Male genital system (Avian)

The male genital organs are comprised of the

- ✓ Testes,
- ✓ Epididymides,
- ✓ Deferent ducts (ductus deferentes),
- ✓ Copulatory organ (phallus) and
- ✓ Accessory organs of the phallus.

Testis (orchis)

Special features:

- ❖ The testes of birds, like those of mammals, are paired.
- ❖ However, as in elephants and cetaceans, the testes do not undergo descent.
- ❖ Both testes remain in the common body/coelomic cavity, located in the vicinity of the kidney. (with some species variation)
- ❖ Accordingly, birds also lack a scrotum.

Thermoregulation:

The potentially deleterious impact of the high avian body temperature (up to 41.5°C) on the developing spermatozoa within the internally located gonads (testis) is prevented by the elaboration of a richly branching venous plexus around the testes.

This vascular network, similar to that seen in elephants, serves as a heat exchange system for cooling of the testes (for the purposes of thermoregulation).

Size and development:

The size and development of the testes exhibits marked variation associated with season, climate, age and breed.

- ✓ Outside the breeding season, the testes of male Galliformes are approximately the size of a cherry pit.
- ✓ During the mating period, they grow to many times this size, reaching 60mm in length and 30mm in thickness in male Galliformes, and up to 80mm by 45mm in drakes. In some wild bird species the weightof the testes can increase by up to 1,000-fold.

A double layer of serosa, the mesorchium, attaches the epididymal border of each of the paired testes to the dorsal wall of the body cavity, near the kidneys.

Location:

In most bird species, the testes are located high in the body cavity, between the lungs and the cranial renal division, adjacent to the adrenal glands, aorta and the caudal vena cava.

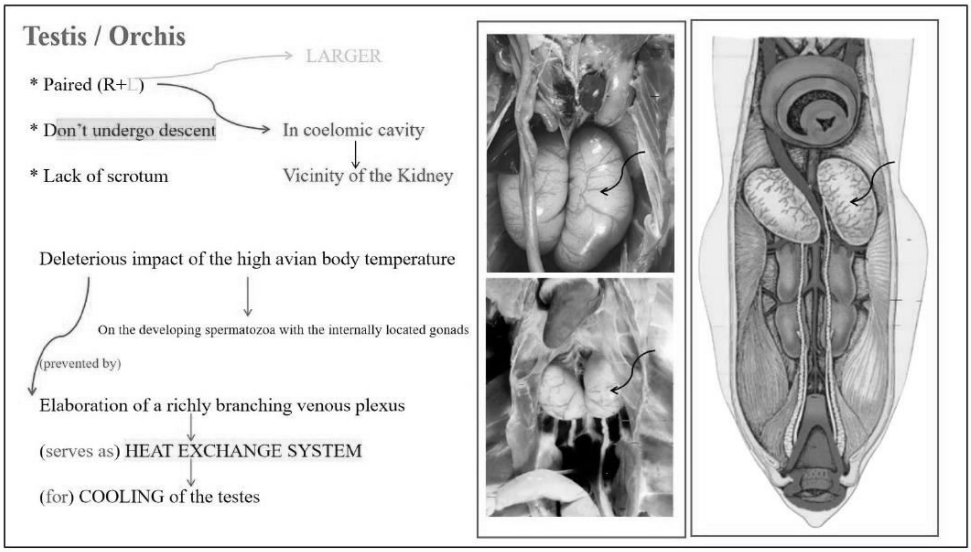
The increase in testicular size during the breeding season brings the testis into contact with the thoracic and abdominal air sacs. This has an additional cooling effect.

Color:

The testes typically appear yellowish-white. Some species, including cockatoos, have strongly pigmented testes that appear in situ as black.

Vessels (veins):

Subcapsular testicular veins, typically three in number, pass over the surface of the testes. They exhibit considerable species-dependent branching. Numerous connecting branches extend between these veins forming the rete venosum that participates in thermoregulation of the testicular parenchyma.



Epididymis

In birds, the rete testis is located on the medial aspect of the testis and is divided into intratesticular, intracapsular and extracapsular components. The last of these opens into the proximal efferent ductules from which sperm are conducted into the epididymis.

- ✓ The epididymis lies against the dorsomedial surface of the testis, extending along approximately two-thirds of the testicular border.
- ✓ Consisting largely of the convoluted epididymal duct, the epididymis reaches a length of only 3–4mm in sexually active chickens.
- ✓ Unlike the mammalian epididymis, which consists of a head, body and tail, the epididymis of birds is not divided into segments.

The proximal efferent ductules narrow to form distal efferent ductules. These empty via connecting ductules into the epididymal duct. Efferent ducts enter the epididymis along its entire length.

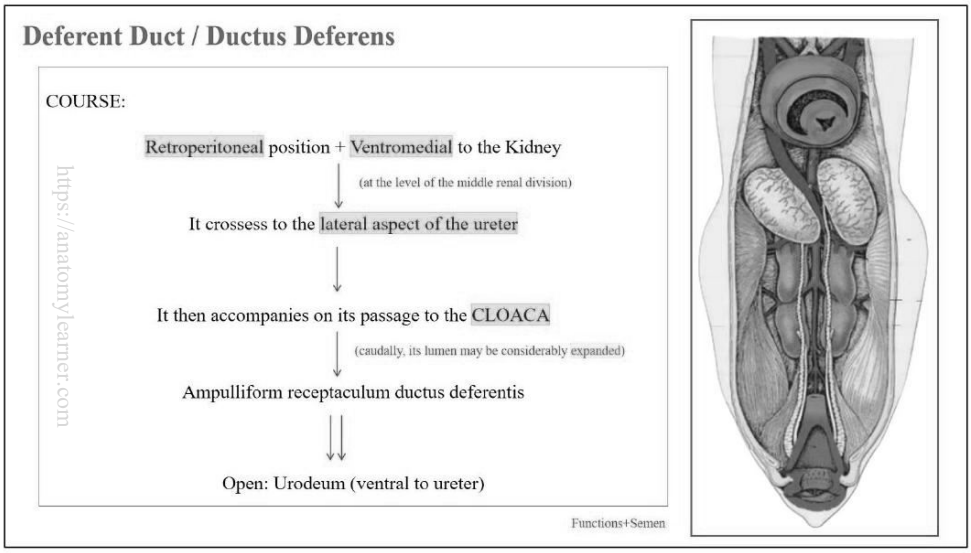
Along its length, the epididymal duct gradually increases in thickness. At the cauddal pole of the epididymis it opens into the deferent duct.

Deferent duct (ductus deferens)

- ❖ The deferent duct follows a strongly meandering course, occupying a retroperitoneal position ventromedial to the kidney.
- ❖ At the level of the middle renal division, it crosses to the lateral aspect of the ureter, which it then accompanies on its passage to the cloaca.
- ❖ Caudally, its lumen may be considerably expanded.

The terminal straight segment of the ductus opens into a dilated section, the ampulliform receptaculum ductus deferentis. The ductus deferens opens at the ostium ductus deferentis

located on the conical papilla ductus deferetis (particularly prominent in chickens) in the urodeum.



The function of the ductus deferens, as in mammals, is to convey mature sperm. By virtue of its highly convoluted arrangement, the ductus deferens traverses a distance of only around 10cm in Galliformes, despite being at least 60cm long in these species.

In male chickens, the white milky semen contains approximately 3.5 million sperm per microlitre. The volume of ejaculate is 0.5–1ml in chickens and 2–5ml in the ostrich.

Phallus (penis, phallus masculinus)

The phallus of the male bird is a component of the cloaca. Among modern bird species there are two types of phallus:

- ✓ Non-protrusible (phallus nonprotrudens) and
- ✓ Protrusible, intromittent (phallus protrudens).

The non-protrusible phallus, seen for example in chickens, is composed of:

- ✓ An unpaired median phallic body flanked by
- ✓ Paired lateral phallic bodies

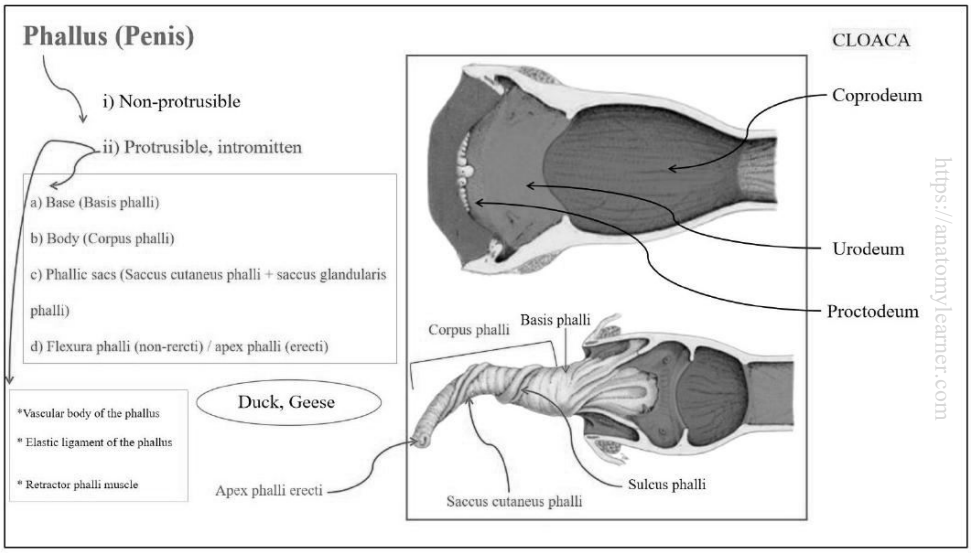
In chickens the median phallic body is visible in day-old chicks. It is rounded in males and conical in females. This subtle difference allows experienced operators to sex chicks at a very young age.

Ducks, geese and ratites have a protrusible phallus. The components of the protrusible phallus include the:

- ✓ Base (basis phalli),
- ✓ Body (corpus phalli),
- ✓ Phallic sacs (saccus cutaneus phalli and saccus glan dularis phalli),
- ✓ Flexura phalli (non-erecti)/apex phalli (erecti).

The phallus arises as the basis phalli in the ventral wall of the cloaca. It incorporates a lymphatic cistern that is partly divided into left and right components.

This cistern continues as a narrow chamber that extends around the cutaneous and glandular phallic sacs (saccus cutaneous phalli and saccus glandularis phalli). These sacs form the hollow interior of the body (corpus) of the phallus.



In the non-tumescent phallus, the body is completely invaginated and the junction between the cutaneous and glandular phallic sacs, the flexura phalli, is curved. The exteriorised flexura phalli becomes the tip (apex) of the erect phallus. A phallic sulcus (sulcus phalli) spirals around the free part of the erect phallus.

Erection of the non-protrusible phallus also occurs due to engorgement with lymph, although in these species the erect phallus protrudes only slightly, if at all, from the cloaca.

Accessory structures of the phallus

The accessory structures of the phallus include the:

- ✓ Vascular body of the phallus
- ✓ Elastic ligament of the phallus
- ✓ Muscle retractor phalli.

The vascular body of the phallus consists of a capillary tuft that is intricately intermingled with lymphatic vessels. Fluid passes from blood capillaries into the interstitium, from which it enters the lymph vessels. The lymph passes through two ducts into the lymphatic cisterns of the phallus. Filling of these cisterns is responsible for erection, aided by contraction of the muscle sphincter cloacae.

The phallus is returned to its invaginated state by the action of the usually striated m. retractor phalli in the ventral wall of the cloaca, with assistance from the elastic ligament of the phallus (highly developed in ducks), which runs through the centre of the erect phallus.

In waterfowl, lymph is pumped from the phallus by two lymph hearts, each located above the transverse process of the first free caudal vertebra.

During ejaculation, semen flows over the surface of the phallus. In the drake and gander, the edges of the phallic sulcus close during ejaculation to form a tube.