clitoris or organ of sexual excitement. These are some of the Ducks, as Anas clangula, in which the clitoris is upward of half an inch long, but without any groove. It is of more considerable size, and provided with a demi-groove like the penis, in the Brevipennes, as the Ostrich and Cassowary.

Several Birds furnish a remarkable peculiarity, and one which is interesting in a developmental point of view, namely, in the coexistence along with the left, of the right ovarium either in a rudimentary or completely developed condition. In the earlier stages of the existence of the embryo within the ovum, it would appear that the two ovaria and oviducts are in general formed of equal size. Upon the right side, however, these structures soon cease to grow, become absorbed, and disappear almost always before the exclusion of the young bird from the egg. In rare cases, however, as in the adult Duck and Goose, rudiments of this arrest of structure are to be seen, and in some Parrots, Eagles, and Vultures also, there constantly occur small rudiments of the right ovarium. The Gos-hawks, as Falco palumbarius and nisus, and the Harriers (Circus) have always two ovaria, provided with mature ova at the period of propagation.

As regards the *Male* organs of generation, the testes of Birds are always double, and situated like the ovaria behind the lungs against the renal capsules. They are either of an elongated or rounded form, and very small during the winter season when the generative functions are at rest, and in small Birds are then so diminutive that they are with difficulty discovered. They become however remarkably turgid at the breeding season, increasing from 20 to 50 times their former size, and are particularly voluminous in some Birds, as the Fowls and Ducks. They are then rarely of equal but mostly unequal size, the left being usually the largest. At this period too of sexual excitement, the contorted seminal vessels are seen very distinctly through their external transparent tunica albuginea, and a very beautiful plexus of vessels is expanded over them. From the seminal vessels proceed the seminal ducts, or vasa deferentia, which pass in the form of serpentine canals upon the anterior surface of the kidneys near to the ureters. Occasionally, as in the Passeres, the seminal ducts form a complex skein of contortions like a ball of thread within the pelvis near to the cloaca, into which they open by a double orifice upon two papilliform projections of the mucous membrane.

The *Spermatozoa* or seminal animalcules constituting the moveable

essential elements of the vivifying fluid in the class of Birds, have in general an elongated body terminated at one end by a filamentary appendage or tail. Those of the Passeres, which exhibit some slight varieties of form in the different genera, are characterized without exception by a very long body, and a tail spirally contorted after the fashion of a cork-screw; they are situated freely in the seminal excretory duct, but within the testicle itself are found enclosed in long pyriform cysts.

A true *Intromittent Organ* or *Penis* is wanting to most Birds; some, however, as the Ostrich, have this part very developed, and traversed by a groove for the passage of the semen; it is of smaller size, tongue-shaped and grooved, as in Crypturus among the Gallinæ, or of a membranous texture and cylindrical, lying in a state of rest folded upon itself, or spirally twisted within the cloaca, as in the Drake. According to the recent researches of Joh. Müller, the varieties in the structure of the penis in Birds may be referred to three principal types. 1*st*, The penis is formed, as has hitherto been observed, only in the Two-toed Ostrich, of two solid fibrous bodies, provided superiorly with a web of cavernous tissue which is traversed by a cleft or groove; a third, more elastic and internally cavernous body, is situated upon the opposite side, and forms the extremity of the penis or rudimentary glans. Erection is the result of the distension of the cavernous tissue. 2*d*, The glans is wanting and the penis has a seminal groove imbedded in cavernous tissue, and also two fibrous bodies. The extremity of the penis with a continuation of its groove is involuted so as to form a sack-like part comparable to a prepuce, which can be partially everted and again retracted by an elastic ligament. This structure is met with in the Cassowary and Three-toed Ostrich or Rhea. 3*dly*, There is found a small tongue-shaped rudiment of a penis, surrounded by a circular pouch, and either with or without a groove. Examples of this type are furnished by the Bustard, several of the Gallinæ, *e. g.* Crypturus, Crax, Penelope, and of the Grallæ, as the Heron, Stork, and Flamingo.

Cloaca.

The term Cloaca is applied to the terminal bladder-like expansion formed by the rectum before terminating in the anus, which occurs in several Mammalia, as the Marsupials and Monotremes, as well as

in Birds and Amphibia, and is the common cavity receiving the orifices of the intestinal, sexual, and urinary organs.

In Birds the cloaca usually forms a very wide vesicular dilatation, a continuation properly of the intestinal tube, nearly as long as it is broad, and invested externally to a considerable extent by peritoneum and lined with mucous membrane, a muscular layer being interposed between these two. The rectum enters the upper and anterior part of the cavity, protected by a circular fold, and to the left behind it the oviducts in the female, or the two vasa deferentia in the male, terminate from either side upon papilliform eminences, provided with similar folds; behind these papillæ is found a well-developed plexus of vessels, or rete mirabile. Between and posterior to the orifices of the excretory ducts of the sexual organs, those of the ureters are found in juxtaposition with each other, while behind them is situated a very prominent circular valve, beneath which the bursa Fabricii opens directly by a small aperture; last of all, is the large circular aperture of the cloaca which at the same time constitutes the external anal outlet. The space between the two circular folds guarding the urethro-sexual cavity and the rectum, has been regarded as a rudimentary receptacle for the urine. The penis, when present, arises from the lower wall of the cloaca, where it is either surrounded by folds, or situated, as in the Ostrich, in a special pouch.

The cloaca is closed by a circular sphincter muscle. From the longitudinal muscular layer particular fasciculi are developed, or, as in the large Brevipennes or short-winged birds, muscles of considerable size, which are inserted into the ischium and expand or open the cloaca. Peculiar muscles are connected with those of the cloaca for moving the penis when present, such as an elevator and retractor of that organ.

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