

VI. Final Changes of the Genitalia after Hatching.

§. 44.

If one examines birds some time after hatching, one finds only the left ovary and a single oviduct in females. One can still recognize a trace of Wolffian body on the right side on the upper part of the kidney, as an oblong little body. In addition, on the left side also below the ovary, is a very small trace of the two excretory ducts of the Wolffian body, which, however, soon disappear. Rathke provides a beautiful and very accurate picture of this stage (see Tab. III, Fig. 12).

§. 45.

A short time after hatching, Wolffian bodies are also reduced in size in males, especially in width. However, they are still longer but narrower than the testes. At first glance, they appear to be the epididymis. They could certainly be considered as such, and, as Rathke believed, they could form a transition of the Wolffian body into the epididymis, if the further metamorphosis of these organs and their final complete disappearance in young birds were not observed. In a young hawk, that was barely able to stand on its feet, I recognized the vasa efferentia, which goes from the testis to the rest of the Wolffian body or the apparent epididymis, and continue in a downward slope into the former excretory duct of the Wolffian body. The blind-ending tubules that were so peculiar, are still visible in the Wolffian body, which is separated from the testis by a small space. Its structure differs from that of the testis in that it is now dirty yellowish,

while the seminal tubules of the testis and the whole testicle, are white in color. The duct that leads downwards from the Wolffian body

originates from the whole length of this body and still lies on the outer side, opposite of the testis. This duct reaches together with the tip of the Wolffian body higher than the testis itself, compared to the adrenals. It is still the same excretory duct of the Wolffian body, which we have described earlier, and it is this duct, which also connects with the vasa efferentia of the testis at the lower part of the Wolffian body. The excretory duct, now ductus deferens, accompanies and partly lies on the ureter. See Fig. i. Tab. IV.

- a. Upper part of the right kidney.
- b. Right adrenal gland.
- c. Right testis.
- d. Right Wolffian body.
- e. Vasa efferentia from the testis to the excretory duct.
- f. Ductus deferens, originating from the entire length of the Wolffian body, formerly the excretory duct of the blind-ending tubules of the Wolffian body.
- g. Ureter

§. 46.

Since the excretory duct of the Wolffian body, even in young birds, originates high at the tip of the thinned and degenerated Wolffian body, it could appear as if a blind-ending tube ascends from the epididymis to the adrenal gland. This blind-ending tube, *vas aberrans*, has been mentioned by Morgagni, Valsalva, Scorzone, and von Tannenberg*. However, all of these descriptions are only applicable for young birds,

because I could not find any trace of this blind-ending tube in adult birds. Similarly, everything that Tannenberg says about the epididymis of birds only applies to young birds, where a remnant of the Wolffian body is still present. Tannenberg** says: "The internal structure of the epididymis can clearly be seen when a testis was injected with mercury, from which it is evident that it only consists of straight ducts, which emerge from the testis, continue in a downward, winding slope and form the excretory duct."

*) On the Male Genitalia of Birds. Gölling. 1810

***) See §. 20.

Tannenberg continues: "Another narrow duct continues upwards to the middle of the adrenal glands where it ends bluntly." This is the same duct that Morgagni filled up to its upper blind-ending end with mercury, and from which often wrongly was deducted that there is a relationship between the adrenals and the genitalia. All these data, however explicable they may be when investigating the nature of the organs of a young bird, are quite puzzling as soon as they are extrapolated to adult birds, and therefore are most likely obtained through the examination of young birds.

§. 47.

The remainder of the Wolffian body becomes smaller and smaller, and finally it can be recognized only as a cellular tissue that separates from the testis, in which the vasa efferentia merge into the ductus deferens. The part of the Wolffian body, which lies between the excretory duct and the testis, disappears in the fetus, the closer the bundle of vasa efferentia is to the testes. When finally all traces of the former organ have disappeared, the vasa efferentia form a very thin, flat swelling from the testis to the ductus deferens, which is the epididymis in birds. It consists of the coils of these tubules, is firmly attached to the testis, and from which all traces of the former odd-looking organ have disappeared.

§. 48.

Rathke claimed earlier that the Wolffian body disappears in the female embryo, but develops into the epididymis in the male. He later withdrew this statement, after he

convinced himself, mainly through the investigation of mammalian embryos, that the epididymis develops from coiled tubes of the ductus deferens and the vasa efferentia and not from the blind-ending tubules of the Wolffian body *). In the meantime his most recent opinion is, according to a letter from him,

*) Burdach's Physiology as Empirical Science with contributions by C. von Baer, Rathke and Meyer. T. IV p. 592

that based on the study of lizard, bird and pig embryos, a part of the Wolffian body disappears, while another part is used for the formation of the epididymis. I also do not agree with this; according to my observations, all traces of the Wolffian body disappear in both male and female embryos, and the epididymis forms in a completely independent way, as I have just shown in birds, and which I will demonstrate in mammals step by step. Mammals and birds differ in that even after the time of hatching, remnants of the Wolffian bodies are still present in birds and they gradually disappear afterwards; whereas in the case of mammals the last trace of the Wolffian body disappears earlier, and the earliest in human embryos, without developing into any part of the epididymis.

§. 49.

I believe that hereby I have also found the answer to the question whether or not birds have an epididymis, which has often led to opposite statements by different observers. According to this, as in mammals, birds have hardly any trace of an epididymis, because the vasa efferentia merge into the ductus deferens without a lot of looping, and form in adult birds an extremely thin oval plate, which rests firmly on the albuginea, elongates downwards like a stalk, and merges immediately into the ductus deferens.

However, in young birds, especially shortly after hatching, this area is greatly enlarged by the remains of the Wolffian body. In contrast in newborn mammals, nothing remains of the Wolffian body, there is a substantial epididymis consisting of winding tubules, which did not develop from the blind-ending tubules of the Wolffian body, as we shall sufficiently prove.