hours.

Isthmus

The isthmus is clearly distinguishable macroscopically from the surrounding segments of the oviduct. It is approximately 10cm long in the chicken.

The mucosal folds are shallower than in the magnum and are associated with secondary folds of varying depth. The oocyte (or zygote) passes through the isthmus in around 1.5 hours.

The glands of the isthmus are similar to those of the magnum. Their secretory product (stable sulphur-containing keratin-type proteins), is unique to this segment of the oviduct and forms the inner and outer shell membranes. The air cell later forms in the space between these membranes, at the blunt end of the egg. More albumen is also added in the isthmus.

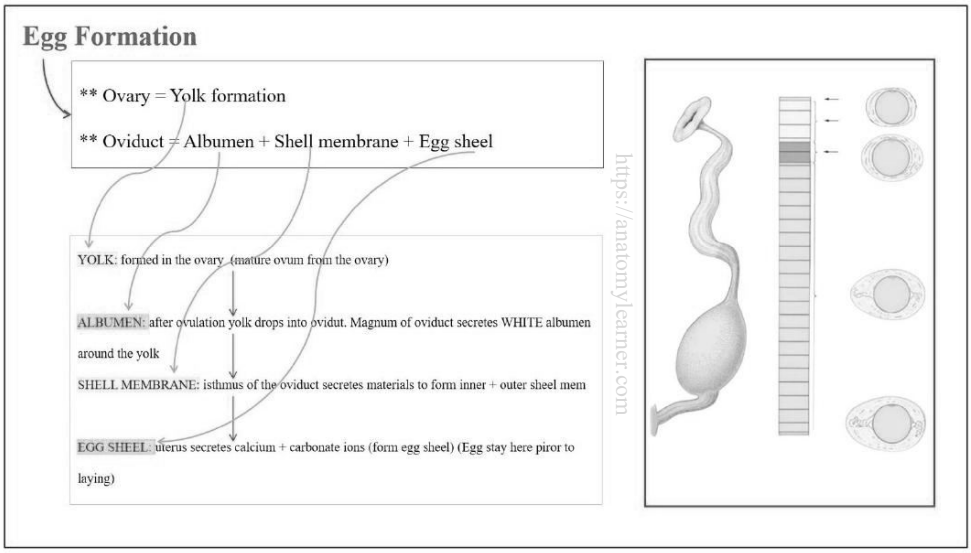
Uterus

The uterus is sometimes also referred to as the ‘shell gland’. It continues from the isthmus without any obvious macroscopic demarcation and is about 8cm long in the chicken.

Initially tubular, the uterus expands into a pouch-like segment. The muscular tunic is well-developed.

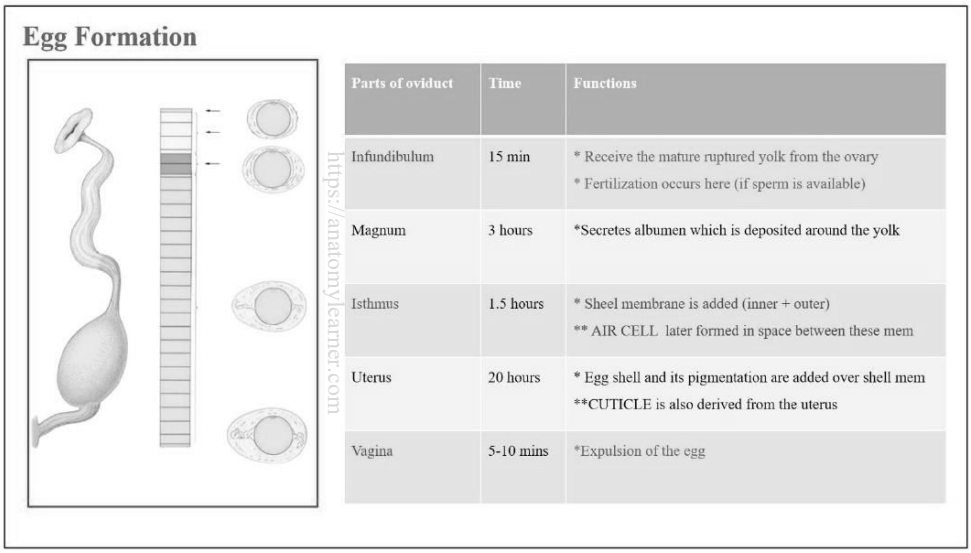
The egg spends around 20 hours in the uterus, considerably longer than in any other segment of the oviduct. Most of this time is occupied by the formation of the calcareous shell from calcium carbonate and other calcium salts.

The thin, organic outermost layer of the egg, known as the cuticle (cuticula), is also derived from the uterus.



Vagina

The vagina is approximately 8cm long and folded upon itself into a sigmoid shape. Its muscular wall is well-developed throughout its length. The time taken for the egg to pass through the vagina is highly variable with an average range of 5–10 minutes.



Parts of oviduct	Time	Functions
Infundibulum	15 min	* Receive the mature ruptured yolk from the ovary * Fertilization occurs here (if sperm is available)
Magnum	3 hours	*Secretes albumen which is deposited around the yolk
Isthmus	1.5 hours	* Sheel membrane is added (inner + outer) ** AIR CELL later formed in space between these mem
Uterus	20 hours	* Egg shell and its pigmentation are added over shell mem **CUTICLE is also derived from the uterus
Vagina	5-10 mins	*Expulsion of the egg