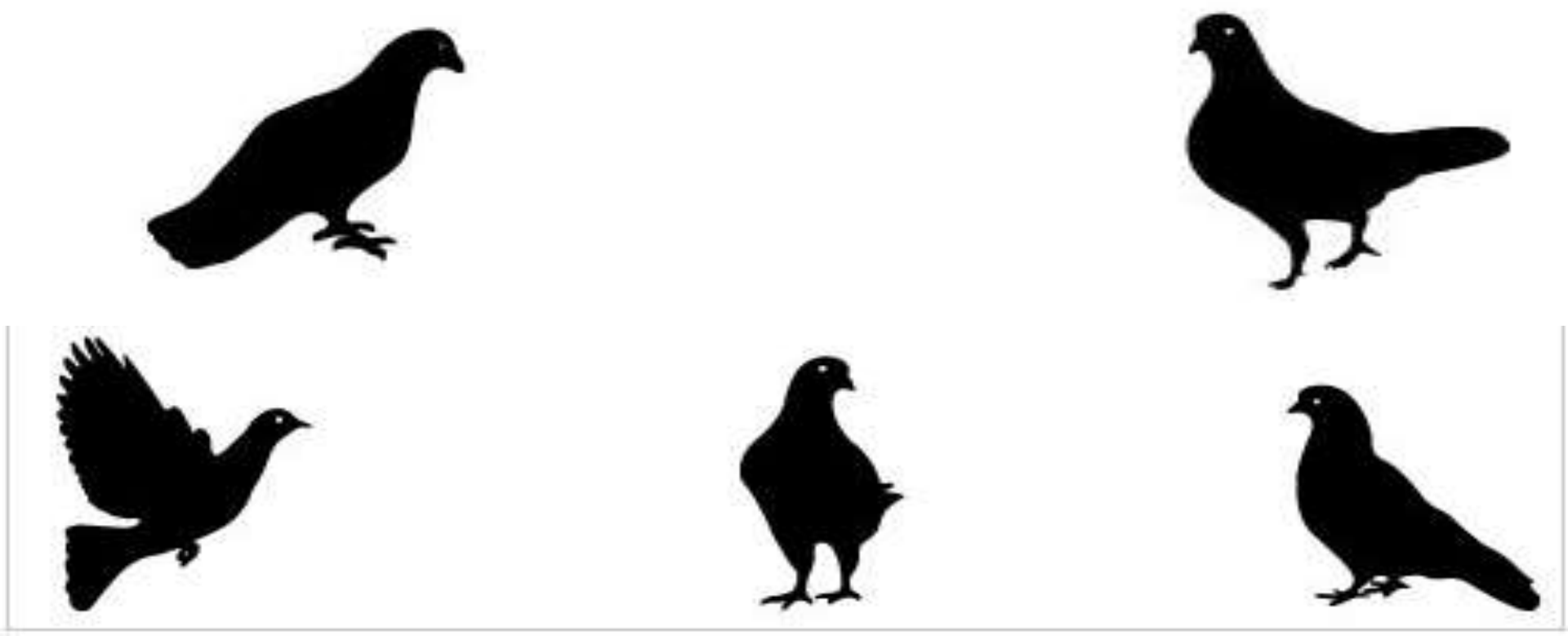




Bird Reproductive System



Outline:

- Bird Life Cycles
- Sexual maturation
- Male reproductive system
- Secondary sex characteristics
- Spermatogenesis
- Regulation of Hormone Levels
- Female Reproductive System
- Courtship
- Fertilization
- Egg Development
- Egg structure
- Parental Care
- environment & bird
- References

Bird Life Cycles

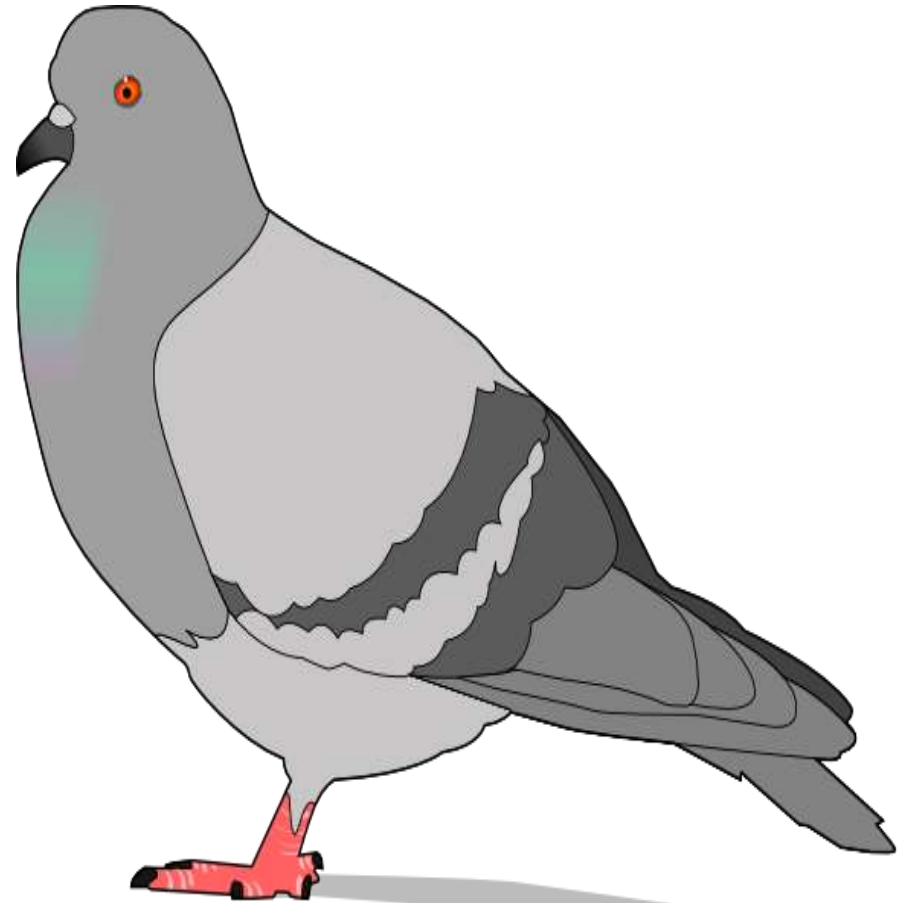
- Bird eggs have a hard shell.
- When the bird grows enough, it breaks out of the egg, this process is called hatching.
- The bird is called a chick.
- The chick quickly grows into an adult.
- The adult female can then lay eggs to continue the life cycle.



The Domestic Pigeon

Sexual maturation

Sexual maturity occurs between 4 and 6 months in male and in 7 months in female.

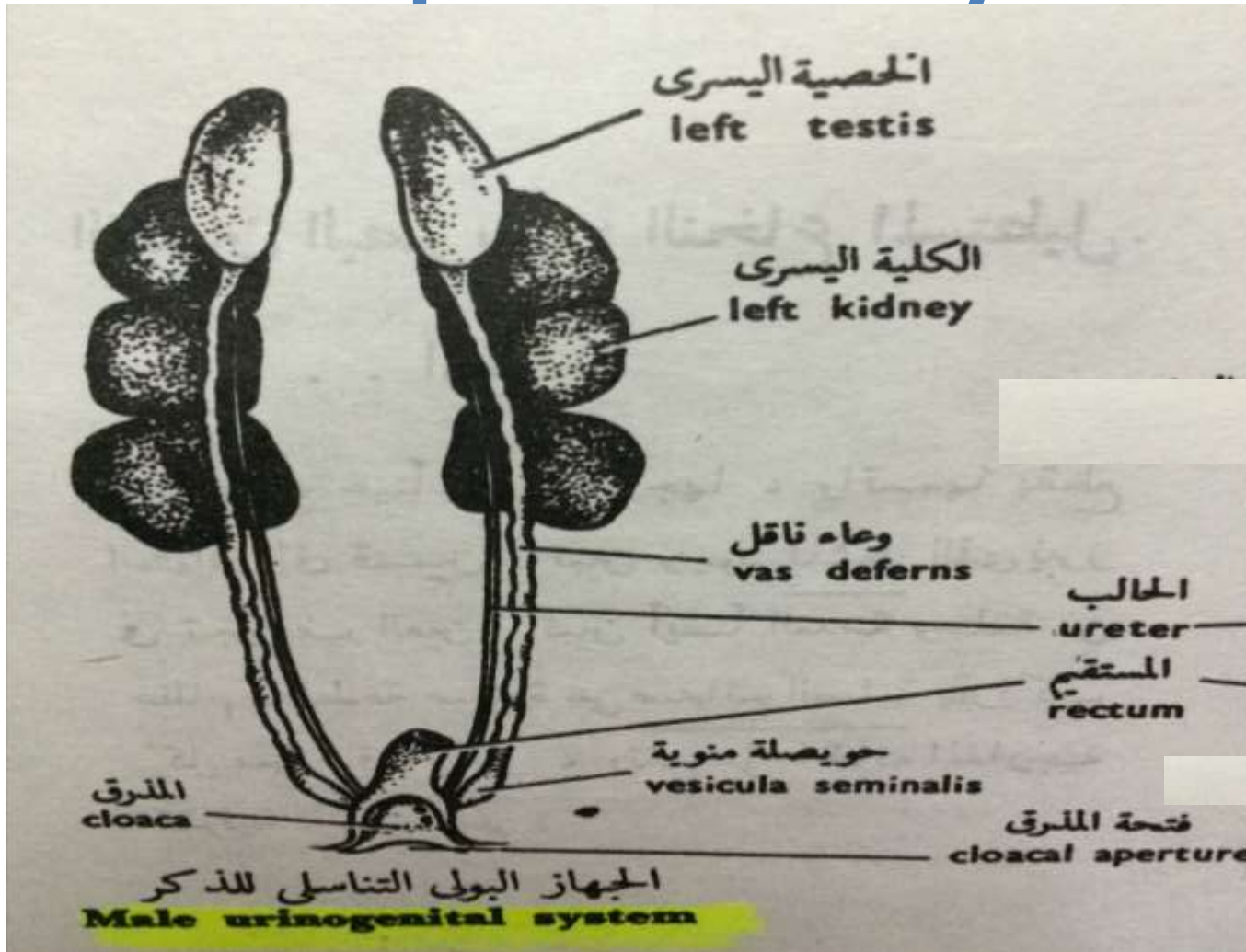


Male reproductive system

The male reproductive system consists of:

- 1) Primary sex organs of a male are the paired testes.
- 2) Secondary sex organs of a male are vas deferentia, vesicle seminal and cloaca.

Male reproductive system



Source :Practical Animal Biology

Testes

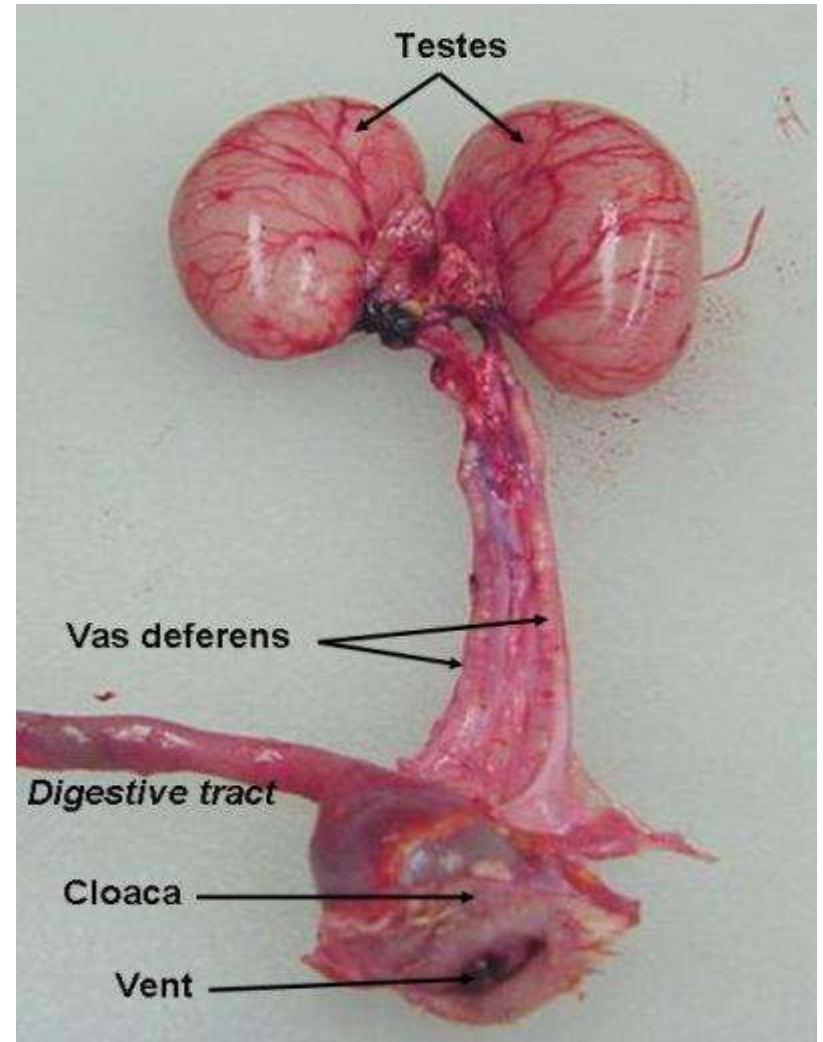
- The Pigeon testes are located within the body - unlike mammalian testes which are located outside the body.
- the testes bean-shaped testes, above the kidneys.
- In seasonal breeders, the testes enlarge during the breeding season and often change color - from yellow to white in most birds.

Testes

Function of testes:

The testes have two functions

- 1) Produce sperm
- 2) Produce the male hormone, (testosterone).



Secondary sex organs

- After Sperm produced by the testes they enter a vas deferens
- The vas deferens passes to the cloaca where it has a common opening with the ureter.
- The terminal vas deferens is swollen as a storage organ: the vesicle seminal.
- Semen transport into cloacal which function as stored of Newly generated sperm.
- There are no copulatory organs in the pigeon, copulation being effected by contact of the cloaca of male with that of female.

male pigeon (left side view)

large intestine

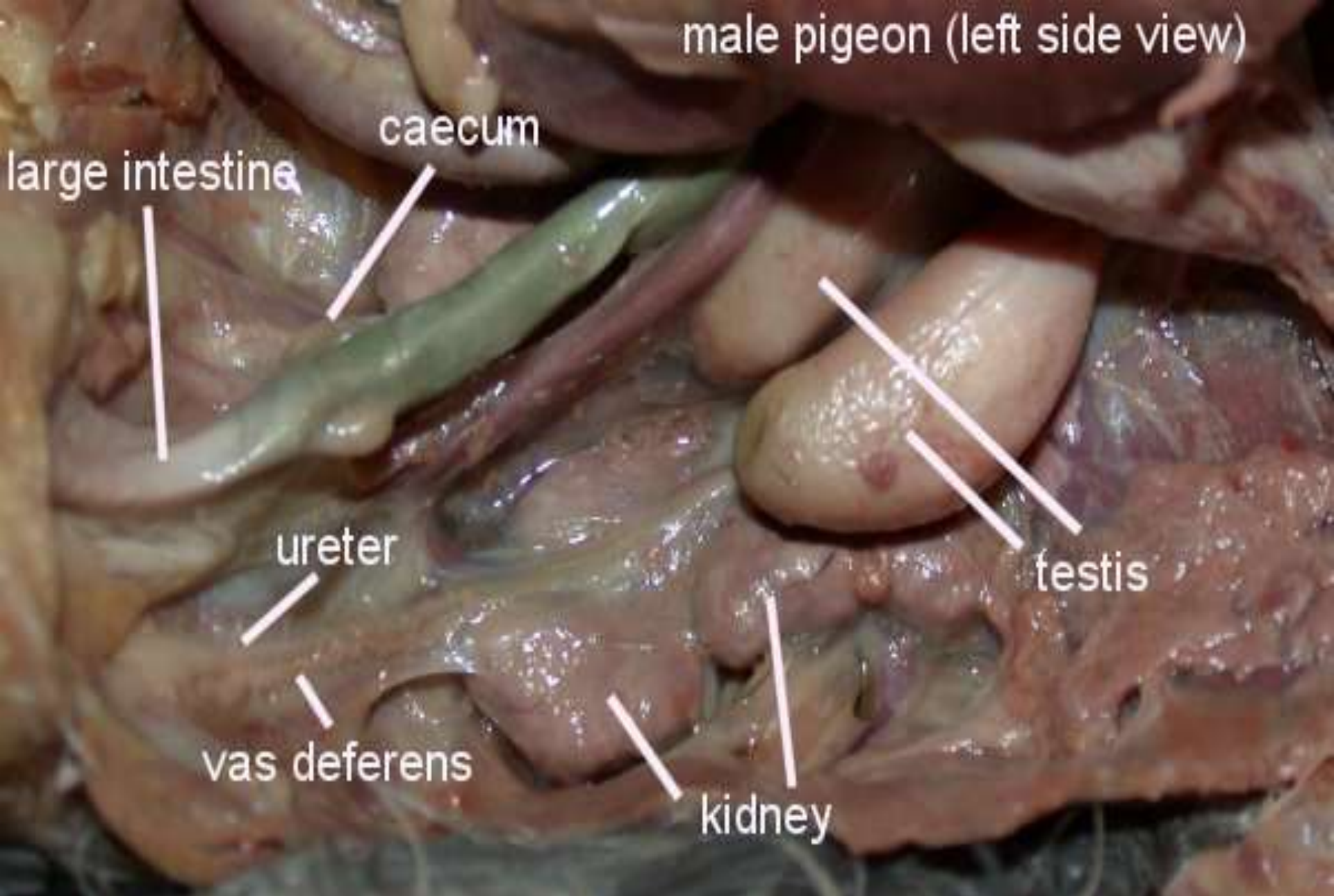
caecum

ureter

vas deferens

kidney

testis



Secondary sex characteristics



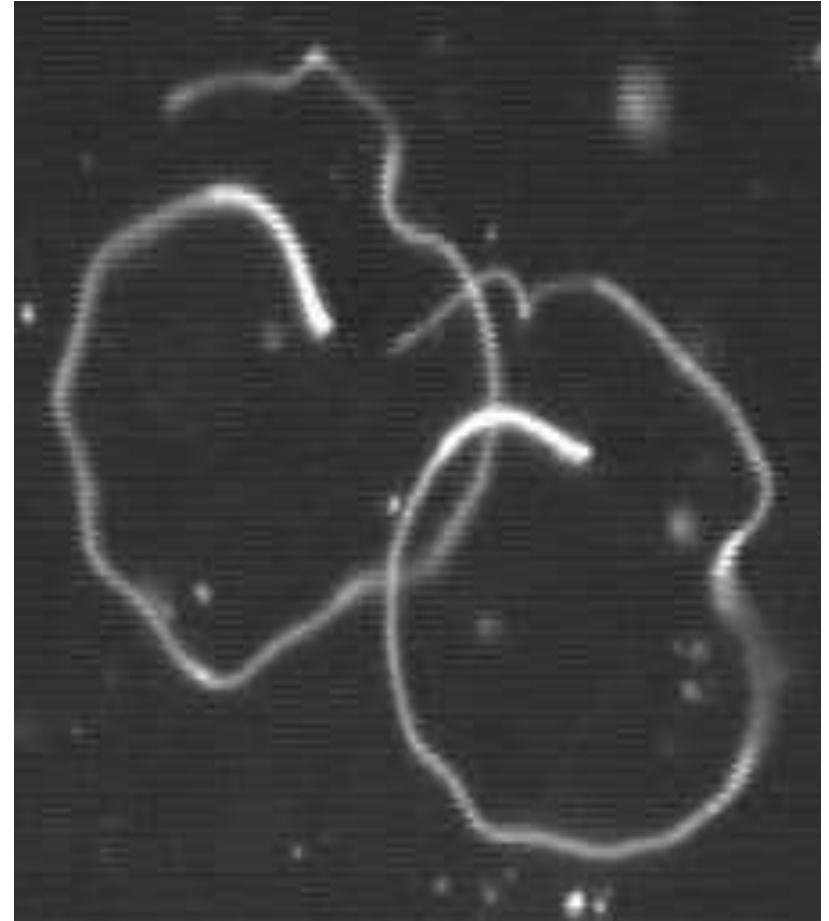
- Cloacal protuberance of a male.
- The cloacal protuberance is analogous to the mammalian scrotum.

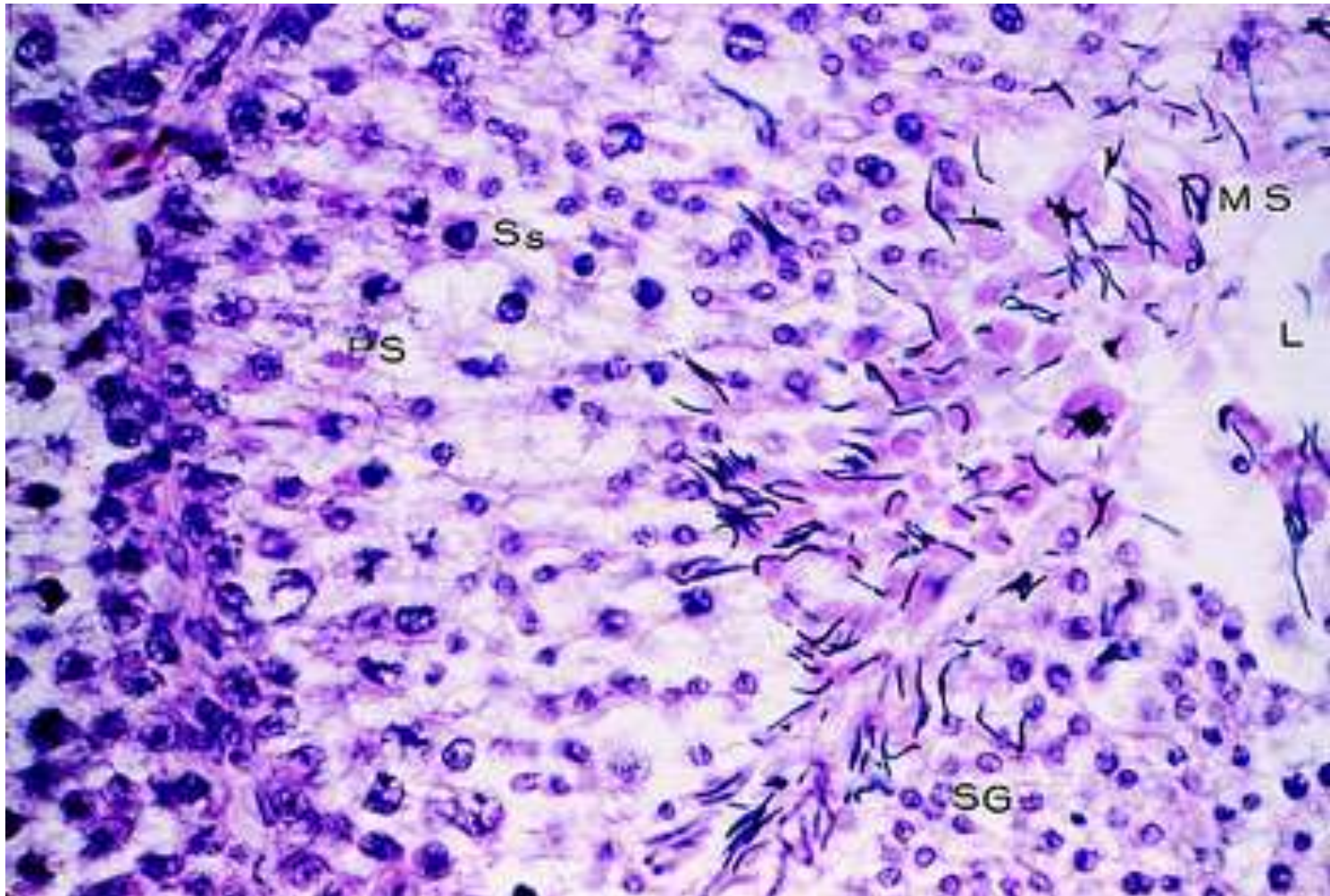
Spermatogenesis

Spermatogenesis is process of meiosis as the sperm form

- The bulk of the testis is composed of numerous convoluted seminiferous tubules.
- Sperm production occurs in seminiferous tubules of the testes.
- Because avian testes are located within the body cavity spermatogenesis occurs at night when temperature is cooler.
- Sperm formation occurs more rapidly in birds as compared to mammals.

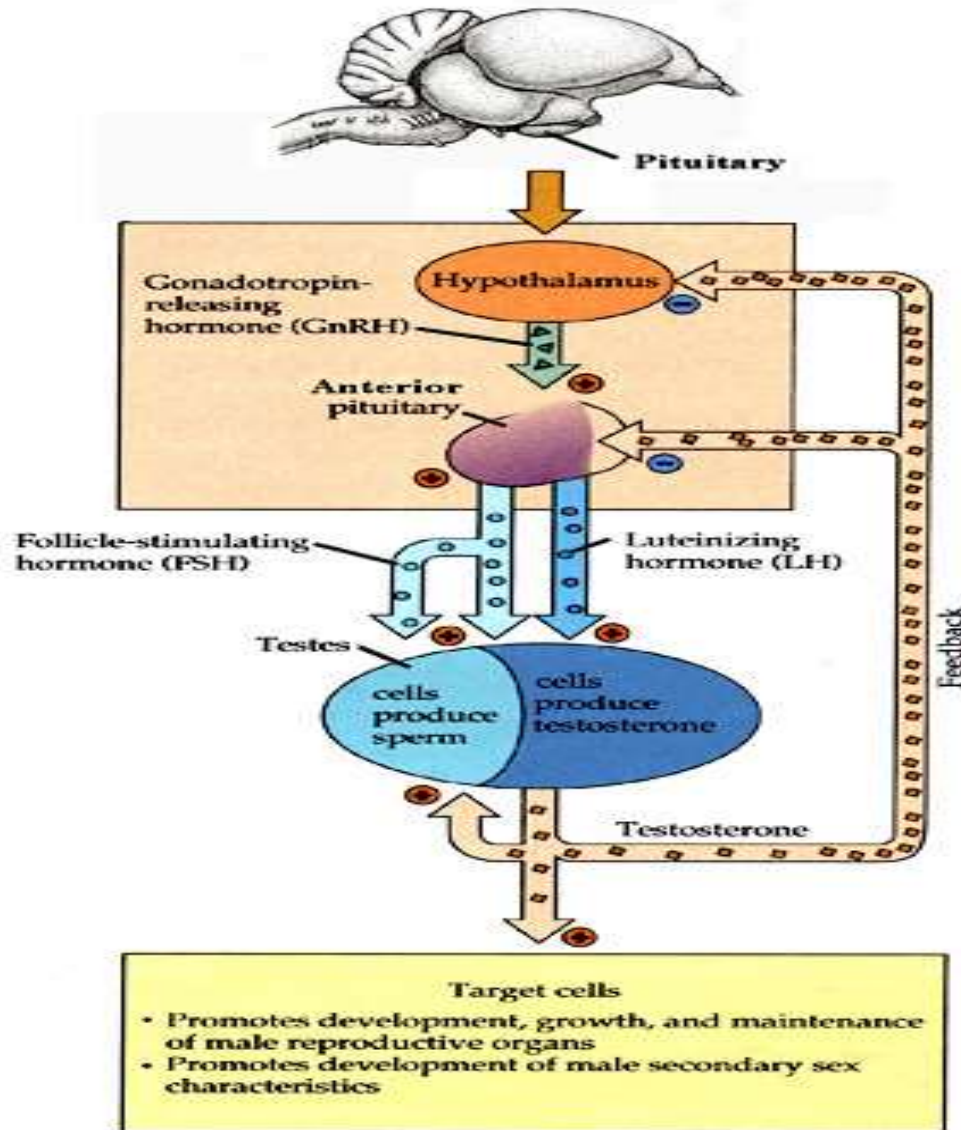
Spermatogenesis





Light photomicrograph of a section of a testis showing a seminiferous tubule during full semen production. SG indicates spermatogonia; PS, primary spermatocyte; Ss, secondary spermatocyte (Samour 2002).

Regulation of Hormone Levels



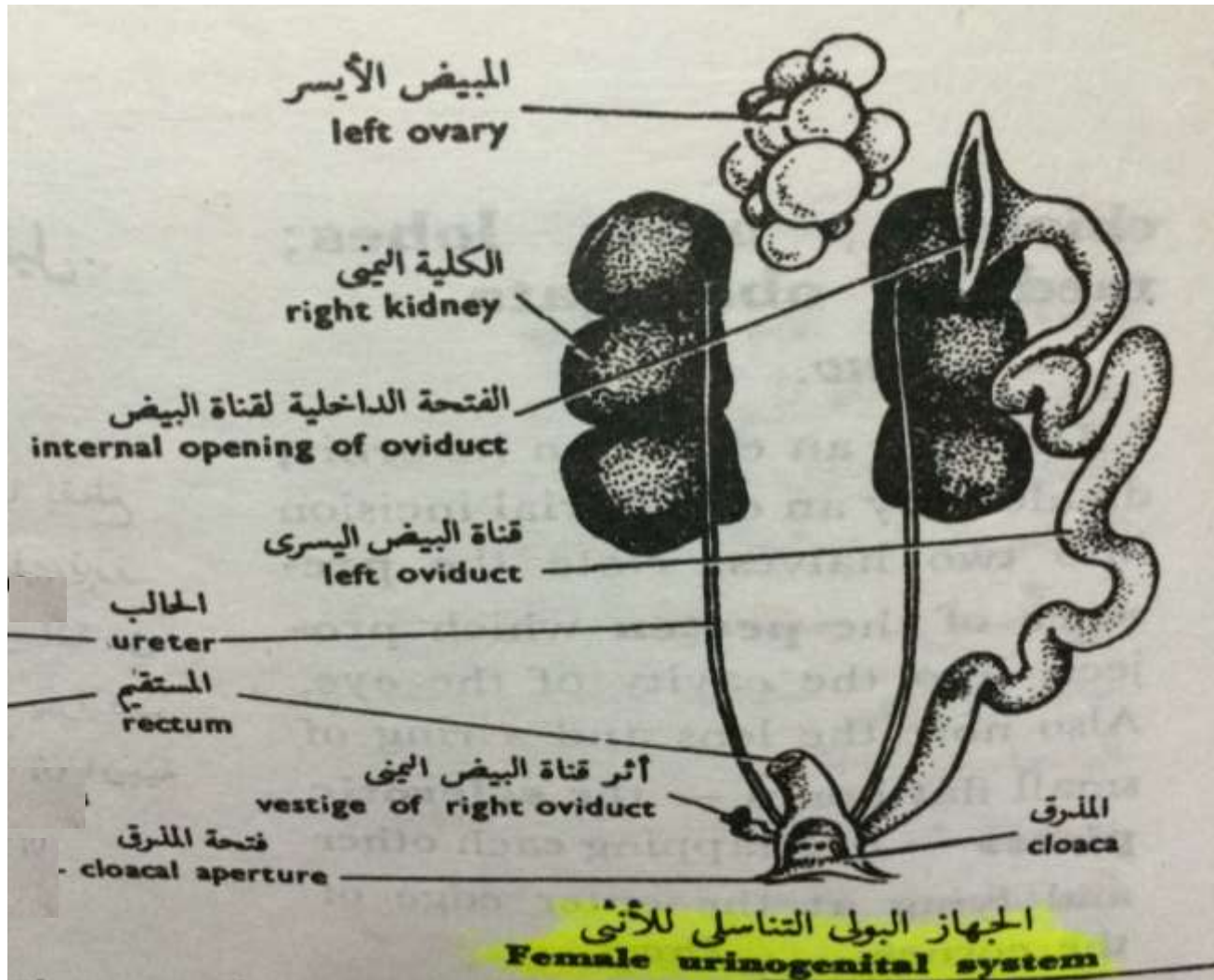
Adapted From Rosenzweig, Leimas, & Breedlove (1996)

Female Reproductive System

The female reproductive system consists of:

- 1) Primary sex organs: single Ovary.
- 2) Secondary sex organs single oviduct, those of the left side and cloaca.

Female Reproductive System



Source : Practical Animal Biology

Female Reproductive System

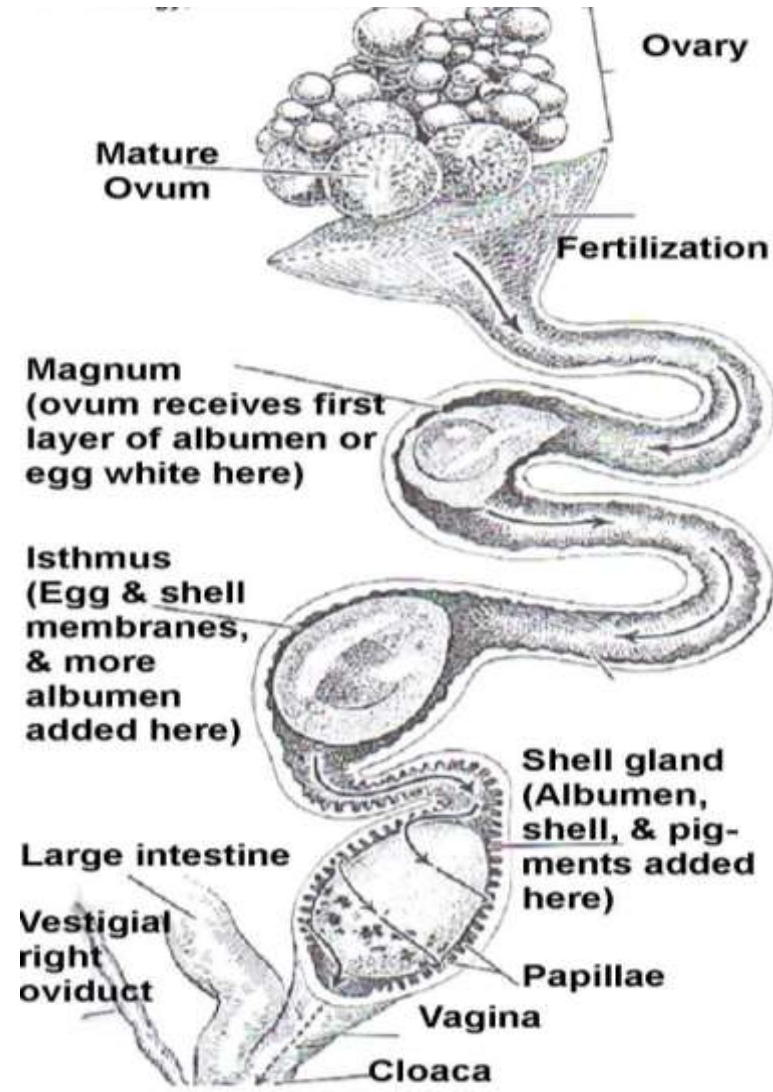
- In early stages of embryonic development, each female bird has two ovaries; only the left one develops into a functional organ.
- The ovary is larger and contains numerous ova of various size.
- The ovary become enlarged during the breeding season.

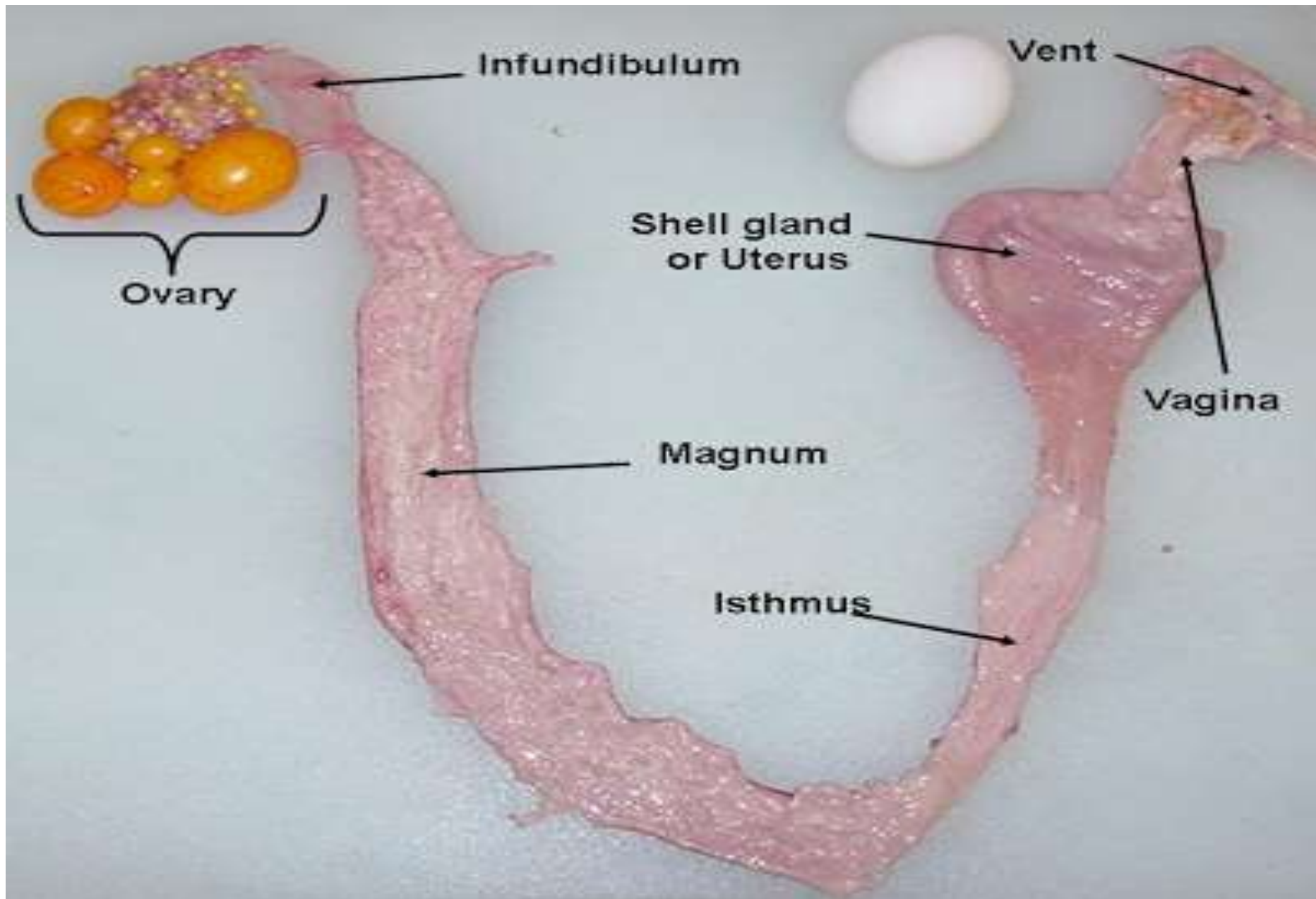
- A mature ovary looks like a bunch of grapes with each grape forming the yolk of an individual egg, and may contain up to 4,000 small ova which can develop into mature ova.
- The yolk = ovum is surrounded by a layer of supporting cells called follicle
- The ovum is a single cell enlarged for food storage



Female Reproductive System

- **The Oviduct**
- Infundibulum (funnel-shaped structure to catch the egg.)
- Magnum (produces the of the egg white)
- Isthmus (produce the soft shell membranes)
- Uterus or Shell Gland (manufactures the calcareous shell in which the egg is laid)
- Vagina (a muscular tube through which the egg is expelled to the outside)





Female Reproductive System

Courtship

- Pigeons mate throughout their life but the peak times are usually in spring and summer.
- For most birds, copulation involves:
The male **puffs up** the feathers on the neck, **song** and a '**cloacal kiss**', with the male on the female's back & twisting his tail under the female's.

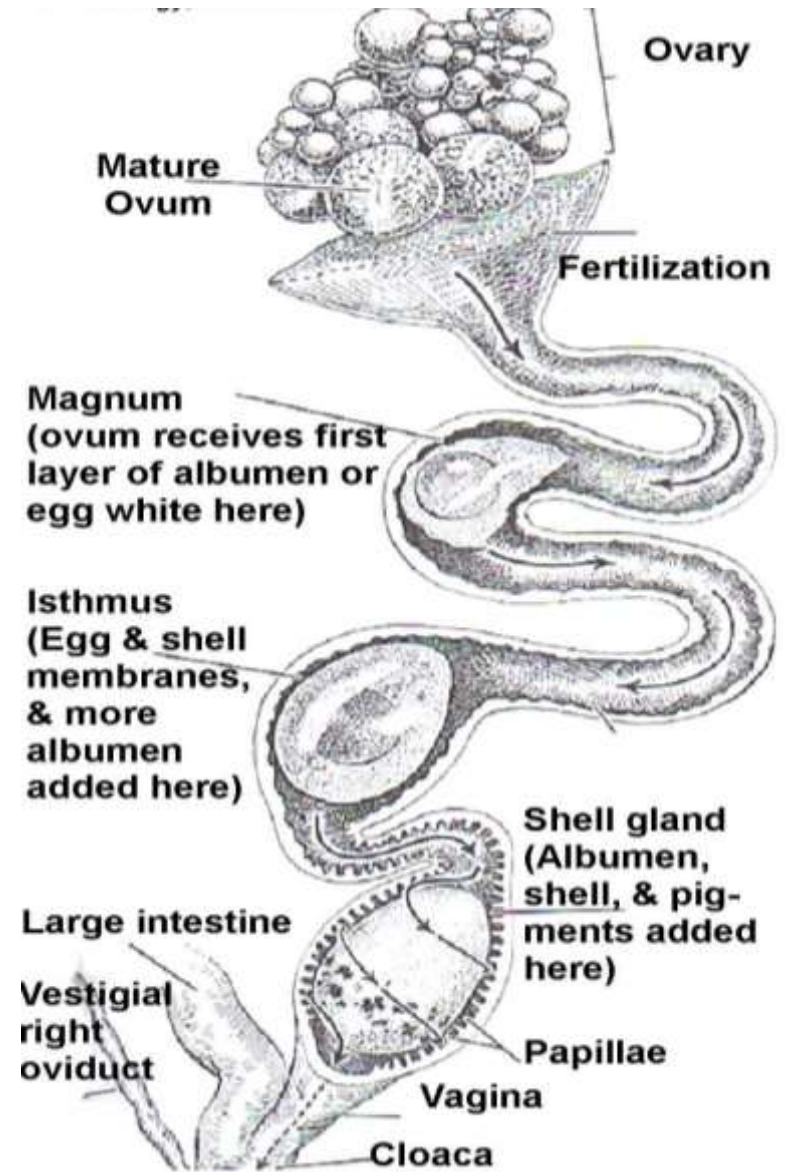


Fertilization

- In the female, sperm is stored in a vaginal pouch where they later swim up the oviduct and fertilize eggs.
- On average, the time between copulation and fertilization is about 72 hours.
- Eight to 12 days after mating, the females lay 1 to 3 (usually 2) white eggs which hatch after 18 days.
- Both male and female incubate the eggs, which hatch after 18 days.
- Unlike most birds, both sexes of pigeons produce "crop milk" to feed to their young, secreted by the lining of a bird's crop.
- The young are independent at four to five weeks of age.

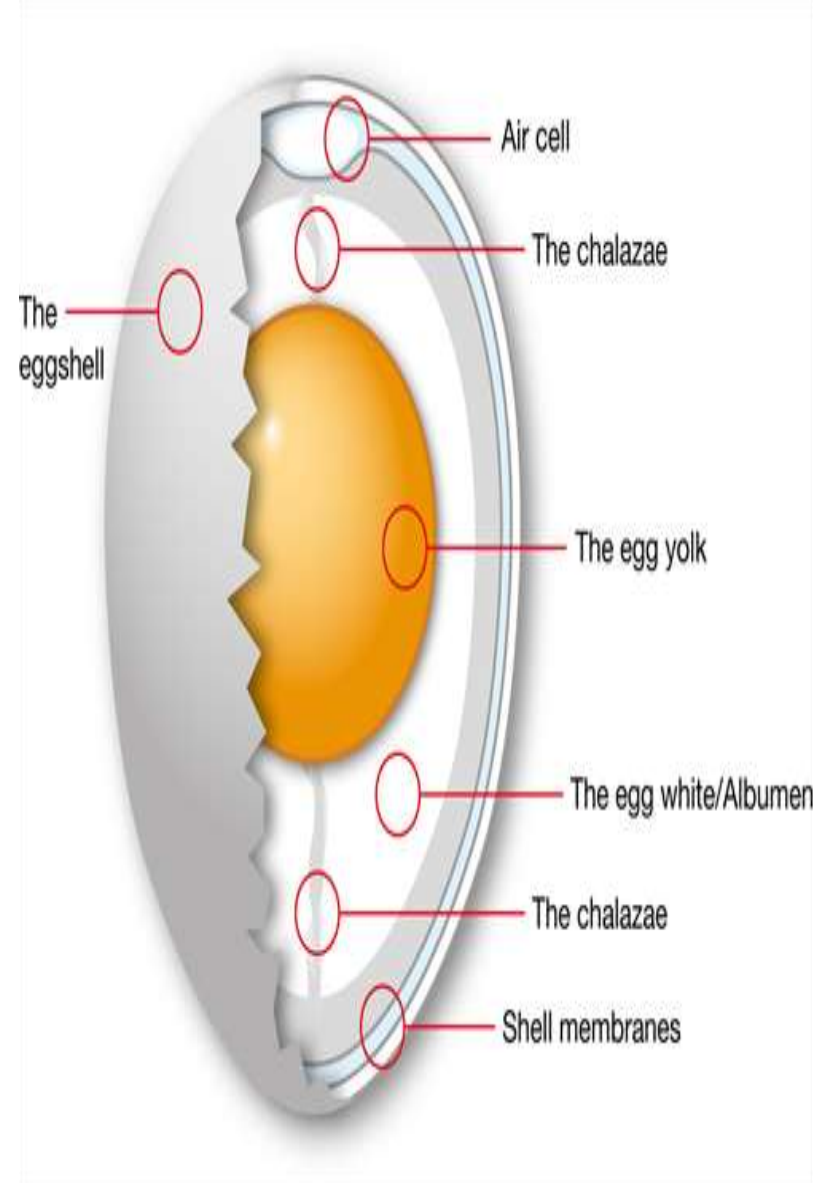
Egg Development

- The egg travels through the female reproductive tract, gaining substance and nutrients and the shell is formed.
- The egg is then stored in the female's uterus until it is laid.



EGG STRUCTURE

- Four parts to the avian egg: Albumen, Yolk, Shell, Membrane
- Gamete located on the yolk surface and surrounded by albumen, or egg white.
- The albumen in turn is surrounded by two shell membranes (inner and outer membranes) and then the eggshell.



Parental Care

Select The best location for Nest

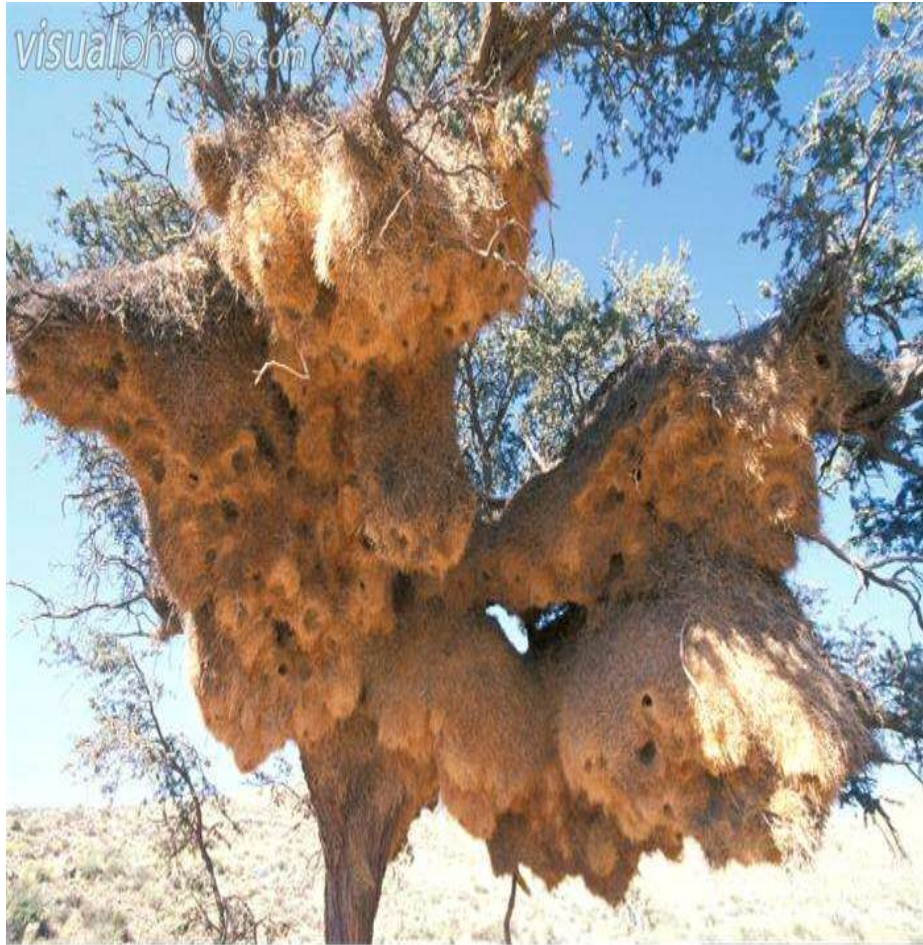
- is one that can't be reached by predators and protect their nests from sun or wind.
- Having a colony of bees, or ants near a nest can actually be a good thing for nesting birds.



Build suspended nests out of grass.



The largest bird's nest



BA2988 [RM] © www.visualphotos.com





Megapodes are birds that do not incubate their eggs with their body heat as other birds do, but bury them.



- Some bird species have no nests, lays eggs on bare rock(guillemot)

Penguins

- Male penguins have no nests keep eggs between their body and feet.



- Both parents feed the chick regurgitated food.



Incubating the eggs



- Monitor and regulate temperature (38 degrees)
- parents take turns.



Care of young

- young pigeons rely on “pigeon milk” for nourishment from the parent’s beak (a sac like food storage located at the bottom of the esophagus, unique to birds).
- A substance that both male and female adults produce.



Source: <http://www.nature.com/>

Environment & bird

Temperature & Nutrition

- Temperature and the timing of reproduction
 - Many bird species reproduce with high spring temperatures
- In the fall and when the lower temperatures birds migrate due to lack of food



Defend from predators

- Toxic birds that use toxins to defend themselves from predators.



Flocking

- The principal benefits of flocking are safety and defence against predators.



Light

- Some birds avoid the day light are active after sunset like bats & some owls.



Egg color:

- 1) Protect eggs from damaging solar radiation.
- 2) Add structural strength to shells when calcium is in short supply.
- 3) Camouflage.



<http://www.skullsunlimited.com/bird-eggs.htm>

References:

- Sturkie's Avian Physiology
- Practical Animal Biology
- Blount, J. D., D. C. Houston, and A. P. Møller. 2000. [Why egg yolk is yellow.](#) Trends in Ecology and Evolution 15: 47-49.
- Brown, C.R. and M. B. Brown. 2003. Testis size increases with colony size in cliff swallows. Behavioral Ecology 14:569-575.