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An Essay on the Wolffian Bodies of the Foetus, and their Remains in the Adult.

William Mitchell Banks.

1864.

Preface.

When I first began this Essay, I had entertained the idea that the Testicle was a subject which might still furnish some points for investigation, but on carefully studying the matter, I soon found that the labours of Sir Astley Cooper, Lauth, Curling &c had left little or nothing, that could be added to our knowledge of the anatomy of the organ itself. Nevertheless, I saw at the same time, that the views of Anatomists, were by no means equally uniform in regard to the uses or origin of certain <u>appendages</u> to the Testis, whose presence was sufficiently constant to make it obvious that in some way or other they had an intimate connection with the organ, while, on the other hand, their frequent absence shewed that they

were by no means essential to its function.
These were the Hydatids of Morgagni and
the Vas aberrans Halleri, and Mr. Turner kindly
drew my attention to the more recently discovered
Organ of Giraldès or Corps Innominé and its
analogue in the female, The Organ of Rosen-
-müller, or Parovarium of (Kobelt.)

As these bodies are plainly the remains
of Foetal structures, my Thesis, thus resolved it-
self into an examination of certain points in Em-
bryology, and I was encouraged to proceed in
this examination by the fact that although
I could not hope, to make any original observa-
-tions after such men as Valentin, Bischoff, Rathke
Kobelt and Kölliker had employed their energies
upon the question, yet British anatomists had
not devoted the same attention to it, that their
Continental brethren had. In truth, although,
I have no doubt, many of them must have
examined the structures which this paper
treats of, and come to an opinion, in their own
minds upon the various disputable questions
I can find no English Treatise bearing directly

upon the point. My Information ~~had~~, consequently had to be drawn either from French or German books, or from such translations and Reviews of them as I could obtain. The nature of the subject also is one which I would humbly venture to think is suitable for a Thesis, as enabling a student, who can, from his limited experience, give no opinion of his own, upon the more practical parts of his profession, to employ upon it what powers of observation he may possess and thereafter draw his own conclusions.

For the Developement of the Generative Organs offers the most remarkable and interesting series of changes, and has long attracted the especial notice of embryologists, while, as Bischoff observes, we find in their observations, erroneous as many of them were, some of the "finest monuments" "of man's spirit of investigation.

Rathke. Abhandlungen zur Bildungs und Entwickelungsgeschichte des Menschen und der Thiere.
Meckels Archiv. 1832. p. 379.

Part First.

On the Developement and Structure. of The Wolffian Bodies.

1 Organ of Development

In man and the higher classes of Mammalia the developement of the Generative Glands is preceded by that of a pair of organs, which, like many others, belong solely to the period of fœtal life, leaving behind them, in the adult, mere traces of their previous existence. The first correct description of these bodies, was given, in his Treatise on the Theory of Generation by C. F. Wolff, from whom they derive their name of the Wolffian bodies, and after him, Oken investigated them in the mammalia (hence the German name - Okenschen Körper) - They were regarded by Wolff, who was unaware that they possessed an Excretory Duct and more recently by Arnold, as the rudiments of the future kidneys, but Rathke afterwards ascertained that the latter were developed

quite independantly. Nevertheless, the appellation of False or Primordial Kidneys, as they are termed by Jacobson and Rathke, is not by any means inappropriate. For it is obvious that organs of such size and high structural development must have some important part to play in the animal economy of the foetus and since we see that in proportion as the kidneys increase in size, so the Wolffian Bodies diminish and atrophy, we may reasonably infer, that as regards function, there must be some connection between them; for as I shall endeavour to shew no part of these latter whatever, in reality, goes to the formation of the Generative System, and, in the foetus, such a system is unnecessary, as regards function. Indeed there can be little doubt that the Corpora Wolffiana are intended for the elimination of the urinary secretion during the early periods of embryonic life, since Müller has noticed in the bird both within their

tubes and their Excretory Duct, a whitish-yellow matter which could be pressed from one part of the tubes to another, while Jacobsen has detected in the fluid of the Allantois of the bird's egg the presence of Uric Acid at a very early period of incubation, before the kidneys were sufficiently developed to be able to furnish such a secretion. Function

To narrate the various opinions and hypotheses which have been advanced in regard to the Primary Origin and the Development of the Wolffian bodies, would be almost useless and certainly very perplexing, since as far as I can see, Baer, Burdach and Rathke, Valentin Reichart, Bischoff and Follin all seem to differ more or less from each other, as to the former. Rathke held that they primarily arose from a single mass, but in this view he was singular, every other authority maintaining, that, at any rate, they originated as two distinct bodies, developed in front of the aorta, which separates them. Origin & Development

Regarding their Development, suffice it to say

that there would seem to be two leading views;
V. Baer had a theory that the two posterior
vertebral arteries of the embryo, gave off at short
intervals, small lateral branches, which return-
-ing on themselves, formed also veins: and that
these vessels poured out along their course
a material from which arose, a multitude
of little sacs, ranged in transverse lines. These
uniting together formed tubules and thus arose
the Transverse Canaliculi of the Wolffian Bodies
with their interlying bloodvessels (2)- Bischoff
again believed that they arose simply from
two little ridges of blastema, in which were formed
under the appearance of little clear vesicles, The
Canaliculi; which afterwards communicated
with a duct running along their outer surface:-
— he ascribes to them, the same mode of origin
as that which obtains in other secreting glands.

Baer's hypo-
-thesis.

Bischoffs
view—

This view which seems the more simple and
natural, has been confirmed by the late researches
of M. Follin.

On this point of Developement I cannot say

Yollin. Recherches sur les Corps de Wolff-
— Paris - 1850 —

anything, as I did not feel myself competent to investigate such a delicate question, nor could I easily have procured specimens of a sufficiently early date to work upon.

2. Wolffian Bodies in Animals -

According to most authors they seem to be absent in fishes, while Kölliker, whose Thesis I shall frequently have occasion to refer to, states that they persist in them through life and perform the functions of kidneys. In Fishes -

Müller describes their appearance in the Batrachians, in whom they exist during the whole period of the larva state, as that of a bunch of coeca situated at the most anterior part of the abdominal cavity, from which an Excretory Duct passes backwards along the side of the vertebral column - Kölliker, however, has not been able to find the Excretory Duct or the Caeca, although he recognizes two grey masses, in the situation, Müller refers to, and has even found in frogs two whitish points at the upper part of the abdomen which he thinks are these two bodies in a state In Batrachians Pl XIII. f. 5.

Müller's Physiology - Translated by Baly -
Vol. II. 1664 -

of atrophy. In snakes they certainly do exist as Rathke has pursued his researches on this subject mainly on the Coluber Natrisc.

In Birds the Wolffian bodies can be very readily examined, appearing in them on the third day of Incubation, and increasing till they extend along the sides of the vertebral column from the heart to the posterior extremity of the body. Müller figures them as composed of Coecal Tubes, running in a lateral direction and bound together by an Excretory Duct, which opens at each side into the Cloaca. He further particularly notices that in the female, in addition to this Excretory Duct a special Oviduct (Fallopian Tube) is provided to which he found no corresponding structure in the male, for in it the Excretory Duct of the Wolffian Body, at once formed a junction with the Testicle by means of certain Vasa Efferentia. It is of importance to bear in mind this statement of Müller, because, as will afterwards be seen, his views in regard to the conduct of these

In Birds

Pl. 14. figs 3 & 4.

Bodies and their Ducts in the Mammalia are very different, whereas according to the most recent opinions, should his own statement about Birds be correct, a distinct homology can be traced between them and the Mammalia as regards the developement of these structures.

My own observations, have been made almost entirely upon the sheep, although I have also examined a good many calves and pigs. I could never obtain a human specimen early enough to see the Wolffian Bodies, but I have examined human foetuses from about the 5th month upwards, in connection with their Remains. The period of Gestation in the sheep is about 19 weeks, but I am sorry to say that I never could obtain any correct information as to what might be the various ages of the foetal sheep which I obtained, and I have accordingly been obliged to give them lengths in place of their ages, in the earlier specimens.

In the earliest embryo which I examined (3/8ths of an inch) the Wolffian Bodies appeared as two long narrow, almost cylindrical structures of a fine red colour, which ran along each side of the Vertebral Column, from the lower extremity of the ventral cavity almost up to the neck. They had an uniform appearance all over, shewing no elevations upon their surfaces and from their lower extremities proceeded their Excretory Ducts, which, running down on each side of the Rectum, opened into the Allantois. At this period the heart was in course of formation, but there were no vestiges of kidneys or genital glands. — In the embryo of 5/8ths inch the Wolffian Bodies have not the same relation to the whole embryo in point of size being now much shorter comparatively so that they appear to be restricted to the abdomen, while their shape tends more to the oval — They may depend either on their upper extremity disappearing while their middle and lower portions go on increasing, or on their

Pl. f. 1. (Pl. f. 1a)

Pl. f. 3. (Pl. f. 8) 2.

not increasing in size with the same rapidity as the other organs of the body:- and the latter view seems to be much the more likely of the two.

When the embryo attains the length of 1 inch, they are still further altered in appearance, owing to a curving outwards and increase in size of their lower extremities, while on their outer surfaces a clear line or cord is distinctly visible. At 1/8th of an inch, they have acquired their permanent shape which is somewhat crescentic or rather pyramidal, having an Anterior (properly Inferior) surface, an Esclernal one, on which the cord is seen, and a Posterior (Superior) on which the organ rests. P.1.f.4. P.1.f.6. (P.1.f.3) Final shape

The Wolffian Bodies are well supplied with vessels, varying from four to six, in number, which penetrate its upper border, and are small parallel branches of the aorta. After the kidneys have attained some size and pushed their way up from behind the Wolffian Bodies, the vessels can be seen very clearly, running to the upper part of the latter in the stretched peritoneum. They are originally branches of the Posterior Vertebral arteries, and it is Their blood-vascular supply P.1.f.11

Kölliker's Entwickelungsgeschichte

this fact which gave rise to Baer's hypotheses (for it would seem to have been little more) as to the Developement of the Wolffian Bodies (p. 7)_ As the Organs diminish so their vessels atrophy also, but their remains can be seen as delicate lines running in the peritoneum, little the embryo is 4 to 4 1/2 inches long_ P.1. f. 12.

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3 The Genital Glands.

When the embryo is about 1/2 an inch long we see rising along the inner border of the Wolffian body, but plainly separate from it, a thin white streak, which is the beginning of the future Ovary or Testis. Völliker describes the appearance of a section made through the whole embryo at this period, in which the peritoneal covering of the Wolffian body was seen passing over these white streaks and hence the probability that they arise from some nuclear blastema deposited in the Subperitoneal Tissue, or what Remak terms the Mittelplatt. The Genital Gland increases very rapidly changing from its streak-like form to a cylindrical and finally to an ovoid one, and rising P.1. f. 3. (P.1. f. 2)

up on the concave inner surface of the Wolffian Body, till it finally comes almost to lie upon it. Pl. f. 8. At first the future Ovary and Testis are perfectly alike in form and position and continue indistinguishable for some time, but gradually the Testicle assumes a rounder, broader, shape, while the Ovary is longer and narrower:- moreover the former preserves the situation which it had from the beginning. viz: with its long axis parallel to that of the Wolffian Body, while the latter becomes more horizontal, in accordance with the position in which it is finally to lie in the adult.

Changes in shape of the Genital glands

The forces which induce these bodies so to act we can evidently know nothing of, connected, as they are, in so intimate a manner, with the original Principle of Life implanted in the cells which form them. But, from the period, when by these changes in shape and position the Genital Glands first shew their tendency to one or other sex, the Wolffian Bodies and their Ducts seem, as it were, to begin to adapt them-

-selves to the special form of Generative Tube, necessary for each sex also, and the whole Theory of Hermaphroditism, depends upon the fact of Nature, so to speak, not adapting the one particular Tube to the one particular Gland.

4. Ligaments of the Genital Glands and Wolffian Bodies.

In addition to their other appendages the Genital Glands and Wolffian bodies possess certain Ligaments, which I find nowhere fully described except by Kölliker, and which I think deserve some little notice.

In the sheep a little longer than 1 inch, there may be seen running from the upper end of the Wolffian Body a small free-margined membrane which proceeds to the Diaphragm and terminates in two or three indistinct processes!- this is termed by Kölliker the Diaphragm Ligament (Zwerfellchbande). The Genital Gland is moreover attached to the Wolffian Body by a mem-

Pl. 7. (Pl. 5. 4)

Diaphragm Ligament.

Seiler. Observationes nonnullae de Testium descensu

1817 —

-ba anous duplicature, which has been named by Seiler the Mesorchium in the male and the Meso-
-oarium in the female, and also by continua-
-tions of this, superiorly and inferiorly, designa-
-ted by Kölliker, respectively, the Upper and Lower "Bauchfellfalte"; the former proceeding up-
-wards and merging into the Diaphragm-Lig-
-ament, the latter proceeding downwards and terminating near the Ducts of the Wolffian Body.

Lastly, from these Ducts, at the point where they leave the Wolffian Body, springs a fine thread-
-like structure (Leistenband), losing itself in the muscles of the Abdominal wall, which when arrived at its full development, is des-
-tined to become the Gubernaculum Testis of the male or the Round Ligament of the female.

As far as I can see, the following is what becomes of these structures in the adult. The Diaphragm Ligament in the female goes to form the main part of the Broad Ligament of the Uterus, being assisted in this by the Mesovarium and the Upper and Lower "Bauchfell fälte". But in the male, when the

Termination of the Diaphragm Ligament. — Pl. f. 15.

testis descends it becomes a mere thread-like structure, running from the top of the Epididymis up into the abdomen, as far as the kidney, quite visible however in the full-grown sheep's foetus. P.2.f.8. (P.2.f.3)

Of the Mesorchium. P.1.f.11.

The Mesorchium and Mesovarium serve as means of permitting the vasculum supply to reach the Genital gland. Cleland has noticed and I have myself observed, a fine white line arising in the Mesorchium which is ultimately traceable to the Testis and to one of the anterior branches which supply the Wolffian Body:- thus becoming larger and hollowed forms the future Spermatic (or Ovarian) artery. In the adult the Mesorchium forms the structure which suspends the testicle in the cavity of the Tunica Vaginalis Scroti.

Of the "Bauchfellfalte"

The Upper "Bauchfellfalte" is, I think, a very important membrane, as, I am persuaded, that it is along it that those ~~vessels~~ tubes which join the testes to the epididymis, make their way. The Lower one becomes a part of the Gubernaculum. P.2.f.6 (P.2.f.3)

Structure of the Wolffian Bodies.

As we have already seen, the Wolffian Bodies at their origin, seem to consist of an aggregation of little cylinders or pediculated vesicles placed transversely and abutting on a filament (the Excretory Duct) which runs from above downwards along the outer margin of the gland. These little cylinders in course of time, become converted into hollow canals, which, when we follow them from their openings almost at right angles into the Excretory duct, are seen to become exceedingly tortuous and finally terminate in dilated cul-de-sacs situated mainly on the inner aspect of the organ: — they have lost their originally parallel distribution and are now interwoven with each other in all directions. In consequence of this flexuosity it is almost impossible to get a section which will shew a canal in all its course from the Cul-de-sac to the Excretory Duct, but as far as I could see, the orifices of entrance of the canals were considerably smaller than their calibre in the middle and more especially in the beginning of their course. The

Canals vary very considerably in size from each other.

In these tubes and culs-de-sac, there is visible a greyish and often slightly yellow secretion formed of rounded and amorphous granular matter. Follin states that Acetic acid dissolves this and after the preparation so treated is dried a number of prismatic crystals is to be seen. Contents of canals-

As I mentioned previously, the Wolffian Bodies are very vascular, so much so that, when fresh, they have a rosy yellow hue to the naked eye with which the clear white of the Genital gland forcibly contrasts. Rathke has figured the arteries as taking a rounded form towards their extremities, and, forming just as in the kidney glomeruli, similar to those of Malpighi, and indeed this has been held as an argument for the probability of the secretion of the Wolffian Bodies being similar to that of the former organ. Unfortunately succeeding investigators have not been able to confirm his observations, at least on Mammals and Birds, for Glomeruli on the arteries.

he seems to have dissected and drawn these glom-
-erules in the embryo of the Coluber Natrix
alone- Follin says the arteries simply lie in
parallel lines between the canalicules, without
forming glomeruli-

I have observed that as the Wolffian Bodies be-
-gin to atrophy, their culs-de-sac diminish in
size and become less numerous, while the
tubular element (though the calibre of
the individual canalicules seems also to be
smaller than at first) appears to the eye to in-
-crease by comparison, but this is doubtless only
due to the disappearance and diminution of the
culs-de-sac. In the male, it is very noticeable
how the canalicules atrophy from their points of
opening into the Excretory Duct for a certain
way inwards, so as to leave that Duct free and
detached from them, in order finally to become
the Vas Deferens- × As the process of diminution
goes on, all structure seems to disappear and
finally the Microscope only shews an amorphous
mass × having transverse granular bands running

Atrophy of the Wolffian Bodies.

P.3.f.3. (P.3.f.1)

P.2.f.7. (P.3.f.4)

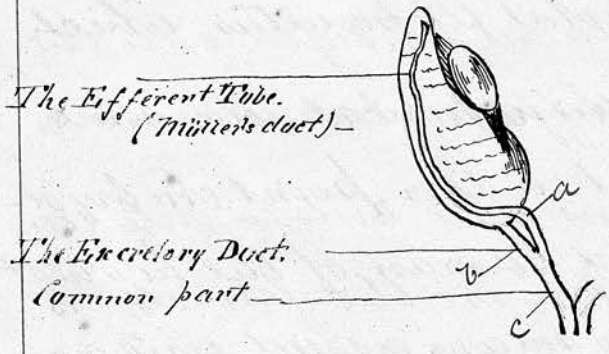
through it, with here and there a round dark body indicating the remains of one of the Culs-de-sac. In the sheep the Bodies begin to disappear when the embryo has attained the lenght of 4 or 5 inches, and when it is 7 — inches long, they are reduced to mere vestiges. And it would seem to be a general rule that the higher the animal is in the scale of nature, the sooner do the Wolffian Bodies disappear, so that when we come to man, we find that even at the end of the 2nd month, only the most feeble remains exist.

I append to this Essay, a series of Drawings, which shew, I am sorry to say, very roughly but still with sufficient clearness the changes in shape which the Wolffian Bodies undergo. But I shall speak of this point more fully in connection with the ultimate Remains in the full grown child and in the Adult.

As far as I have now gone, all that has been said concerning the Developement, Form and Structure of those remarkable Bodies, hardly admits of doubt.

For although it is true, that modern authors have differed upon certain minute points, their general conclusions tend pretty much to the same result, while their differences do not materially affect any great question in the Developement of the Genital system. But on the subject which now follows, hangs not only the correct understanding of what in each sex constitutes the Efferent Tube of the Genital Gland, but also the explanation of certain forms of Hermaphrodism, the knowledge of what are the analogous parts in each sex, and the import of certain structures connected with the Genital Apparatus which are possessed of considerable anatomical and some pathological interest. But on this point embryologists, both French and German, of the highest reputation, are even by no means agreed and, as I think, it is the chief point of interest in the whole investigation I have accordingly bestowed upon it all the care I could. I refer to the nature and development of the two ducts connected with each Wolffian Body. Before stating what result I have

Fig 1.


The Efferent Tube.
(Miller's duct)
The Excretory Duct.
Common part
a
b
c

come to in my own mind, I shall here enunciate, in order to shew what diversity of opinion there has been and still is upon the point, the views held by Müller, Reichert, Valentin, Coste, Baltzer, Kobelt, Allan Thomson and Follin—

Müller, then, believed that the Excretory Duct of the Wolffian body, lead from the lower extremity of the gland, to the Sinus Urogenitalis, and that along the outer border of the organ, there ran a fine filament viz the Efferent tube of the Generative apparatus, which above terminated by a free extremity, and inferiorly, below the base of the gland, merged into the Excretory duct × This Efferent tube, became in the male the Vas Deferens and entered into connection with the testicle;— in the female, its upper extremity merely acquired an open mouth, and so it formed the Fallopian Tube. It followed, therefore, that that portion of the Excretory Duct, below where the Efferent tube joined it, must form, in both sexes the lower parts of the two

× (72-13)

Bischoff. Traité du développement de l'homme et des mammifères – Traduit de l'allemand par A. Jourdan – p. 345 –

Coste. Recherches sur le développement et la signification du système genital –
Comptes Rendus – 1839 – p. 331 –

structures above mentioned. The Filament or Excretory Tube which he describes as running along the outer aspect of the Gland, has received from him the name of The Müllerian Duct and by that name will be mentioned henceforward, although, as we shall afterwards see, he committed a great error in supposing that that duct joined the Excretory Duct, for the two are continued downwards separately into the Sinus Urogenitalis. Müller's View.

Bischoff, in his Treatise on Development, describes a Band, which runs all the length of the organ along its outer and anterior aspect and he says that this contains both the Excretory Duct ~~and~~, which on account of its tenuity was very difficult to distinguish, unless when filled by the secretion of the gland, and also a thicker filament (Müllerian Duct?) which was at first solid but afterwards came to be developed into the Vas Deferens or Fallopian Tube. Bischoffs View

M. Coste believed, with Bischoff, that there was a complete independance between the Excretory Ducts and those of the Genital Glands (Mullerian?). Coste's View

Rathke. Abhandlungen zur Bildungs und Entwick-
-elungsgeschichte des Menschen und des Thiere-
Meckels Archiv. p. 379-1832-

Rathke. Entwickelungsgeschichte der Natter.
p. 210 - 1835-

and that no part of the Wolffian Bodies or their Excretory Ducts went to the formation of the Genital System.

Rathke, at first held the opinion that the future Vas Deferens and Fallopian Tube were developed distinct from the Excretory ducts, but in their immediate neighbourhood, and that when these ducts disappeared, the former occupied their place. But afterwards from his Researches on the Colubrine natrix, which, he believed were also applicable to Mammalia, he was induced to alter this opinion, and then he maintained that there was developed alongside of the Excretory Duct, in both sexes, a Filament (Mullerian Duct?) - at first solid and afterwards hollow, which terminated above by an open end. This in the female, became the Fallopian Tube, while the Excretory Duct disappeared along with the rest of the Wolffian Body, but in the male this new canal was absorbed at certain period and totally disappeared, while the Excretory Duct was developed into the Vas Deferens.

Rathke's View

Kobelt. Das Neben-Eierstock des Weibes, das längst verwischte Seitenstück des Nebenhoden des Mannes entdeckt- Heidelberg 1847-

Lent

* Valentin at first ranged himself on the side of Müller but in his Physiology published in 1850, he seems to have abandoned his former ideas, for in that edition, he merely gives a reprint of Kobelt's, then recent, observations-)

Valentin. Lehrbuch der Physiologie des Menschen Band II. Dritte Abtheilung- p. 104-

In 1847 Kobelt of Freiburg published a most elaborate Treatise on the Parovarium of the female as the analogue of the Epididymis of the male, and of all the authors who have written on the subject, none have, I think, done so much to eluci-date the true nature of the changes occurring in the Wolffian Bodies and their Ducts, as he, though I venture to differ from his views on some minor points. To quote his own words:— P.14. f.2.

"By means of the Excretory Duct of the Gener-" "-ative Gland, that is to say, by means of the" "Müllerian Duct in the female, and of the" "Excretory Duct of the Wolffian Body in the" "male, and on the other hand by means of" "the "Rudiments Mammaires" which exist in" "all animals, each embryo, according as it" "developes itself, can take the attributes which" "characterize one or other sex." — He thus agrees perfectly with Rathke in his latter view.

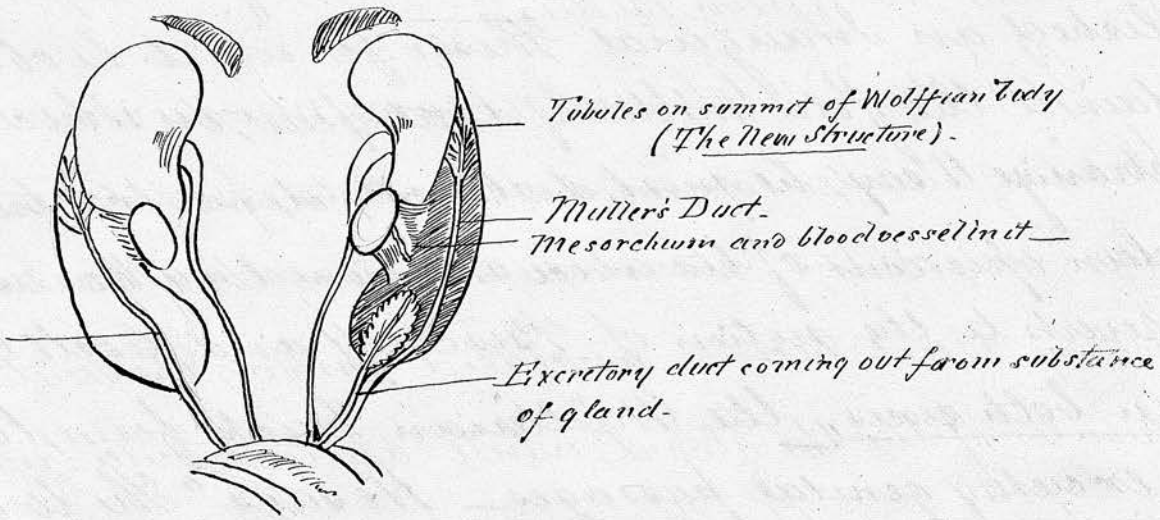
* Bergman, Leuckart and Grolick, and in this country Dr. Allen Thomson, a very high

authority on embryological questions, also con-
-cur with Rathke and Robelt. Finally Köl-
-liker, the most recent writer on Development,
distinctly adheres to their views.

Other anatom
-ists

One would have now thought that such
an overwhelming mass of evidence, all tending
to prove that, in the male, the Excretory Ducts
and in the female, the Müllerian Ducts, were
the real developing tubes, would have been quite
conclusive. But in 1850 Dr. Follin of Paris pub-
-lished an Inaugural Thesis for which he ob-
-tained the gold medal of that year, in which
strange to say, he most distinctly denies the mo-
-dern opinions of the above-mentioned authors and
reverts to the notion of Bischoff and Coste that
in both sexes, the Müllerian Ducts form the
excretory genital passages— He says "The Wolf-
"-fian Bodies, as I shall shew form neither the"
" kidneys nor genital glands, nor does their "
" Excretory Duct form the Vas Deferens, or its "
" commencement, the Epididymis:— their "
" "rapports de voisinage" are the only grounds for "

Follin's View


Tubules on summit of Wolffian body
(The New Structure).
Müller's Duct.
Mesorchium and blood vessel in it
Müller's duct.
Excretory duct coming out from substance
of gland.

" supposing so" — and again:— "The Excretory Duct"
" of the Genital Gland, is developed independ-"
"-antly of the Wolffian Body:— in the male sex"
" that duct approaches the testicle, unites itself"
" to it by an abrupt hook, next folds itself in-"
"-definitely, and so forms the Epididymis. In the "
" female sex, that duct expands slightly at its"
" upper end and remains separate from the"
" Genital Gland. All these phenomena occur apart"
" from the Wolffian Bodies" —

Finally D.r Cleland in an Introductory Sketch of the developement of the Testes, prefixed to his Essay on the Gubernaculum, says that the Excretory Duct becomes concealed among the secreting tubules of the ~~the~~ gland, while along its outer border is developed the Mullerian duct, which ends at its upper part in a mass of Convoluted tubules which are formed independantly of ~~each other~~ those of the Wolffian Body, but in a position originally occupied by them. From the Mullerian Duct is formed the Vas Deferens and from these Convoluted

Cleland's View

the Epididymos in the male! – and in the female the same duct forms the Fallopian Tube and the Convoluted Tubules or striae, the Fimbriated extremity.

Müller.
Cleland
Beschoff
Coste
Follin
} —— Hold various opinions concerning the relations of the two Ducts to each other and to the Wolffian Body, but believe that in both sexes the Müllerian Ducts are the Developing Tubes –

Valentin – 2nd opinion
Rathke " – "
Kobelt –
Leuckart –
Allen Thomson
&c.
} are agreed as to the relations and conducts of the two Ducts and believe that in the male the Excretory Duct and in the female, the Müllerian duct develops –

I am ~~somewhat~~ afraid that it will be somewhat difficult to follow the varying and perplexing accounts given above, but in extracting them, from the works of their different authors I have endeavoured to condense and render them

as intelligible as possible, and although I have been obliged to employ a considerable amount of repetition, still, it is almost necessary to do so, in order to keep the main facts prominently in view—

I will now state what I have observed myself and how far it accords with the views of others—

6. Ducts of the Wolffian Bodies—

In the embryo which I first examined (3/8 tenths of an inch) I saw proceeding from the lower end of the Wolffian Body a single Duct which went towards the Allantois!— this is the Excretory Duct. When the embryo attained the length of 6/10 tenths, the Genital Gland was seen as a faint white streak along the inner border of the Wolffian Body and about the same period along its outer edge, a fine cord was seen raising itself up, as it were, from the substance of the Gland, and evidently continuous with the Excretory Duct. But in this cord, there was rapidly developed, in addition to the Excretory Duct, a clear white filament

P.1.f.3 (P.1.f.2)

P.1.f.5

viz the Müllerian Duct, which soon extended also from the top to the bottom of the Gland, and in the embryo of 1 4/10ths of an inch or so, their relations to each other could be distinctly seen –

The Excretory Duct was of a greyish colour exactly similar to that of the Wolffian Body itself, while the Müllerian Duct shone out clear and white and although the former is in reality much the larger of the two, it is only discernible with the utmost difficulty (at least while it lies along the Gland) while the latter attracts notice at once: – and this I think led Müller and Cleland into the error of supposing that the Excretory Duct emerged from the substance of the gland at its lower end, and did not run up along its whole length – The Müllerian Duct lay in front of and upon its fellow, having a slightly wavy course, but when the two became free of the gland at its base, Müllers duct formed a graceful curve over the other and turned completely behind it – Immediately after that, the two ducts from the opposite Wolffian body joined them, and the

- P.1 f. 9 & 10 (P.1 f. 5 & 6)

Appearance of the ducts –

Their position

whole four united into one solid cord termed Thiersch's Genital cord (Genitalstrang)-

Müller's duct was shewn by Rathke to be at first a solid filament, which in process of time became a hollow duct.

This state of matters continues for some time till the embryo is about two inches long, or there abouts and then the Wolffian Bodies begin, so to speak, to revolve on their own long axes, so that the Ducts which were at first situated along their outer edges now come to be almost in front of them, and this goes on till they are in fact completely on the inner side next to the Genital Gland. I should suppose that this arises not from any action on the part of the Organs themselves, but from the growth of surrounding tissues, from their own commencing atrophy and from the more compact closing in of the Abdominal walls in front, which, in a manner roll the organs round-

Wolffian Bs. revolve — P.I. f.11.

When the Embryo is about 3 inches long, the upper part of the Wolffian Body

proper begins to shorten from above downwards so that the Genital Gland, which at first lay about the middle of the organ, is speedily found to have its summit on a level with that of the Wolffian Body. But state on a superficial view that Body seems as long as ever. How can this be? The reason is that as the upper part of the Wolffian Body shortens away, its place is taken by a totally New Structure, whose lower edge lies just level with the top of the Genital gland — In the embryo of the sheep, which is often congested and its vessels full of blood, the Wolffian body has then a fine orange pink colour, and, in contrast with this, the newly formed structure at its summit is seen to be of a pearly white colour, just like the genital gland. +

P.I.f.12.

Formation of a New Structure

P.I.f.13. (P.I.f.7)

We saw that at first the two ducts reached quite to the top of the organ and in reality they still do so, but in consequence of the changes which have been just described, the end of Muller's duct now reaches close to the top of the genital

Ducts change their position only apparently

gland, following the margin of the now diminished Wolffian Body, but apparently seeming to lie across it:— while, the Excretory Duct, at its upper end, melts away into the New Structure— Bos- choff, without knowing the cause of the two ducts thus separating from each other, describes the fact thus "When, at the slightly pointed" " upper extremity of the Wolffian body, the parts " " of the Cord separated from each other, the excret- " "-ory Duct continued to mount upon the sum- " "-mit of the Wolffian Body and became " " continuous with the thread prolonged to " "the Diaphragm (Diaphragm Ligament?)— " " But the anterior solid filament (Müllers duct) " " inflected itself from without inwards over the " " internal face of the Wolffian Body to reach the " " upper part of the Genital Gland"— But without an explanation such as I have given above, how is it possible to conceive of a solid filament leaving the side of an organ and travel- -ling over its surface?— with it, no such feat is necessary, for in reality it only returns its prim- -ary position, following the convex curvature of P.1 f.13 (P.1 f.11)

the Wolffian Body– Bischoff, again, thought that the Excretory Duct merged into the Diaphragm Ligament, but, as I think, it is simply continued, from the proper substance of the Wolffian body, into the new Structure on its summit–

To Dr. Cleland is due the merit of first pointing out the existence of this new Structure, (the future Globus Major) though, he certainly committed an error in saying that the Müllerian Duct terminated in it– it is the Excretory duct, which really forms a connection with it– But this will be treated of afterwards. Cleland's error (Drawing at p 29–)

7. Connection of the Ducts with the Wolffian Body–

Before proceeding to notice the changes which occur in the two Ducts, whose origin we have now traced, it is necessary here, to shew, in a few words, what are their connections with their Glands, and with the Allantois into which they open below. The Excretory Duct, as we have

I have often seen this my self, but only one little scraps of sections, which however intelligible to my self, would hardly prove equally so to the eye of another, who had not been looking specially at the structures in question.

I have therefore been unable to send in any preparations to shew this.

seen, runs up along the whole outer border of the Gland, and into it open, at short intervales, the tubules of which the latter is composed, as can be seen on making a longitudinal section of the gland comprising its duct. The ducts seemed to me to be smaller at their mouths than at any other part of their course. It is quite possible, and has been done by many Physiologists to inject the Wolffian Bodies, for which purpose filtered ink seems to answer best. A very fine canula is to be pushed into the Excretory Duct and the injection being very gently thrown in is seen to mount up the tube and then flow into the flexuous canals of the Wolffian Bodies. When the New Structure appears at the apex of the Body, the Excretory duct, as far as I can see, seems by degrees to prolong itself upwards into it, and ultimately receive the canals of which, as I shall afterwards describe, it is composed. This is a very difficult thing indeed to demonstrate, but when we come to consider the formation of the Vas Deferens and Globus Major, it will

Injecting the Wolffian Bodies

(P.1.f.1) P.1.f.13 & P.3.f.3 (P.3.f.1)

Excret.y Duct enters New Structure

be evident that such must take place.

Müllers ducts are at first mere solid threads (which Kölliker thinks is opposed to the usual formation of such Gland ducts) but finally become hollow and terminate in minute cleft-shaped openings at their upper extremities - In the male they are smaller than in the female, more especially in the human subject - at any rate those who have examined them in man say so. + But in the sheep, the difference is not very well marked and would, at first, hardly serve alone as a guide to distinguish the sexes.

Appearance of Müllers Duct

P. I. f. 9 & 10 - (P. I. f. 5 & 6.)

8. Opening of the Ducts into the Allantois.

In connection with the early history of the Wolffian bodies we must briefly consider the structure named the Allantois and the connection between them - There are three views regarding its formation. (1) That of Reichert:- that it is developed from a growth of cells from the posterior extremity of the Corpora Wolffiana (2) That of Valentin, von Baer &c.:- that it is formed out

of a saccular process which passes out from the cloa-
-cal termination of the intestine (3) That of Bischoff
;- that it arises as a double mass of cells projec-
-ing from the visceral plate of the tail, which
fuses together and forms a single vesicle!- and
he overthrows the two former notions by shewing
that this existed before either Wolffian Bodies or
Intestine were visible-

Views as to the Allantois.

Be this as it may, the Excretory Ducts and the lower
end of the Intestine certainly form a connection with
this vesicle, which when the visceral plates close to-
-gether, hangs out of the abdomen. The portion of it
nearest the embryo, together with the small part
already within it, form the bladder, while
the most remote part, having become greatly at-
-tenuated, is drawn gradually into the abdom-
-inal cavity and forms the urachus- When the
Ducts of Müller come to be developed, they too
open into the Allantois (or as we may by this
time more correctly say, the part of it termed Sinus
Urogenitalis) close beside the Excretory Ducts
The term Canalis or Sinus Urogenitalis was applied

Changes in the Allantois-

Openings of the Ducts

was applied by Müller to the part where the four ducts open - The two Excretory Ducts emerge open very close to each other; so much so, that Valentin said they opened together by one aperture, but such is not the case for a distinct septum can be seen between them. The Müllerian ducts open somewhat in a line with them, and the orifices of the Ureters are seen higher up.

G. Development of the Ducts in the Female -

As the Wolffian Bodies begin to waste away, the Müllerian Ducts on the contrary begin to increase in size and length. At the same time the ovary comes to lie more and more horizontally the Diaphragm Ligament has begun to widen into the Broad Ligament, and owing to the changes in position &c. of the Wolffian Bodies described at page 32 Muller's Ducts in place of having the whole of their length interposed between it and the Ovary as now on the inner side and close to the latter — By the time that the embryo is five inches in length, these changes are

P. 1. f. 14.

well seen, and about this period the development of the different parts of the Generative apparatus seems to goon with most rapidity, in so much so that a quarter of an inch of increase in the length of the animal makes a wonderful difference in their appearance.

At the point, whence the Round Ligament springs the Müllerian Ducts makes a curve, and the portion of it below this, which is destined to form the cornua uteri, increases materially in size while at its upper extremity, the Duct makes a turn upon itself, much resembling the crook of a Bishop's crozier, and its open orifice there becomes more and more patulous and bell-shaped. In the foetus of 7 inches the parts have almost assumed their permanent appearance, the ovaries being now quite horizontal, on a level with the summit of what may now be termed the uterus and a long way distant from the kidneys. The lower ends of Müller's Duct are now the horns of the Uterus, and the middle and upper portions, forming, the Fallopian Tubes, begin

Formation of Cornua uteri

Pl. f. 15. & 16.

† Pl. f. 9 & Pl. II. f. 1

Pl. f. 17 & 18.

Of the Fallopian Tubes.

Todd's Encyclopedia of Anatomy and Physiology -
Article Ruminantia - p. 544 -

to acquire numerous folds and convolutions. For some time there has been forming along the margin of the Fallopian Tube, a fine membrane, which now broadens at its upper part where the Tube takes the curve upon itself and extends to the bell-mouthed extremity of the latter. In the adult sheep this forms a sort of bag or veil, having at its extremity the Pavilion of the Fallopian Tube, and adapted, as it were, to envelope the Ovary. This bag or net which exists also in the pig is not represented in the drawing of the Uterus and its Appendages in the Sheep given in Todd's Encyclopedia. The Pavilion or Morsus Diaboli is formed by a simple expansion of the mouth of Müllers Duct, aided probably by the addition of a membrane such as I have described as being connected with the Fallopian Tube, which forms the fringe. I have examined it most carefully by steeping it in Tartaric Acid, & then spreading out on a glass slide, and examining it by the aid of a lens and a

Curtain in the sheep

P.6. P.7.f.4

strong light, and it appeared perfectly trans-
-parent without the slightest trace of tubular
or other remains in it whatever. I mention this as it will ~~afterwards~~ be seen to bear on Dr. Clelands idea that the Fimbriae were formed from the striated tubules in the new structure at the top of the Wolffian Body into which he ~~alleged~~ believed that Müllers duct ended—
—Were such the case, the Fimbriated extremity would have infallibly shewn some traces of these tubules, which it does not—

Fimbriated Extremity

The Wolffian Bodies and their Excretory Ducts form no part of the proper Generative system of the female—

10 Developement of the Ducts in the Male—

It will be remembered that at page 24 to 30 I gave a brief account of the different opinions of two sets of anatomists, regarding the forma-
-tion of the Fallopian Tube and Vas Deferens:—
—the one set believing that Müllers Duct form both, the other that they only form the Fallop-

-ian Tubes and that the Vasa Deferentia arise from the Excretory Ducts of the Wolffian Body.

For a considerable time, during my examination of these structures, I held firmly by the first idea. Müllers Duct is undoubtedly a more prominent object than the Excretory Duct and its development into the Fallopian Tube in the female is so plain and clear, that one is almost tempted to take it as a matter of course that it acts similarly in the ~~male~~ other sex- In the male again, the Duct is smaller and it is more difficult to observe what happens to it, while at a certain period, as I noticed before, the parts of the Generative system, metamorphose so rapidly, that should a single link ~~the~~ two in the chain of development be missed over, (in the shape of embryos of a certain age) the Müllerian duct has faded away and the Excretory has started into full view as the Vas Deferens, before one can be fully sensible of the change without the minutest examination - Moreover

As ~~seems~~ appeared so simple to believe that in both sexes

the same duct should develope for the same end viz. as a Genital canal- and it seemed unreasonable to suppose that a special structure should be created in the male apparently for no other purpose, than to atrophy again as soon as it had attained a certain perfection— However after making sections of the so-called Thiersch's Genital-cord and reading Weber and Leuckart's description of the Uterus Masculinus, I was induced to reconsider the matter on a new series of embryos, and was eventually convinced, although at first much against my own inclination, that the opinion I had espoused was wrong and that that of Rathke, Kölliker and Kölliker was the only one which could at once satisfactorily account for the eccentricities, if I may so term them of Hermaphrodism and give a rational explanation of the origin and anatomical significance of such bodies as the Hydatid of Morgagni or the Vas Aberrans Halleri or the Organ of Weber— When such men as Valentin and Rathke fell into much the same error

(vide their first opinions)- it is not to be wondered at that one so little accustomed to the study of embryology and the peculiar appearances of foetal structures, as I, should have been deceived in a similar manner–

In the male then I believe the Excretory Duct undergoes a process of separation from the canaliculi of the Wolffian Body (p 20) but it is entirely or all but freed from them, while the Müllerian duct, all but its upper and lower ends, almost entirely disappears.

Excr.y D. separates from tubes of Wolffian B.

P.3. f.3. (P.3. f.1.)

Just as in the female we saw Müllers Duct come to occupy a position close besides its ovary, so does the Excretory Duct with regard to the testicle!– and at the point where the Gubernaculum (Round Ligament) springs, it too, like the former, makes a sharp bend. The portion of it between this point and the bladder, remaining straight becomes the Vas Deferens; the portion immediately at that point, becoming gradually more and more convoluted forms the Globus Minor and the part above that, doing the same, forms the Body

P.2. f.6. (P.2. f.3)

Formation of Vas Deferens

Globus Minor

Body of Epididymis

of the Epididymis— As the testis begins to be pulled down by the Gubernaculum it turns gradually on to its outer side, whereas it originally lay on its inner side, and in place of becoming more horizontal like the ovary it becomes more vertical in position, so that its vessels come to lie and enter at its upper end. These vessels increase greatly in thickness just above the testicle, thus forming what is termed the "Vascular Tumour" in the adult. In the bull and ram they get so convoluted as to form a swelling like a coiled rope on the superior extremity of the Testis. As the Testis approaches the Inguinal Abdominal Ring, the vas deferens neces- -sarily becomes more horizontal and when the gland enters the ring and descends into the scrotum it finally runs perpendicularly from below upwards.

Vessels of the Testis

P.2.f.849. (P.2.f.5)

P.3.f.182.

11. Formation of the Globus Major.

I have now explained the formation of the Vas Deferens, the Globus Minor and the Body of the Epididymis, but what forms the Globus major?— meaning thereby the Coni Vasculosi and Vasa Effer-

-entia:- and how does the Testis form a junction with its Duct- At page 33 I described how at a certain epoch the upper part of the Wolffian body shrank away and its place was taken by a New structure, first noticed by Dr. Cleland+- As the Wolffian Body atrophies away this new Structure on the contrary becomes more and more distinct. x

Description of the New Structure P.1.f.13. P.1.f.7 (Vide figure on p. 29 (P.5.f.6.)

It exists both in the male and in the female, but in the former it serves by far the most important end- In a sheep of about 6 inches long where, from some inflammatory process most likely, the testes had become glued on to the front of the kidneys it was beautifully seen, forming a sort of cocked-hat shaped body, seated near the summit of the testis, much as the the Supra-renal capsule is on the kidney. On making microscopic sections of it, this structure is seen to be composed of a homogeneous substance containing within it certain tubules, which as Dr. Cleland remarks "cannot be composed of the canals of the Wolffian Body transformed for were this the case we should find them consisting of hollow tubes from the first whereas they begin as solid bodies"

P.2.f.5.

It's contained tubules

" indistinctly separated and smaller than the "
" Wolffian tubules."

These tubules which are about twelve to eighteen in number, as far as I could count, run almost transversely from without inwards, being broad at their outer ends and pointed at their inner where they converge somewhat towards each other. They are slightly wavy in their course; at their outer ends they are seen to be bound together by a tube running round and, as it were, collecting them in a manner and I am convinced that the Wolffian Duct becoming slightly prolonged upwards, effects a junction with this common tube. Here then are the future Coni Vasculosi of the adult which when unravelled are found each to consist simply of one tube convoluted upon itself and which all open into a common duct at their outer extremities, continuous with the canal of the Epididymis. As was said previously this structure comes eventually to rest quite on the summit of the Testicle - and then from

P.3. f.3.
(P.3. f.1)

it there passes a short straight cord into the substance of the gland and to this cord the converging points of the Coni Vasculosi are seen to attach themselves. It soon becomes striated longitudinally and each striation, becomes a distinct Vas Efferens connected with a Conus Vasculosus. + P.3.f.4 &5. (P.3.f.2&3)

This process which I have traced all through and which agrees with Dr. Cleland's description, except as regards the Duct, affords I think the best explanation of the formation of the Globus Major, and is one of the most interesting points in the whole subject. It will be observed that according to this theory no part whatever of the Wolffian Body enters into the construction of the Generative Apparatus and in consequence we are not under the necessity of supposing the transformation of one kind of secreting structure into another.

Having thus stated my own views, which, to a certain extent, are those also of Dr. Cleland. I shall now give those of other authors and

endeavour to point in what particulars they fail.

Beginning with Müller, he I think, has approached very nearly to the true state of things for he says:- In both sexes the Wolffian Bodies are not converted into any other organ. In the male the part of the epididymis, which consists of the Coni Vasculosi is formed of Transverse Tubes which connect the Efferent Tube with the Testis and all that part of the Efferent Tube, which is thrown into strongly-marked convolutions along the outer boarder of the Wolffian Body contributes to the formation of the Epididymis- Had he only given a more minute and accurate account of these "Transverse connecting Tubules" and had he known that the Excretory Duct was the true Efferent Tube his description would have been complete and, as it is, his evidence is in favour of the probability of the theory I have given above- Müllers view of the Globus major-

Bischoff again says that he made vain efforts to discover a communication between the Testis and Bischoffs view-

the Excretory duct of the Wolffian Body: that he had often seen a filament (the Transverse Tubules above mentioned) such as Müller described and figured, but it always turned out to be either a bloodvessel or a fine fold of peritoneum, and that the only origin he could ascribe to the epididymis was that Müller's Duct became closed at its upper extremity, folded indefinitely and so formed it. Follin's account is precisely similar. This theory is, I think, quite untenable. Every anatomist must see that there is no difficulty in understanding how a simple tube, may so twist and turn upon itself as to form the Body and Globus Minor of the Epididymis, and so enlarge and swell out as to form the Fallopian Tube and Cornua Uteri, but how a simple tube could by any possibility so form a complicated structure, such as is composed of the Coni Vasculosi and Vasa Efferentia, is I think quite incomprehensible. Besides, as regards the sheep at least, and we may hence very fairly infer, as regards

Follin's account.

man two, there is nothing, I am more certain of, than the existence of a distinctly situated and arising between the Testis and the New Structure on the top of the Epididymis—

Lastly, Kobell partitions out the various canalicules of the Wolffian Body into three distinct sets:— An Upper, Middle and Lower, to each of which he assigns a different destiny:— The Upper set along with the Ampulla (upper termination) of the Excretory Duct being changed into certain vesicles found on or in the Epididymis, the Middle becoming the Coni Vasculosi and communicating at a latter period with the Rete Testis as Vasa Efferentia, while the Lower disappear or are changed into the Vas Aberrantia of Haller: and he gives a drawing which certainly shews these occurrences in a very plain manner:— rather too plain in fact— But in order that such should take place, it would be necessary for the summit of the Testis to remain exactly on a level with the central tubules of the Wolffian Body, P. 14. f. 182.

so that they might readily effect a junction with it_ It does not do so: long before any junction can be traced between the two glands the top of the one is on a level with that of the other_ Again it so happens that the bulbous culs de sacs of the Wolffian bodies which lie next the Testis and it is not likely that they would change into delicate vasa Efferentia. This theory also involves the transformation of a structure whose function is that of the kidney into one whose function is to secrete semen. Moreover most other anatomists, however they may differ as to the origin of the Epididymis, agree that at any rate, no part of the Generative System, is formed from the Wolffian Bodies_ Kobelt published his paper in 1847, but within the last year or two, Kölliker of Paris has pointed out that the true vestigies of the Wolffian Body (or at any rate the greater part of it) are to be found lying in front of the Vascular Tumour at a short distance above the Epididymis. How would Kobelt account for these?_ He would

have required to divide the Wolffian Body into four sets to provide for them too.

Finally it is perfectly easy at a certain epoch to see the new formation at the top of the Wolffian Body, lying close on the summit of the Testis and the whole length of the Wolffian Body, in an advanced state of Atrophy, stretching down the side of it.— But while thus disagreeing with him as to the conduct of the Upper and Middle tubules, I reserve my opinion as to the Lower (Waller's Vasa Aberrantia) regarding which I think he gives a satisfactory account—

Kölliker only differs from ~~myself and~~ Dr. Cleland & myself in believing that the Caput Epididymis is formed by the altered upper tubules of the Wolffian Body. As the reasons for thinking it an entirely original formation are given at pages— 47— I need not here recapitulate them—

Resumé.

Müller— considers the Caput Epididymis to be formed from— Transverse tubules connecting the Testis and its Duct.

Follen & Bischoff— from the Convoluted upper end of Müllers Duct—

Robell. ——— from the Middle Tubes of the Wolffian Body

Kölliker— from the Upper Do. Do

Cleland. from a New structure formed on top of Wolffian Body—

12

Formation of the Vagina, Uterus and Seminal Vesicles.

It is obvious that to treat of the formation ~~of the formation~~ of the various parts of the Generative System, at one time or as a whole, would render the subject far too complicated to be easily followed and I am therefore under the necessity of taking it piece by piece, and following each part to its final developement, before treating of another. We have traced the progress of the Ovary and Fallopian Tube in the Female and of the Testis, Vas Deferens and Epididymis in the Male, and there now remain to be considered the Uterus and Vagina on the one hand and the Vesiculae Seminales on the other, which all arise in connection with a structure not hitherto spoken of viz the Genital Cord:- a structure which seems to have been first carefully investigated by Thiersch-

The Genital Cord-

In a previous part of the paper I mentioned that the two ducts of the one Wolffian Body joined those of the other, at a short distance from their respective glands and that the whole form after

thus forming the Genital cord, proceeded on their way to the Sinus Urogenitalis. + Just before the junction is effected, the two Müllerian Ducts curve over the two Excretory Ducts so that on making transverse sections of the cord, the former are found to lie posteriorly in it. I do not find that Müller, Bischoff, Follin or Leuland made such sections; - at any rate they do not mention having done so in their writings, but Theirsch has done so in the sheep and Kölliker in the calf with the result of finally settling a number of vexed questions. I have repeated their observations many times on sheep from two to four inches in length, by hardening them in spirit and making sections through the whole embryo from the commencement of the Genital cord continuously down to the Sinus urogenitalis. P. 1. f. 7. (P. 1. f. 4)

In such sections then, the two Müllerian Ducts are found lying behind the two Excretory; × the former being known by their round shape, clear defined edges and thicker walls, the latter being more oval in shape and their walls not half so thick. Sections thro' Genital cord. P. 6. f. 142. (P. 3. f. 6).

In the female of about 2½ or 3 inches, in a slice made at a very short distance from the commencement of the cord, the two Müllerian Ducts, are seen to approach very close to each other; then (after a few more sections) they coalesce and finally they join into one tube, which advances somewhat forwards in the substance of the cord so as to lie between, in place of behind the two Excretory Ducts, which remain separate during their whole course. But about the middle of the cord, this single tube shews signs of separating again into its two component ~~tubes~~ halves & very soon the two Mullerian Ducts again appear as separate canals, but this time, it struck me, that they did not lie so much side by side as one in front of the other, and they had also retreated to their original position behind the other Ducts. At the end of the Cord they had again united into a common tube — The Excretory Ducts, which at first were of much greater diameter than the others gradually diminish in calibre, till at the lower end of the Genital string they are much the smaller of the two

P.b.f.2
P.4.f.1

Genital cord in the female

sets. In older embryos Müllers ducts get quite united all the way down into a single broad canal which soon completely occupies the whole cord while the now comparatively small wolffian Ducts are pushed aside. This canal represents the vagina and body of the uterus and the remains of the Excretory Ducts are transformed into the Canals of Gaertner, situated, in the adult, in the midst of its anterior walls.

Müller's ducts form one canal

Specimens are occasionally met with in which both uterus and vagina are double or where the uterus is single and the vagina double or vice-versâ - and the conduct of Müllers duct in the Genital cord explains these anomalies in the most simple and beautiful manner. In the cords of the earliest embryos which I have examined, the point of union of Müller's Ducts took place first at a spot which in the adult would have corresponded to the Cervix Uteri - now if the union had gone on above that point and ceased below it a single uterus and double vagina would have resulted: had it gone on below it and not above, we would

Abnormalities explained

have had a double uterus with a single vagina, and should no union have taken place at any point both ~~will be~~ would have been double. I obtained by chance, at the Slaughter-Houses, a very fine specimen of double uterus and cervix in the sheep. (of which I give a sketch.) I now regret exceedingly that I did not preserve the original as the man from whom I got stated that it was a great rarity. Whether the vagina was double or not I cannot say, as in dressing the sheep, it is always cut away from the uterus. P. 5.

The single canal formed in the Genital cord by the union of Müllers ducts increases with great rapidity both in length and breadth, but still it is a considerable time, ere any distinction can be made between Vagina and Uterus as seen externally In the sheep of 4 to 5 inches long, on slitting up the Genital Canal, several delicate transverse rugae are seen forming about a third of the way down and these represent the future cervix. At the same time, at the external outlet of the canal several longitudinal folds are visible, in one of the largest of which the opening of the urethra is seen. Soon P. 10 f. 5. Genital canal divides into vag. & uterus P. 10. f. 1.

however the vagina becomes distinguishable externally by its bulk greatly exceeding that of the upper part of the canal which forms the Uterus and Cervix and when the embryo is 7 or 8 inches long the disproportion is very striking, the vagina being about 2½ times broader than the uterus. On the Internal aspect the rugae get stronger and stronger till the cervix is distinctly marked off, and it is remarkable how large this is in comparison with the body of the uterus. Even in the full grown sheep it measures several inches, is of an almost cartilaginous density and is possessed of a most complex series of rugae or folds up the middle of which the canal winds— Synchronously with the appearance of the rugae of the cervix, the walls of that part become considerably thickened more especially at the point where the Os Externum is to form, and even in mature foetuses they are thicker than those of the vagina or Fundus uteri.

P. 10. f. 6.

The Vagina

P. 10. f. 2. 3. 4.

Cervix Uteri

Body of uterus

Towards the end of utero-gestation, the ~~Fundus uteri~~ Body of the uterus assumes as regards size, some proportion to the rest of the Genital Canal.

In the human species, the uterus up to the end of

Meckel. Manuel d'anatomie. T. III. p. 660.

the third month as two-horned and it is only towards the end of the fourth, that it increases in bulk to produce the Body and fundus properly!- and this is a proof that the uterus in man is formed just as in the lower animals, from the union of the Müllerian ducts, and not from a prolongation from the sinus Urogenitalis, which as will be seen immediately was the doctrine of Rathke-

Uterus in the woman

In the male the processes which go on in the Genital cord are exactly the same as those in the female; the two Müllerian ducts uniting into one tube and the Excretory remaining separate!- and this, I think, is an irrefutable proof that the former can by no possibility form the Vasa Deferentia- It was this that first shewed me my error in thinking so, and, I am sure, that if Bischoff or Kölliker or Cleland had made careful sections of the Genital cord for themselves, they would not have fallen into the same mistake.- The single tube thus formed by the united Müllerian ducts does not however, as in the other sex, develope into a large and important organ but diminishes away (or to speak more correctly, ceases to

P. 6. f. 1.
P. 3. f. 6

Genital cord in male.

Vide - Diagram page 68.

to grow) till it only remains as the hollow vesicle found on the Prostate Gland and known by the name of the Uterian organ or Uterus Masculinus.

Uterus masculinus.

13

I shall now offer a few remarks on the origin of the Vesiculae Seminales: for although the modern opinion would seem to be that they are not absolutely essential to the procreative system in so far as they do not originate or elaborate Seminal animalcules, yet they are most intimately connected with the structures which have just now been considered.

Vesiculae Seminales.

Rathke, in his writings, gives the following description of their Development.[x] At the point where the ducts of the Wolffian Bodies open into the Allantois, a small conical diverticulum forms into which the extremities of these canals open, so that in fact they have thus only a single orifice of entrance into the Sinus urogenitalis. From this Diverticulum the Vesiculae Seminales arise under the form of two other small lateral pouches which necessarily have only an indirect communication with the Sinus Urogenitalis and Vasa Deferentia

by means of the primary Diverticulum from which they spring. But gradually the latter shortens, so that the Vesiculae seminales come to lie quite close to the Sinus urogenitalis (the future Urethra, in the male) and also to the openings of the Vasa Deferentia, which finally coalesce with them. The shortened Diverticulum now splits into two and each Vas Deferens carrying with it a Seminal vesicle, thus comes to open independently into the urethra — Rathke on their formation

In the adult human subject the Vesiculae seminales are two oblong, sacculated bodies, wider behind ~~them~~ but narrow in front and measuring about 2 1/2 inches long which lie on the under surface of the bladder extending forwards and downwards from near the terminations of the ureters to the base of the prostate and opening into the common Seminal or Ejaculatory Ducts. Their sacculated appearance is owing to their peculiar formation, each consisting of a tube coiled upon itself in a complicated manner and firmly held in that condition by a very dense fibrous tissue; which en Sem. vesicles in man. P. II. f-1-

unravelled this tube is found to be from 4 to 6 inches long and about the widtth of a quill. Its posterior extremity is closed so that it forms a long cul-de-sac, but there are generally if not always several longer or shorter branches or diverticula developed from it, which end by closed extremities. Its anterior extremity, which forms the fore part of the vesicula becomes straight and narrowed and joining the narrow termination of the corresponding vas deferens forms the Seminal duct. In structure the vesicul ae Seminales resemble very closely the adjoining sacculated portions of the vasa deferentia.

I have prefaced this short account of the structure of the fully formed Seminal vesicles because I think it affords primâ facie evidence in favour of, or at any rate, certainly does not militate against what seems to be the true account of their mode of formation. — In making sections then of the Genital cord from above downwards in male sheep from 3 to 4 inches long we come to a point near its lower end, where the two Excretory

Ducts (Vasa Deferentia) come to be apparently somewhat dilated, but on careful examination it is seen that from their outer sides, there spring two hollow saccules which widen at their outer ends, so as to be pear shaped ∠ After a few more slices of the cord have been removed, these are no longer seen and the Excretory Ducts resume their ordinary appearance before entering the Sinus Uro-genitalis. These hollow saccules are the first rudi-ments of the Vesiculæ Seminales and there can be no more difficulty in understanding how by their elongation and folding upon themselves they form the vesiculæ themselves than in understanding how the Excretory Duct can form the convolutions of the Body of the Epididymis, while the sim-plicity of this mode of formation contrasts strongly with that detailed by Rathke — They are at first entirely contained within the substance of the genital cord, but soon become visible externally on its lateral walls as two minute points, after which they rapidly increase, keeping pace in growth with the neighbouring structures.

True mode of formation

P. 6. f. 1.
P. 3 f. 6.

14

The Sinus Urogenitalis.

In the foregoing pages, the term Sinus Urogenitalis has frequently been used and though there is no doubt as to what that structure really is, there has been considerable controversy of opinion as to what are the transformations which it undergoes. At a very early period of embryonic life, the Allantois and Intestine have one common external opening and as the allantois receives the ducts of the Wolffian Bodies, it thus happens that the Urinary, Generative and Alimentary conduits all open into one vestibule, termed the cloaca, similar to that which is found permanently in many of the Vertebrata. Rathke states that from the sides of this cloaca spring two lateral folds which advance to meet one another,* while the part where the intestine and allantois join grows forward towards these folds till by the coalescing of all the three, a complete septum is formed and the intestine shut off from the rest of the cloaca. By the thickening of the septum

The Cloaca

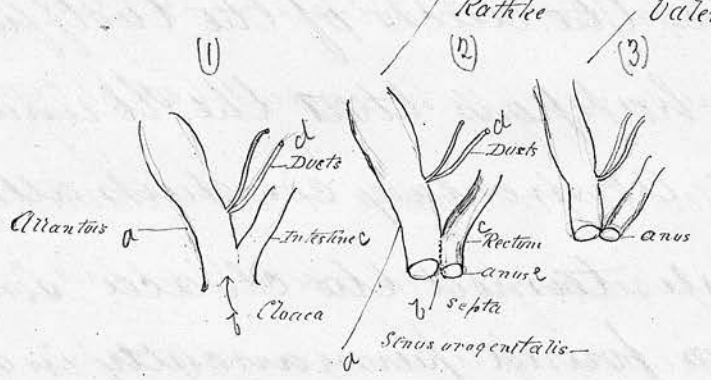
*(B2-44-)

Divisions of the cloaca Rathke

Fig 3

Diagram to illustrate the Division of the Cloaca—

Rathke / Valentin & Bischoff—



the perineum is formed - Valentin and Bischoff again think that the cloaca simply shortens and disappears up to the point where the allantois and intestine meet and thus these organs acquire their external openings - × I have made several dissections of these parts under water with needles and the aid of a lens, but although I was unsuccessful in finding the ~~the~~ projections which Rathke says form the septum, I think that reasoning from analogy his must be the correct view - For the existence of a Raphé or cord (as on the penis and scrotum) seems to indicate that the parts were formed by the fusion of two originally separate halves, and as we have such a raphé on the perineum, it is reasonable to infer that it too is the result of the line of junction of two such septa or projections as Rathke speaks of. — However this may be, the portion of the allantois, from the openings of the Ducts of the Wolffian Bodies is now termed the Sinus or Canalis Urogenitalis, serving, as it does, as a common exit for the urinary and genital canals - A few pages back, in Rathkes description

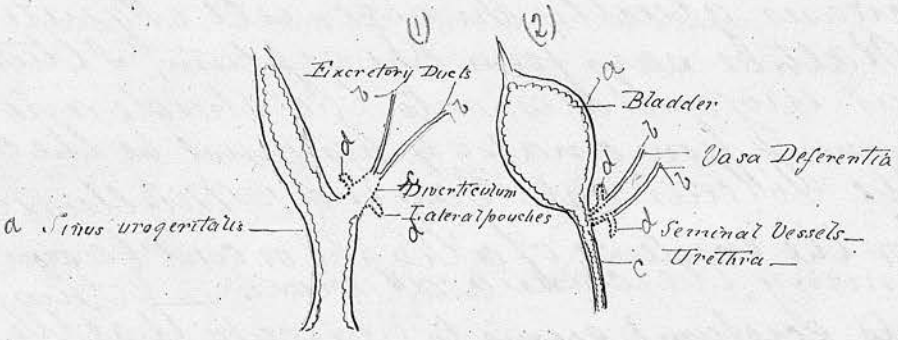
(82-69-)

Perineum

Sinus urogenitalis

Fig 2.

Diagram to illustrate Rathke's view of the formation of the Seminal Vesicles.



of the formation of the seminal vesicles it was stated that he believed that in the male at the point where the Ducts of the Wolffian Bodies entered, a sort of diverticulum or cul-de-sac formed from the sides of which the vesicles arose. In the female however this diverticulum in place of disappearing as it does in the other sex, increases greatly in size, till it quite throws the Sinus urogenitalis into the shade and thus forms the Uterus and Vagina:- Müllers ducts only forming the cornua at most. — This proposition seems quite untenable however, for no other anatomists have ever been able to see this diverticulum either in the male (p-62) or in the female — I have looked for it in vain — Here again, if Rathke had practised the mode of investigating these points by making sections of the Genital cord, he would have avoided this mistake, for he would then have seen that Müllers ducts, in that cord, unite to form a single

canal opening into the Sinus urogenitalis, which rapidly increases and is the true organ of the uterus and vagina - In fact he simply mistook this canal going into the ~~uterus~~ Sinus, for a prolongation from it.

But what becomes of the Sinus itself? - In the male, then, it simply contracts to form part of the urethra, that part, namely, which lies between the entrance of the vasa deferentia and the penis i.e the membranous and a small part of the prostatic portion, in the adult - The Neck of the bladder and what of the urethra lies between that and the entrance of the vasa deferentia is simply produced by a narrowing of the allantois, at the point where it enters the Sinus urogenitalis, while the part of the allantois above that again, swells out into the bladder - Finding of the Sinus urogenitalis in the male.

Round the part where the Excretory Ducts (Vasa Deferentia) ~~debouche~~ open, a deposit of cells takes place, from which the substance of the prostate is developed. In sections through the prostates of 6 & 7 months old children a number Prostate

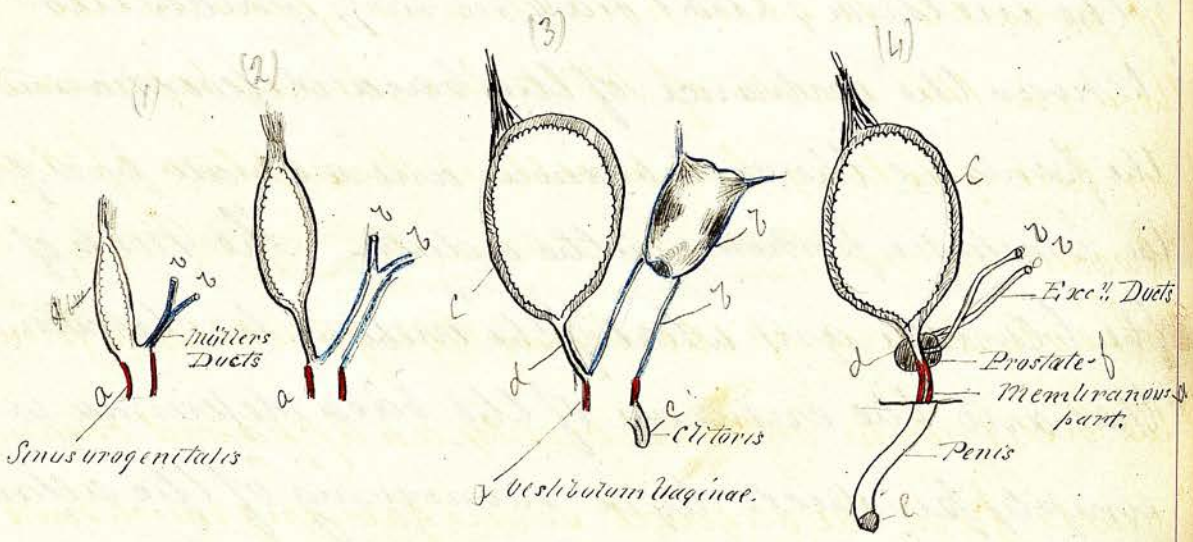


Diagram to illustrate the Sinus urogenitalis.

of small ducts were visible running towards the urethra and terminating in three or four acini at their ~~outer~~ inner ends; these being the rudiments of the glandulen portion of the organ-

In the female the Sinus urogenitalis forms no part of the urethra, but is developed into the vestibulum vaginae, and as I do not think it possible to shew how this happens better than in the words of Kölliker, I may be pardoned for here quoting his excellent description of it as it occurs in man:-

Finding of the Sinus Uro.g. in woman.

" The shortening of the Sinus Urogenitalis to form " the vestibulum vaginae is only an apparent one, and " results from the original sinus growing much more " slowly than the surrounding parts and so event- " -ually coming to appear but a small space by com- " -parison. In the human embryo of 3 months, the Sinus " urogenitalis measures 2½ m.m. and appears as " a canal broader than and immediately con- " -tinuous with the bladder and urethra (which " latter is not yet to be distinguished as a separ- " -ate part):- a canal at whose upper end the "

" vagina, which along with the uterus is only 3 m.m. "
" opens upon a small elevation. "
" In the four months old embryo the connections "
" of the canal are the same, but the uterus and "
" vagina measure 6 m.m., while the sinus has "
" hardly made any increase in size. But by the 5th "
" or 6th " months, the vagina has so broadened "
" as to appear a direct lengthening of the sinus "
" urogenitalis and the urethra, which is now dis- "
" -tinct from the bladder, appears as a canal open- "
" -ing into the vagina. In the 6th " month foetus "
" the sinus, which may now be termed the ves- "
" -tibulum vaginae is only 3/3 m.m. while the "
" vagina measures 11 and the uterus 4 m.m. These "
" numbers shew that the original sinus urog- "
" -enitalis not only does not disappear, but even "
" grows, but as the vagina and uterus, and the "
" lower part of the primitive bladder, which be- "
" comes the urethra, grow much quicker, the sinus "
" urogenitalis appears finally as a mere appen- "
" -dage. Moreover as the vagina broadens much "
" more than the urethra, thus the sinus urogeni- "

"-alis, which was at first the immediate continuation"
"of the bladder, becomes at least the end of the vagina"
"into which the urethra opens."

It will thus be seen that the sinus urogenitalis comes to form very different portions of the urogenital system in the two sexes: X in the male, assisting in the construction of the urethra - in the female, of the vagina. Nevertheless on careful examination a close analogy can be seen between the membranous portion of the urethra and the vestibulum vaginae. For suppose we were to cut off all that portion of the urethra contained in the Bulbus Corpus Spongiosum, what would then be the lowest portion of it (the membranous part) would ~~serve~~ exactly correspond to the vestibulum vaginae, the only difference being that, whereas in the male, the Generative Ducts (Vas deferentia) open into the urethra, in the female, there united Generative Ducts (Vagina) so increase in size as to make it appear that the urethra opens into them: - the truth being that the vestibulum

X (92-49-)

Sinus compared in the two sexes

vaginae and the membranous part of the urethra are simply the continuations of the Allantois below where the Generative Ducts open, or in other words the Sinus Urogenitalis. Finally the glands of Cowper are formed in the one, and in the other sex the glands of Bartholini;- which are universally admitted to be the homotypes of each other.

Developement of the External Generative Organs.

The External Organs of Generation do not make their appearance, till those which are charged with the preparation and maturation of the germ have already made some progress in the Interior, so that according to Kiedemann there is no trace of them visible till the end of the 5th. week in man-

Just as, for a considerable period, the internal organs of the two sexes do not present any characteristic difference, so is it with the External, and furthermore, as in the former, the female presents the type of greater simplicity and the

various parts adhere more to their original ~~form~~ plan of formation, we shall find the same rule hold good with regard to the latter.

In the following description I shall employ the terms, made use of by Kölliker, for the various temporary parts, as I think they are very expressive and will render the subject more easily understood.

In the first weeks, then, of Embryonic life, there is seen at the inferior extremity of the abdomen and in front of the rudimentary tail, a simple opening - the mouth of the Cloaca or Common receptacle of the Intestine and of the Allantois with the Ducts of the Wolffian Bodies. Before this separates into Rectum and Urogenital canal, there appears in front of it, a gentle elevation which soon forms itself into a little prominence or Hump - (The Sexual Prominence) and about the same period, two small swellings are visible on each side of the Cloacal Aperture (The Sexual Folds). These three elevations all become more and more prominent, until the Sexual Prominence

Cloaca - P.4. f.1.

Sexual promin - ence.

Sexual Folds

clearly shews itself as the future Genital member. (clitoris or penis) and then along its under surface, in the embryo of 1½th inch, a furrow now runs from near its point to the Cloacal aperture (the Sexual Furrow). The small portion of the rachemich which is not grooved by this furrow is the glans penis or clitoridis. About this period the separation of the cloaca and formation of the perineum described at page 66 occurs and from this stage it is necessary to trace the development of the parts in each sex separately. Sexual Furrow P.4. f.4.

In the Female. - Beginning with the female as the more easy, we find that the two Sexual Folds continuing separate on each side of the Urogenital aperture (vestibulum vaginae) form the Labia Majora, while the Sexual Prominence becomes the Clitoris, in man the orifice of the vagina, at first small and round, increases in size, and more especially in length, in proportion as the large, elongated clitoris diminishes, for the lips of the Sexual Furrow of the latter, receding considerably from each other, cause it Labia majora Clitoris

to shorten and it is finally drawn gradually within the vestibule of the vagina. At the same time, the margins of the Sexual furrow increase in size and even become pendulous, so as to form the Labia Minora, and also a sort of Prepuce covering for the Glans Clitoridis. In the sheep however the process is more simple, for the clitoris simply diminishes to a sort of pendulous body at the Inferior Commissure of the vagina, the groove on its upper surface, being continuous with the vaginal canal. It is thus, not drawn within the vagina, nor do the lips of its Sexual Furrow form proper Labia Minora.

Labia minora

P. 4. f. 5. 6. & 11.

The clitoris, however, does not always diminish into a merely rudimentary member, for Hagger has shewn that in the monkeys of the genus Ateles it is normally of extraordinary length and is possessed of very large Corpora Cavernosa, while in another genus, Stenops, the urethra traverses the clitoris, although the vagina has its usual position more posteriorly. In the other genera of monkeys, the organ presents nothing unusual-

Clitoris in Monkeys

* Farre. The Uterus and its Appendages.
Supplement to Todd's Cyclopedia - p 710.

Regarding the formation of the Hymen I can say nothing from personal observation, but Dr. Farre in his Article on the Uterus and its Appendages has given a very complete account of it. He states that it belongs to the same class of structures as the Valvulae conniventes and fringe-like folds of mucous membrane which not unfrequently surround the terminal orifices of mucous tubes. The lower end of the vagina in the foetus invariably terminates in a marked projection outwards of the mucous lining of the Tube. It takes the form of a laterally compressed conical fold, the base of which is continuous all round with the vaginal walls but the apex is directed forwards. Its centre exhibits a vertical slit-like orifice, the direction of which is apparently due to the lateral compression of the Nymphae and Labia between which it lies. This is the Hymen. As growth advances the posterior half of the fold becomes much more developed than the anterior and thus it happens, that in adults, the hymen usually presents

Hymen

Farre's description of it

the form of a crescentic or semilunar fold, the con-
-cave border of which is directed upwards or for-
-wards, while that which, in the foetus, had been
the upper half, has now become unfolded or lost
among the plaits of the Mucous Membrane, situ-
-ated at the upper part of the vaginal entrance.
But the primary foetal forms may be retained
viz the Circular Fold of Mucous membrane,
which as the part become more expanded, acquires
a central <u>round</u>, in place of <u>slit-like</u> aperture, Varieties of the Hymen.
while should the margins of the Orifice adhere,
as is sometimes the result of Inflammation in in-
-fancy, the Completely Imperforate Hymen is form-
-ed.
On the whole then the formation of the Hymen bears
a striking analogy to that of the Cervix Uteri, to
which during foetal life, it bears a marked re-
-semblance in form, projecting, as it does, between Resemblance to cervix.
the Nymphae, just as the Cervix does into the
vagina. Both constitute invaginations or intus-
-susceptions of the same canal, while in both the
the posterior half which is most largely developed-

Bischoff mentions that Breyer has attempted to shew

a comparison between the Hymen and the Fraenum Preputii of the male sex. But the only ground for this, which I can see, is the slight resemblance which exists between them in their being both composed of a thin structure formed by a double layer of mucous membrane, with a little connective tissue and some fine vessels interposed, and if we look at them from a developmental point of view, there is no analogy whatever. For where does the Hymen exist?— It exists at the lowermost part of the Genital canal, that is to say, at the lowermost point of the united Müllerian Ducts of the embryo, and these in the male form the structure in the Prostate, known as the Vesicula Prostatica. If therefore, we are to look for the analogue of the Hymen we must find it in some structure blocking up the entrance of the Prostatic Vesicle; and it is well known that in many animals this is so completely shut up at its mouth as to form a perfectly shut sac.— But furthermore it is going out of the way to find a representative for the Fraenum Preputii in the Hymen, for there really

Hymen in the male?—

Lizars Anatomical Plates.
Plate. XCI.

× In the third volume of Quain there are drawings of Kobelt given to shew this—

exists a very similar structure in the female at-
-tached to the lower surface of the clitoris where
the nymphae spring from it, and formed by the
partial union of the upper ends of these bodies
(It is well represented in Lizar's Plate of the ex-
-ternal generative organs.†) What gives additiona-
-al weight to this, is the fact that Kobelt has shewn
that the Nymphae, which contain no true erectile
structure, correspond only to the cutaneous covering
of the male urethra; the true Corpus Spongiosum
being represented by what he terms the Pars inter-
-media, a vascular plexus running along the
under surface of the clitoris, while the halves of
the Bulb, find their homotypes in the masses of
vascular parenchyma composed mainly of tor-
-tuous veins, lying behind the Nymphae and term
-ed by him Vestibular Bulbs. +

Pars intermedia.

Vestibular Bulbs.

In the Male.

In the male the Genital member in place
of remaining stationary (as the clitoris) elongates
to form the penis, while the margins of the Sexual
Furrow, instead of enlarging and receding from each

Penis.

P.4. f.849.

other (Nymphae) approach, and uniting together convert the groove into the canal of the urethra. The sexual folds growing larger and larger, meet over the opening of the Sinus urogenitalis and form the scrotum and thus the canal of the Sinus, in place of opening externally in front of the anus, is prolonged forwards into that which has just been formed in the penis - The sides of the sexual folds which meet and coal- esce together, are the future Septum Scroti- Along the line of union of the edges of the sexual groove and of the sexual folds, a clear white streak is seen, which, in the adult is the raphé of the Scrotum and penis. In the sheep, the penis forms a remarkable bend and in place of becoming a free, pendulous organ as in man, is continued up- wards under the skin of the abdomen almost to the ~~Wolffian Bodies~~ umbilicus - and so with most other quadrupeds -

Canal of Urethra in penis.

Scrotum.

Septum Scroti

P. 4. f. 10.

Raphé

While, then, the external parts of the Genera- tive system, arise in pairs on each side of a median fissure, the tendency in the female is for

these parts to remain separate, and for the fissure to remain pervious, while in the male the former unite to form single organs and the latter closes up.-

The Mammae are visible in the embryo of birds as long as two small dots situated in front of the Sexual Folds, the apices of which form two of the Mammillae. It is not till the animal has attained a very considerable size (8 or 10 inches) that other two mammillae appear in front of the previous ones — They exist in the male also being situated immediately in front of the scrotum

Mammae

P.4.f.2.
P.4.f.6.

Mammillae

I append here a Tabular view of the Embryonic structures which enter into the Formation of the Generative system, in accordance with the account which I have now given — In order to have rendered that account complete I should perhaps have included the Internal developement of the ovaries and testes, but of this I could only have given a resumé compiled from other authors, as I was unable both from want of time and ability to examine these struc-

– laws for myself and I would prefer here (with a few unavoidable exceptions) to speak only of what I have myself either seen or endeavoured to see –

In the Female.

Pavilion of the Fallopian Tube.	Upper end of the Müllerian Duct
Fallopian Tube itself	Mullers Duct as far as the Round Lig.t
Cornua Uteri	Do. from the Round Lig.t to Genital cord
Body of the uterus and the Vagina	Mullers ducts united in the Genital cord

Urachus	Upper part of the Allantois
Bladder.	Middle Do. – Do.
Urethra.	Lower Do. – Do.
Vestibulum Vaginae	Sinus Urogenitalis

Clitoris	Sexual Prominence
Nymphae	Edges of Sexual Furrow
Labia Majora	Sexual Folds

In the Male.

Caput Epididymis (Coni Vasc: and Vasa Effer).	Tubules arising in New Struc. line on summit of Wolffian Body. –
Body of Epididymis and Globus Minor	Excretory Duct of Wolffian Body as far as Tubenaculum

Vas Deferens ---------- { Excretory Duct below the Gubernaculum.

Vesiculae Seminales. ---------- { Offshoots from lower part of the Excretory Ducts.

Urachus ---------- Upper part of the Allantois.

Bladder ---------- Middle Do. Do.

Neck of the Bladder & Beginning of urethra } ---- Lower Do. Do.

Membranous part of urethra ---------- Sinus Urogenitalis.

Spongy part of Do. ---- { Formed by the union of the edges of Sexual Furrow.

Penis ---------- Sexual Prominence

Scrotum ---------- Sexual Folds.

Raphe of penis and scrotum ---- { Line of union of Sexual Furrow and of Sexual Folds.

Part Second.

Of the Remains of the Wolffian Bodies.

Having given a description of the Wolffian Bodies in the embryo and of the changes which their Ducts and other structures connected with them undergo I shall now endeavour to describe their mode of atrophy; what parts of them remain; what these remains form in the adult, and what are the analogous parts in the two sexes:— in fact, to describe the Developement of the Remains of the Wolffian Bodies—

To return then to the early periods of embryonic life it will be remembered, that the Wolffian Body when it had acquired its perfect form, presented the appearance of a three-sided pyramid, with the angles rounded off and bent in a crescentic shape, with its convex aspect directed outwards.✕ It was of a yellowish red hue and its two ducts were visible running up, side by side, along its outer border, while on its inner concave surface lay the Genital

Wolffian Body fully developed.

P.1. f. 9. & 10.
P.1. f 5 & 6.

Gland. When the embryo is about three inches long they begin to diminish in breadth very consider-
-ably and the process described at page 32 by which the Ducts come to lie on their anterior faces, takes place. At 3¾ inches the new Body which forms on their upper surfaces is plainly visible both to the naked and in microscopic sections thro' the long axis of the gland. In the male, thus, the future Epididymis (Caput) enlarges pretty rapidly and gradually attains a position on the sum-
-mit of the testicle, the Excretory Ducts comes to lie quite on the inside of the Wolffian Body and ~~in~~ that body itself, by the time the embryo P.2. f.6. P.2. f.3 & P.5. f.6
is 5 or 6 inches long, is reduced to a mere granul-
-ar strip running down the side of the duct and Mode of atrophy in the male
dependant, as it were, from the Triangular New Structure on the top of the Testicle. But it is noticeable that in this atrophied vestige, the whole length of the Wolffian Body is represented, that is to say, it atrophies equally throughout all its length. When the sheep is 7 inches long the testes have descended into the abdominal

wall in process of reaching the scrotum, their vessels are very large, and the shreds of the Wolffian Body are seen lying on the Vascular Tumour; while a mere thread, representing its Body and lower part, extends down to where the Globus Minor is forming: in the foetus of 10 inches this thread too has disappeared and all of the Wolffian Body that is to be seen, is a few scattered tubules lying in front of the vessels and encroaching a little on the epididymis. P.3.f.2. P.2.f.6.

— In the female there is a very slight difference. There the structure which forms the caput epididymis in the male is not required to perform a similar office and in consequence it never de- Atrophy in the female more complete
-velopes to the same extent as in the male; but still it shews its non-identity of structure with the Wolffian Body, by not atrophying in nearly so complete a manner, for that body disappears from below upwards even more thoroughly than in the male, for while, in the latter a very distinct trace is left in front of the vessels, in the female it all but utterly disappears. P.1.f.16. P.2.f.1.

By the time that the sheep has woolly down upon it, all we see is a mere speck[+] situated in what P.J.f.142. is now the Broad Ligament of the Uterus, a little way external to the outer end of the ovary or what in the male would be the upper end of the Testicle. And what is this speck? It is the New Structure, which existed on the summit of the Wolffian Body and which now survives the ruin of the latter.

The General Conclusion, then, is that while in the male the Wolffian Body atrophies into a small mass lying in front of the Vascular Tumour and General summary the New Structure becomes the Caput Epididymis; in the female the former all but totally disappears while the latter still preserves its integrity, being found in the Broad Ligament and situated with relation to the ovary, just as the Globus Major is with relation to the Testicle.

1. Remains in the Female.

(a.) The Organ of Rosenmüller or Parovarium.

In the year 1801 Rosenmüller, while prosecuting anatomical researches at Erlangen, and engaged in observations on the progressive growth of the

Rosenmüller. Quaedam de Ovariis Embryonum et Foetuum Humanorum — 1802.

ovary, in the human foetus, was struck by the ap-
-pearance of a body connected with that organ
which in his Latin Treatise on the subject he thus
describes:— "If now, in the <u>New born Infant</u>,
"the duplicature of the peritoneum, which lies
"between the Ovary and the Fallopian Tube, be care-
"-fully examined by reflected light, there is per-
"-ceived to exist in it a sort of Conical Body not very
"pellucid, whose base looks towards the Tuba and
"its apex towards the outer end of the ovary. At
"first sight the Body seemed to be of a glandul-
"-ar nature and composed of numerous acini, but
"it will appear that such is not the case and that
"the granular particles are not acini."

Rosenmüller's own account

"In the Infant of 7 days, the Conoid Body was
"found to be of considerable size, from numerous
"canaliculi at its base, broad and convoluted
"and proceeding towards the upper part and of
"the ovary, where, becoming very fine and placed
"closely side by side, they disappeared. I count-
"-ed about twenty such canaliculi. I, at first
"sight, imagined they were Lymphatic vessels,

Footnote

For the perusal of the works of Rosenmüller, Kobell and Weber, I am indebted to Professor Simpson who kindly lent them to me from his own Library.

" but when I examined them with a magnifying "
" power, a most beautiful spectacle struck me "
" with delight. For I observed not only the before "
" mentioned pellucid canaliculi, but other more "
" delicate ducts connected with them, which "
" proceeded from the base of the Conoid Body, "
" convoluted, with serpentine windings and "
" exhibiting the appearance of ringlets lying "
" close side by side. Towards the ovary they "
" become less tortuous and after becoming nearly "
" straight, they disappear. The apex of the cone "
" is adherent to the ovary, but the canaliculi "
" and the ducts there become so very fine, that "
" nothing can be seen except a somewhat dark "
" spot which indicates the ending of the cone. "

" Whether there be any resemblance between "
" this conical structure with its ducts and "
" the vas deferens and epididymis of the "
" male, I cannot decide, but I am very desirous "
" to examine more carefully the structure of these "
" parts and I hope and wish, that other skilful "
" anatomists may do so likewise. "

I have not hesitated to give thus long quotation from the original work of Rosenmüller, as it is now so scarce, that any fragments of it are worth recording, and to speak candidly, it is hardly possible to give a better description of the organ, which bears his name, than he himself has done, ~~which~~ while the plates of it which he gives are remarkable for their accuracy. At the conclusion of his paper, he mentions, that, in the infant of two years old he saw in each Broad Ligament a saccule or cyst, but little or no vestiges of the Corpus Body; however, on opening the cysts, he found, as he had expected, the duct of that Body enclosed within them - He makes no mention of seeing the Corpus Body in the adult.

Meckel, writing in 1825, gives a brief description of the organ of Rosenmüller and notices that it had been found impossible to inject its tubules either from the ovary or from the Fallopian Tube, and that consequently they could not be a means of communication between these two. Nevertheless, he had observed their resemblance to

Meckel's idea as to the parovarium -

the epididymis of the male and hints that from the appearance which the Fallopian Tube presents in its early state, it is probable that these tubules of Rosenmüllers Organ do enable it to communicate with the ovary, but that this communication is soon effaced, when the abdominal extremity of the Tuba opens and a new passage is formed.

Neither Rosenmüller nor Meckel however make any mention of what is the origin of this singular Body and even Bischoff (1843) only says that probably it is the remains of the canaliculi of the Wolffian Body. Indeed Rosenmüller seems to have been under the belief that it existed solely in foetuses and infants. and Kölliker & Kobelt ~~seem~~ appear to have been the first to direct attention to its structure & formation in connection with its Development in man and animals.

I have examined the organ in Human subjects from the 7th to 9th months of Intra-uterine life up to 60 years of age, and in none of those which I looked at, did I find it totally absent. To see it to advantage the

uterus and Broad Ligaments should be removed as soon as possible after death and no alcohol applied to them:- the less fat there is about the parts the more easily is it seen. Holding up the Broad Ligament between the eye and a strong light, the organ is readily detected at the outer end of the ovary, between it and the Fallopian Tube, enclosed between the two layers of peritoneum which form the Broad Ligament. Some little care is necessary, not to confound with the tubules of the Organ, any of the numerous vessels which radiate behind it in the Broad Ligament. — Method of seeing the Organ.

Having already given Rosenmüller's description of it, I shall be very brief in what I have to state about it.- Suffice it to say, that the organ is of a conical or fan-shaped appearance, having its base turned towards the Tuba, while its apex is lost upon the ovary and that it consists of 18 to 20 more or less wavy tubules, converging towards each other at the apex, and, at the ~~the~~ base of the organ becoming much thicker and highly convoluted, while they are all connected together at their outer extremities. Besides these tubules which form — Description of the Organ — P.7.f.1. P4.f.2.

the body of the organ, there are scattered about, in its vicinity, sundry little fragments of canaliculi and isolated granules which are not united to the Organ itself. By careful dissection it is clearly seen, that the tubules which converge to the ovary have no true junction or communication with it and merely lose themselves in its peritoneal capsule. Fragments around it –

According to Follin, each tubule consists of a very thick envelope of cellular tissue containing longitudinal fibres, in which, in a fine injection very delicate vessels can be seen:– lining this is a layer of very fine pavement epithelium. Owing to the thickness of their walls the calibre of the tubules is reduced to a minimum. Follin has never been able to see any special product of these tubes, beyond the contained epithelium. Minute Structure –

In the new born infant,+ a barleycorn might cover the Organ, while in the adult it is an affair of considerable magnitude, being nearly an inch broad at its base, while the tubules are about ½ an inch long – so large is it often, that it seems somewhat P.7, f.4 – P.4. f.4.

strange that it should have so long escaped the eyes of anatomists. In its growth it seems to keep pace with that of the Uterus and its appendages. In the girl, its tubules are about the size and thickness of threads; pretty equal in size and highly convoluted;— but in full-grown subjects they are greatly increased in thickness, resembling very fine twine, and are quite opaque. They moreover lose their convoluted appearance to a certain extent, and become much straighter (in fact almost quite straight) except at their outer ends, where they are still curved. In very old people, like the rest of the Generative system, they undergo retrograde change and many of them atrophy, but still even in very aged ~~people~~ women, they never totally disappear. One of the best specimens I possess was obtained from a woman of from 55 to 60 years— It has been noticed that after parturition, the organ is red and tumefied, and I have observed that it always best seen in the sheep during pregnancy, indeed in young sheep which have never had lambs it is usually very feebly marked; so that in them

Size of organ & its tubules

Effects of age

P. 7. f. 2.

Of parturition

pregnancy seems to have a decided effect upon its development, much the same as the period of puberty has, in the human race.

Having now described the appearance and structure of Rosenmüllers organ, I shall say a few words concerning its origin and analogues.

As I stated previously, the new structure which forms on the summit of the wolffian Body, exists not only in the male, but also in the female, although, in the latter, (during foetal life at any rate) it never attains the same proportions nor do its contained tubuli become equally well developed. Furthermore (page 87) in the female, I believe the wolffian Body all but entirely disappears and that the vestige which we see in the Broad Ligament is the new structure which has not atrophied like the wolffian Body proper.

New Structure exists in both Sexes.

Every observer seems to have been at once struck with the extraordinary resemblance which the Organ of Rosenmüller bears to the Caput Epididymis of the male

and on closely examining it, it becomes plain that there is not only a mere superficial likeness but also a structural one. In the first place, its position with regard to the ovary is precisely the same, as that of the Caput Epididymis with regard to the Testicle, while in its fan-like shape it exactly resembles the Globus Major unravelled and spread out. It consists, like the Caput, of hollow tubules varying in number from 16 to 20 and these tubules, straight at the apex of the organ but highly convoluted and rolled up and thickened, at its base, are identical with the Coni Vasculosi, while, to complete the analogy, the whole are bound and connected together at their outer extremities. There can, I think, be not the slightest doubt that the organ of Rosenmüller is (as he himself imagined it might be) the Analogue of the Globus Major. But whence did this organ take its rise? It is simply the Vestige, which is visible in the Broad Ligament of the Foetus after the disappearance of the Wolffian Body

Resemblance to Globus Major in position

and In structure

Origin of the organ

P.2. f.142.

P.2. f.1.

now fully grown and perfected, and that beside, I hold to be the new structure which I have so frequently mentioned and which I have endeavoured to shew forms in the male the Globus Major. The only point of difference between the two organs is that in the Female the cord which, in the other sex, connects the new structure to the Testicle and afterwards splits up into Vasa Efferentia, does not form, and consequently, in Rosenmüller's organ, no true representation of these Vasa exist—

Non representative of Vasa Efferentia—

So I believe, then, that the organ itself is the new structure, on the summit of the Wolffian Body, matured and fully grown, so I consider that the remains of that Body are to be found in the little fragmentary canalicules and isolated bodies × which lie scattered about and chiefly on the inner side of Rosenmuller's Organ—

Remains of Wolffian B.s proper—

P.7. f.1
P.4. f.2

Kobell who in 1847 published his Paper, Ueber der Neben-Eierstock des Weibes &c.— for the express purpose of proving the Analogy of these Globus Major and Organ of Rosenmüller

as he differs from Dr. Cleland and myself in regard to the formation of the former, necessarily does so in regard to the latter:- the Parovarium, as he prefers to designate it. He divides (p 52) the canalicules of the Wolffian Body in the male into three sets- Upper. Middle. and Lower:- The Upper set disappears or else forms sundry little cysts on the top of the epididymis, the Middle ones effect a junction with the Testicle and form the Globus Major and the Lower either disappear or form the Vasa Aberrantia Halleri- Now. he asserts that in the female a similar division occurs and that he can find in it, analogues of the three sets: for, according to his views, the Upper set forms certain hydatids at the outer margin of the parovarium (The cysts of the Epididymis)- the Middle set forms the Parovarium itself (the Globus Major) while the lower becomes elongated and intermingled with the vessels of the Ovarian Plexus (Vasa Aberrantia Halleri)- I must say that I think Kobelt has been somewhat led away by his desire to prove his analogies correct in the

Kobelt's view of the parovarium

minutest particular- I have when describing the formation of the Globus Major, stated what I conceive to be arguments against his plan of dividing the Wolffian Body into ects of tubules and these of course are applicable also to the Parovarium. For my own part, I have never been able to see any such series of Tubules, forming cysts, disposed along the outer side of the par- ovarium, as he represents, nor have I seen another series on its inner side, elongated and blending with the Ovarian Plexus- The cysts, which are common enough, appear to me to form quite in- differently at any part of the Organ whatever, and do not shew any preference for the outer side more than the Upper or Lower- The tubules struck me, as all being pretty much of one appearance and presenting no distinctions by which one could with confidence say, that this set corresponded to such & such a structure in the other sex, and that set to such another. The remains of the Wolffian Body proper are I think to be found in the acat-

Objections to the partitioning of the Wolffian B.

P.T.f.243.

-tined little pieces of canalicules and small round bodies dispersed about the Parovarium and had Kobelt known of the existence of the organ of Giraldès in the male he would have seen that the fragmentary tubes of that organ lying as they do not far from the caput epididymis corresponded exactly to those lying near the Parovarium -

The Parovarium seems to be somewhat more highly developed in man than in the lower animals. In the sheep it consists of very fine tubules indeed:- mere threads - which converge towards the ovary, while at their outer extremities they swell out into little saccules, or become thickened and highly convoluted and often rolled up into little balls - small granules and fragments are scattered abundantly throughout. In the pig and sheep, when I have examined the organ very frequently small cysts were very common indeed in connection with it, but none of them were larger than a pea -

Parovarium in sheep -

P.S. J. 4.5.687 -

Cysts often.

(b.) Of the Canals of Gaertner.

Having disposed of the Wolffian Bodies with their accompanying New Structures and of the Müllerian Ducts, we have now to trace the changes which the Excretory Ducts undergo. These it will be remembered, run in the Genital cord in front of the Müllerian Ducts, and as these latter were seen to blend together and enlarge to form the Uterus and vagina, while the former remained separate and did not increase much in size, we would naturally expect to find them in the adult as two tubes lying some where in front of, that is to say, on the anterior wall of the Uterus and Vagina. Furthermore, they opened along with the Müllerian ducts into the Sinus Urogenitalis, but that was shewn to become in the Female, the Vestibulum Vaginae and therefore the probability is that somewhere at the vaginal outlet we will find these openings.

The Excretory Ducts.

These probabilities were changed into

certainties by the discovery of Gaertner- That anatomist, while engaged in researches on the lymphatics of the cow, discovered by accident two canals full of a clear, slightly yellow fluid which from their appearance he judged to be neither lymphatics nor bloodvessels. By after examinations he convinced himself, that these canals could be traced to within a short distance of the ovary, that they opened below into the vagina on each side of the urethral aperture and that they possessed about the middle of their course sundry branches or diverticulæ. He was however quite unaware of their origin or use. In the works of British anatomists, I can find no very detailed account of them, but they have, since Gaertner's time, been described by many of their continental compeers and more especially by Kobell and Follin.

Gaertner's discovery—

I have dissected them out for myself in a considerable number of pigs, sheep and cows, and although, most probably from my own want

Footnote

~ Kobelt & Follin (op: cit.) - both give very excellent drawings of Gaertners' Canals -

of skill I have not been able to get in any one subject, such a connected view of them as Kobelt and Follin give, still I have seen enough to convince me that their descriptions are highly accurate. It may be as well to state here, how they are to be found, as this is a matter of some difficulty, if not gone about in the proper way. Like the paravanium, they are, I think, best seen in well grown animals which have at some time been pregnant. Having obtained a subject carefully isolate the vagina, Uterus and Broad Ligaments and then slitting up the Back wall of the vagina throughout its whole length, a view of the mucous surface of its anterior wall with the opening of the urethra upon it, is gained. If now a careful search is made on each side of that orifice, the two minute openings of the Gaertner's canals may be found, very commonly placed at the base of one of the longitudinal columnar rugæ which abound at the mouth of the vagina. The openings are however frequently indistinguishable and

Mode of finding them—

P.9. f.2.

we must carefully raise the Mucous membrane over where we expect them to lie and try to light on them: failing in that, I have often found them, by cutting right through the vaginal wall with a sharp razor, so as to make a clean, smooth cut, and on looking at the surface of the section, the cut ends of the tubes were visible. They lie at a considerable depth from the surface of the mucous membrane, embedded in the muscular walls of the vagina, from which it is quite possible to isolate them with care. They are very constantly present, so much so that Follin out of 30 pigs found them only wanting in one.

Their position in the vaginal wall.

From their openings beside the urethra it is comparatively easy to trace them upwards in the walls of the vagina, but at the point where the vagina and uterus meet, they undergo a sudden contraction, and in most cases, I was unable to trace them any further, but in others they could be seen running up along the cervix uteri, in its muscular wall and then turning somewhat to the sides

P. 9. f. 1.

Their course

they follow the margins of the cornua uteri into the Broad Ligaments and terminate not far from the ovary:- thus I have only seen in one or two very favourable specimens and more usually they ended in the Ligament just a little way from the sides of the Cervix uteri, while a few very fine clear vesicles indicated where they had existed in the Broad Ligament. Sometimes they are much better seen on one side than on the other. Follin who injected them with coloured Turpentine found that the injection in some cases ran up their whole course, so that he was enabled to trace them all the way up to the Organ of Rosenmüller, but in many cases the canals were only permeable as far as the function of the Vagina and cervix uteri, while beyond that a mere filament was all that indicated their existence. When you can trace them in their whole course, they are found to end near or at the parovarium by a fine termination which undergoes a variety of flexuosities and convolutions, beautifully represented in a plate

Injections of them-

by Kobelt.— Now, admitting these canals to be formed from the Excretory Ducts and also that the Parovarium corresponds to the Globus minor, I think it highly probable that in this tortuous and convoluted condition of the Seminal extremities of Gaertner's canals, we find the analogue of that similar condition of the Excretory Ducts in the male, which I have endeavoured to shew, forms the Body and Globus Minor of the Epididymis.— P.9.f.1.

Convoluted extremities

In addition to the irregularities shewn by these canals as regards the point at which they end and the distance to which they are permeable, they often, in place of running their whole course as tubes of an equal, or at any rate progressively diminishing calibre, present numerous cyst-like swellings along their track. These are in reality due to successive contractions and bulgings:— the canal swelling out and becoming distended with fluid at one point and immediately beyond that dwindling down to a P.9.f.1.

Dilatations in their track.

thread, and again swelling out beyond that. This is undoubtedly one of the methods in which the canals atrophy, and hence as I before mentioned when they could no longer be distinguished as tubes or filaments in the Broad Ligament, we could trace their course by the minute cysts which constituted their remains.

M. De Blainville held that, at their lower ends, they dilated, in the cow, into ampullae: but as a general rule this is not the case (Follin) and they are not longer there than further up. However there can be no doubt that under certain conditions, when their outlets get blocked up, they may, at their lower extremities get so distended with fluid, as to present an ampulla-like appearance. I have seen them myself in the sheep distended and filled up for about 1/4 inches with a yellowish matter like the product of a sebaceous follicle.

Distensions of their lower ends

In the cow along the vaginal and even the cervico-uterine portions of their course, there exists as Gaertner himself knew, a number of small excres-

-cences or diverticula, which Gollin states were in-
-jectable along with the rest of the canals and
which he has seen existing to the number of
20. They are sometimes so distinct that I have
been able to dissect a few of them out with the scalp-
-el in a rough way, but owing to my not having
attempted the injection of the canals, I cannot say
what their whole number might amount to. I do
not find any mention made as to the use or mor-
-phological meaning of these diverticula, but it
would be curious to find if there is anything in the
male to which they correspond. They cannot be
the analogues of the seminal vesicles in a highly
rudimentary form, because they are far too numer-
-ous and moreover no trace of them is seen in the
female Genital cord, while the saccules of the pri-
-mary Seminal vesicles are perfectly distinct. But
we know that the Vasa Deferentia towards their
terminations beneath the bladder, become en-
-larged and sacculated, approaching thus in
character to the Seminal vesicles, which are now

Diverticula in their course

believed to be of a glandular nature, I am no great advocate for discovering an analogue for every trifling cyst or hydatid in one or other sex, yet if we are to look for a structure corresponding to these diverticules of the Gaertner's canals, I would suggest that the saccculated terminations of the vesa Deferentia might answer. This however is a mere hypothesis and I would not wish it to be considered anything more.

What do they correspond to in the male?

P. II. f. 1.

On slitting up the canals they are seen to be lined by a smooth fine mucous lining and on pressure a thickish liquid may often be squeezed from them, resembling that which exists in the cervix uteri.

Their contents

With regard to their microscopic character I am sorry to say I can ~~say~~ state nothing from personal observation, as owing to my having spent so long over the first part of the paper, and from the necessary encroachments made on my time by my other studies, I was afraid, that had I tried to make any such observations, I would have much exceeded

the period allowed for preparing the essay. As however Sollin has mentioned some very curious and interesting facts connected with their minute structure, I may be pardoned, for here quoting verbatim what he says: — "On submitting to" microscopic examination portions of the wall of "these canals we find in them all the elements of "a tissue composed of long nucleated fibres, gran- "ular in their interior, often very flexuous and "sometimes separated at various points, by con- "tractions, to which succeed dilatations. These fibres "are exactly similar to those which have been re- "cently described by Kölliker, in a remarkable mem- "oir on the unstriped muscles. These fibres have "been seen in the skin, in the iris, in the intestinal "canal, in the simple glands, in the rings of the trachea "and bronchi, in the divisions of the glandular crypts "of the liver, of the pancreas and of the salivary glands" "and of a great many other parts — with whatever "care I have conducted this examination, I have never" "been able to find any thing else but a bed of long- "itudinal fibres: the circular fibres seem to be wanting. "Internal to this wall, which I consider muscular" Microscopic Structure

"lies a layer of nucleated pavement epithelium;—"
"the mucous lining."

It is a somewhat singular fact that in woman in whom the Parovarium is so well developed, the canals of Gaertner either do not exist at all, or if they do are so slightly marked as to have escaped the eyes of most anatomists, although many have searched most carefully for them. Follin has been unable to find them, and places no credit in the accounts of those writers who say they have found in the substance of the uterus branching lacunae which might be compared to them: he believes they have mistaken for them either uterine sinuses or some of the large branching uterine arteries. I have looked at the Broad ligaments, both before and after steeping in Sulphuric acid, through a strong light and with a lens, but I cannot say that I have seen anything which I could with certainty say corresponded to Gaertner's Canals or that part of their course, at any rate, which lies in the Broad ligaments. Kobell however figures a fine outline of a filament proceeding from the parovarium

Absence of them in man

Be this as it may, it is pretty plain, that if Gaertners

Giraldès Note sur un organe placé dans le cordon Spermatique &c.–
Proceedings of Roy. Soc. of Lond.– May. 1858.–

Canals do exist in the human species, it must only be in the feeblest and most rudimentary form

2. Remains of the Wolffian Bodies in the Male.

(a.) The Organ of Giraldès or Corps Innominé.

At page 87 it was mentioned, that in the male sheep of 10 inches long, the Wolffian Body, after the New Structure on its summit was fairly formed into the Globus Major and its Efferent Duct separated from its tubules had diminished to a mere speck lying on the front of the vesicular Tumour close beside the caput epididymis. † P. 3. f. 2. P. 2. f. 6.

In 1857 Professor Giraldès of Paris announced the discovery of a new body situated in the Spermatic cord which he considered to be the remains of the Wolffian Body, and in May 1858 his observations were communicated to the Royal Society of London by Sir Benjamin Brodie. I have sought for and examined the body — the Corps Innominé, as it was termed by its discoverer — in a considerable number of human foetuses from the 6th month to the time of birth, of new born infants, of children, adults and Giraldès' discovery.

aged persons, and have found it to be of very constant occurence, more especially in young subjects. Following the directions of Giraldès I macerated the testicle and cord for some hours, in a moderately strong solution of Tartaric Acid, which has the effect of swelling and gelatinizing the connective tissue and rendering it extremely transparent, and then slit up the sac of the Tunica vaginalis as far up as the point where that membrane comes to be reflected down on the cord. The organ is then seen usually lying beneath this portion of the Tunica vaginalis, which goes down along the front of the cord before investing the Epididymis and Testicle. It varies somewhat in its position, being placed sometimes quite close to the caput epididymis and at other times higher up on the cord. It may even lie so high up as to be beyond the Tunica vaginalis altogether, but this is rare. Its usual appearance is that of a yellowish granular corpuscle whose colour contrasts with that of the dark venous plexus on which it lies and whose size varies from that of a mere speck up to that of a body equal to 3 or 4 pins heads. Frequently

Mode of examining it

Position. P. 12. f. 1.

Appearance

Size

it is not aggregated in one mass, but is in two or three detached pieces, one being, perhaps, up on the cord and another down by the side of the caput epididymis. It is obviously much more easily found in lean than in fat subjects, and indeed if much adipose tissue be scattered throughout the cord, it is almost impossible to detect it, but in infants it is commonly distinguishable by the fact that it is of a slightly yellow colour, while the fat granules are usually pure white. In shape, as in position and size, the Body varies greatly, being sometimes like a small round ball at others, of an elongated form and often quite irregular and scattered up and down (I should have mentioned previously that to facilitate its detection in the adult, Professor Geraldés recommends macerating the cord in Dilute Nitric acid.) P.13.f.2. Varies in its shape. P.8.f.243, P5.f.1.

When examined microscopically the Corpus Innominé is seen to be well supplied with vessels and in two specimens of natural injection, which I possess, a regular plexus is seen to be distributed on their surfaces. It is mainly composed of tubes which P.3.f.7.

are of very various lengths and diameters:- they are usually short and thick; sometimes highly tortuous and may possess knobs or dilatations in their walls:- and are occasionally regularly branched. —Their microscopical appearance—

They end in blind eschemities. Very frequently no tubular structure is seen but simply several rounded granular bodies or vesicles, but in general the organ is a compound of short irregular tubes with these vesicles scattered about among them; Gerald- de's says they are lined with epithelium, and on cracking them between two glass slides, a fluid may sometimes be squeezed out which I have seen contain fine epithelium cells and granular matter. P. 3, f. 9&10- P.3 f. 4&5

The organ is most perfect in the new born infant and probably during the first few years of life, that is to say, it then consists of several tubes or vesicles but in old subjects these are generally reduced in number by the disappearance of some of them, still in the remains which we do see in old people. The tubes are much larger in calibre, though fewer in number, than in the infant— —Effects of age— P.3. f.8

In the ram the corpus Innominé is rather difficult to detect, owing to the large amount of fat and connective tissue usually present in the cord, but when dissected out it is found to be a large affair compared with what it is in man, being probably in keeping with the enormous testicles of the animal. It is about the size of a pea and consists of tubes, imbedded in a matrix of connective tissue and so wound and twisted about among themselves, as to make it quite impossible to unravel them. I hardened some of them and then made sections through them so as to see the cut ends of the tubes—

In the Ram P. 12. f. 283.

I have no hesitation in saying that M. Giraldés opinion, that the corpus Innominé is the remains of the Wolffian Body, is perfectly correct, as it is quite easy to trace the gradual atrophy of that Body down to a small speck in front of the vessels which can be detected at all periods of life in a more or less altered form and which is simply the organ which M. Giraldés has described. Dr. Heleland in his Thesis stated, before M. Giraldés paper was published, that

Is the remains of the Wolffian B. proper—

the "remains of the Wolffian Body could be seen"
"in the sheep (at the full time) lying in front"
"of the vascular Tumour" and, I have no doubt,
many other anatomists were well aware of this
fact, but the merit of Giraldès observation lies
in his having shewn that these remains are
recognizable in the adult and are persistent
throughout the whole period of life. But he, I
think, committed an error in saying that it was
comparable to the Ovary of Rosenmüller, for there is
not the slightest resemblance between them few
scattered, microscopic tubules which compose the for-
mer and the large and comparatively well organ-
ized structure of the latter. The Parovarium is
undoubtedly the analogue of the Epididymis if
we are to find in the female a structure corresponds-
ing to the Ovary of Giraldès, it must be in those frag-
mentary and scattered tubules, which lie in the
neighbourhood of the parovarium.

Is not the ana-
logue of the
Parovarium

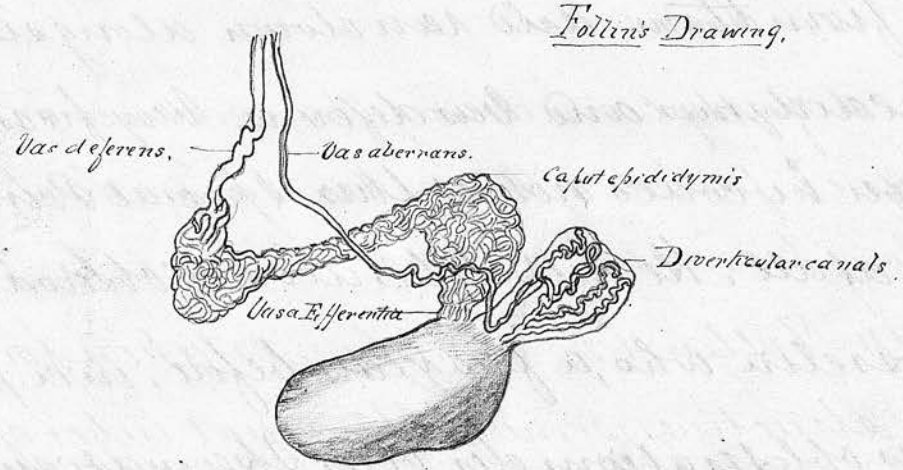
Seven years before Giraldès published his obser-
vations, M. Follin in his Thesis, which I have so

frequently referred to, endeavoured to give an explanation of what became of the Wolffian Body in the male, as follows. He found, while injecting the Testicle, that very frequently on the apex of the Caput Epididymis, a special point was found into which the injection would not at first run, but after it had filled the tubules of the testicle itself to repletion, & very distended, as it were, and often filled the canals within this Special Point and also a long vessel which proceeded from them and ran down alongside of the epididymis and Vas deferens. Very frequently however he could not get this Special Point injected at all. He calls to his aid the observations of M. Gosselin who, a few years before, in a paper "Sur les oblitérations des voies Spermatiques" had noticed the difficulty of injecting some parts of the Caput Epididymis, and he comes to the conclusion that in the Caput epididymis there exists "a structure composed of several vessels which" "~~the~~ is comparable to the organ of Rosenmüller. These

Giraldès Follin's idea

Special point on top of Caput

Follin's Drawing.



" canals usually number from 7 to 10 - they are "
" flexuous, contorted several times upon themselves"
" and terminate in culs-de-sac. Often they form "
" a group which may be detached from the Caput " Follin's diverticular canals in the Cap. Epidid.
" Epididymis and it was easy for me, several times, "
" to dissect and isolate them with the point of a "
" needle from the rest of the seminal canals. But "
" on Testicles not dissected, it is easy to see that they "
" are embodied (~~fomt~~ font corps avec le reste &c.) with the "
" rest of the Efferent vessels:- The fibro-serous envelope "
" which covers the caput epididymis, surrounds and "
" binds them down also."

+ After carefully considering the evidence which he adduces in favour of this idea (and which would be too long to insert here) I am induced to think that M. Follin has simply mistaken for adventitious structures, some of the usual tubes of the Caput epididymis, which from some cause or another, were not easily of at all injectable. His Drawing speaks for itself. The quotations which he gives from M. Gosselin do not, I think, in the least help his theory, for that gentleman was

of opinion that the difficulty of injection arose solely from some obstruction of a few of the spermatic canals, and, I think, when we consider the extreme prevalence of venereal diseases in France and the frequency with which inflammations of various kinds, due to them, attack the epididymis (their favourite site), that that explanation is the true one - But besides that, M. Follin did succeed sometimes in injecting these diverticular tubules and not only them but a long canal proceeding from them which he considers to be the remains of the Excretory Duct - Now, I should like to know, how M. Follin, holding as he does, that no part of the Wolffian Body enters into the construction of the Genital System, can yet inject its remains from that system? - Again, what the tube proceeding from these imaginary remains is, I cannot imagine. It certainly is not in the position in which every other anatomist has represented the Vas aberrans and if it be true as I have all along been advocating, that the Excretory Duct forms the Vas Deferens and

Objections to Follin's Theory

Sir Astley Cooper. On the Structure and Diseases of the Testicle - Plate 9. fig 11 - and p. 26.

Epididymis, then it certainly cannot be the remains of that. Moreover, if it were the product of one single duct, how does he account for the presence of three basal Aberrantia such as Sir Astley Cooper has figured or how explain satisfactorily the existence of branches from the basal aberrans as Lauth has described. No anatomist was ever more successful in making injections of the testicle than Sir Astley Cooper, and yet in none of his preparations does he describe any such diverticular canals in the caput epididymis or any such tube proceeding from them — Not understanding thoroughly the injecting system, I have not tried it here, as I would not be inclined to put much faith in my own preparations in that way, but I have often most carefully unravelled and dissected out the Coni vasculosi, and although I have found sometimes a few of them of a different colour from the rest and looking at first sight like a different structure, I never could find such a body as M. Follin describes.

How can he account for three V. Aberrantia

Curling - Article Testis.

Jodi Encyclopedia. Vol IV.

(b.) The Vas Aberrans Halleri.

What then is the real origin of the vas aberrans first described by Haller? — Let us first glance at its anatomy, before proceeding to trace its origin. It is a blind duct found connected either to the Body of the Epididymis or to the vas Deferens, but most usually attached at the angle formed by the termination of the one in the other. Monro found it existed 4 times out of 10, but Curling and Lauth believe it occurs more frequently. Cooper and Lauth, as said before, have found as many as three at once and the latter has seen it branched. It is a convoluted duct, of about the same calibre as the canal of the epididymis, which is contracted at its insertion and terminates in a blind and often dilated extremity. It runs up along the spermatic cord usually for two or three inches and when unravelled varies in length from 1 to several inches. Luschka states + that occasionally it does not communicate with the canal of the epididymis, but appears to be a simple serous cyst. With regard to the uses

Position

Number.

+(Luschka)

Hunter's Works by Palmer.
Vol. 4. footnote to p. 24.

Müller's Physiology by Baly.
Vol I. p. 499.

of the vasa Aberrantia, Hunter considered them as supernumerary vas Deferentia (and so I think did Sir Astley Cooper) of a nature similar to the double ureters, but they are far too frequent in their occurrence for this hypothesis and moreover are not conductors of any fluid as the supernumerary ureters are. Müller makes a simple statement that their use is to secrete a fluid which they pour into the epididymis, but here on the other hand they are too often absent to render this idea tenable and the secretion from such a small organ could be of no use whatever. Curling is inclined to think that the duct does not serve any particular office, but is a sort of diverticulum, which though common must be viewed as accidental, like the process not unfrequently connected with the intestinal canal.

Opinions as to its uses.

To Roberts is undoubtedly due the merit of first pointing out the true origin of the vas aberrans (vide p. 10 of his Essay) when he stated that "or they (if there be more than one) are formed by one or more of the lower set of coecal tubes of the original

Roberts's explanation

Wolffian Body, still adhering to their Efferent Duct, the Epididymis. By this, is easily explained the presence of more than one of these Vas aberrantia and also their occasional Branching.

The shape of them also narrowed at their entrance into the canal of the epididymis but dilated at their coecal extremity corresponds exactly with the description of the canaliculi of the Wolffian body given at page 18 whilst should a severance take place at the point of entrance, then, in the adult, the form described by Luschka, where the Vas is unconnected with the epididymis and merely forms a simple serous cyst, will result.

Corresponds in shape to Wolffian tubules.

Kobell found the Vas Aberrans in human foetuses of the 3rd and 5th months first formed:- and in the latter foetus a separation had occured, which would have produced the form Luschka mentions.

I possess a specimen of a 7th month foetus in which the Vas Aberrans is excellently seen, of such a shape as to render it impossible to believe it the remains of the Excretory Duct, as Follin thinks, or of any other Duct. In a young man of

In foetuses.

Morgagni. De sedibus et causis morborum -
Cooke's Translation. Vol 4. p. 423.

25, who died much attenuated from phthisis and where there was no fat in the spermatic cord, I could trace the Vas Aberrans all the way up to its termination in front of the Cord where it ended by a thickened, slightly convoluted extremity, close beside and almost in contact with which lay the organ of Giraldés, Here then, were the whole remains of the Wolffian Body lying together and the connection between some of its tubules and their Excretory Duct (The Epididymis) still kept up by means of the Vas Aberrans. P.12.1- P.5/5

(c) The Hydatid of Morgagni —

Following the plan pursued in describing the vestiges of the Wolffian Body in the female, as we have now finished with that organ itself, there remains to be considered, what becomes of that one of its two ducts which does not develope viz (in the male) The Müllerian Duct.

When the New Structure on the summit of the Wolffian Body, has acquired a considerable size Müller's Duct can be clearly seen lying apparently

across that Body (page 34) but in reality follow-
-ing its convex outer surface and lying just above
the line where the New Structure and the Wolf-
-fian Body are continuous with each other, while Upper part of Müller's Duct
its slightly swollen upper end or ampulla pro-
-jects a little way inwards towards the testis.
When the new structure comes to rest on the head P. I. f. 13.
of the testicle, it carries with it, the upper part P. I. f. 7.
of Müller's duct, while the Wolffian Body below
disappears:- and thus it happens that the
ampulla of the Duct comes to lie in the groove
between the New structure (caput epididymes)
and the head of the Testicle.
Now in that very position, we find in the adult,
a curious body known as the Hydatid of Mor-
-gagni and till lately as inexplicable in its
Morphology as the two Aberrans of Haller.
— In describing it, I prefer to use the term "Hydatid"
as it is now familiar to anatomical ears:- of course
not meaning by the name any diseased state
caused by the presence of an animal.
This so-called Hydatid is simply the ampulla
of Müller's duct, which has undergone a certain

amount of developement, while the portion of the Duct immediately below, generally, though not always, disappears without leaving any traces. It is a small pendulous body, often of a pinkish hue, which is found attached either to the top of the Globus Major, to the part of the testis immediately below or to the angle between these two points. + It is composed of a Duplicature of the Tunica vaginalis containing a little fine cellular tissue and some small vessels disposed not in loops and festoons. It possesses no tubes whatever, as I have made sure of by repeated sections both in the adult and in the infant and hence it cannot be a remnant of any part of the Wolffian Body proper, as it would then certainly present some appearance of a tubular nature – It may sometimes become cystic and contain a little fluid and, in a man who died of dropsy, I found it partaking of the general malady and distended with serum to the size of a bean.

There are often more than one of these bodies

Is the ampulla of Muller's Duct

P. 10. f. 8.
P. 13. f. 1.
P. 5. f. 3 & 5.

Description of the Hydatids

situated close together — It varies much in size from that of a pins head to a pea, and is most commonly suspended from the main organ by a pedicle, which is often extremely fine and thin. It is visible in the foetus, while the testes are still in the abdomen and is a very constant appendage of the testicle, Huschke having found it in 9 out of 10 cases and Kobelt in 25 out of 29. I did not think of counting all the testes I examined, in order to determine its frequency, but I find from my notes, that on one occasion, when I examined 16 testicles of new-born children, that in 1 only, could I not detect it. It exists in the ram, but is very small, not so large as in man, and its presence is the exception and not the rule. From its position, appearance and structure less mature, there can be little doubt that it is the swollen end of Müllers Duct in a persistent state, and indeed it is quite possible to trace its gradual formation in the embryo. In this case it must correspond to the pavilion

P.10. f.15.

Size and Frequency.

In the Ram.

P.12. f.243.

of the Fallopian Tube, which in the female is formed by that upper end swelling out and opening up into a trumpet-shaped form. Most authors, it is true, compare it to the pediculated vesicle often found in or about the Pavilion of the Tuba, but, as far as I can see, when such vesicles do exist, there are usually half a dozen of them scattered about among the Fimbriae of the Morsus Diaboli and the Ruyschian Fringes which extend between it and the ovary. In fact with such facilities for their formation as are afforded by the Fimbriae it would be singular if such vesicles did not occur very frequently. But these vesicles are not like Morgagni's Hydatid; — a solitary body, constant in its position and appearance; for Kobelt admits that out of 175 uteri he only found the vesicle on the pavilion in one half the number. I am inclined, then, to think these vesicles in the female are simply dropsies of the natural fimbriae and to consider the whole Pavilion or Morsus Diaboli as the true representative of

Is the analogue of the Pavilion

Does not correspond to the Vesicles on the Pavilion.

Text

* Curling suggests that its use may be to extend the serous exhaling surface of the Tunica vaginalis. — I do not think it has any more purpose to play than the rest of the structures which have been already spoken of; - and certainly it would be a refinement of Physiology to suggest uses for them.

Morgagnis Hydatid and not such morbid structures (as these vesicles are) occasionally forming one. Of course if we consider the vesicle as just a part of the whole pavilion, then, no doubt, it does represent Morgagnis Hydatid to a certain extent—

On account of that Hydatid containing sometimes a considerable quantity of fat, Huschka was led to believe in the somewhat singular notion that there was an analogy between it and the Appendices Epiploicae:- but the presence of fat in it, to any extent, as a purely accidental and even rare occurence. *

Similar to the Appendices Epiploicae?

(d.) Small cysts on the Testicle.

The portion of Müllers Duct down to the Globus Minor most usually quite disappears but still traces of it are met with. Thus on the the caput epididymis of New born children I have seen two or three small Hydatids running in a line from Morgagnis one, which I do not doubt were the remains of the Duct formed first in the same way as we saw

Müllers duct from ampulla to Globus minor

P.10. f.7. 9 & 11.

Recherches sur les kystes de l'épididyme du testicule et de l'appendice testiculaire - Gosselin.

Archives Gen. de Medicine. 1848. Vol. 16. p. 25

(p 408) the cysts and vesicles were by the canals of Gaertner when partially atrophied.

Again, below the Tunica Vaginalis which stretches between the Body of the Epididymis and the side of the Testicle and binds the one to the other, I have seen in the child of 6 years old, distinct traces of a fine cord running down as far as the Globus Minor, which could be nothing but a lower portion of Muller's Duct — that duct and the Excretory one (Epididymis) still running down side by side as in the embryo — An excellent proof of the correctness of this statement was given by M. Gosselin in a most elaborate treatise on the Cysts of the Testicle in which he shewed that the small serous cysts, never attaining a greater size than that of a pea, which are so common in that organ had their favourite and almost sole site along the convex face of the Body of the Epididymes and the free extremity of the ~~Tube~~ caput and that they were quite superficial lying under the Tunica vaginalis and were never embedded in the

P. 13. f. 4 — Fine cord running along Body of Epididymis

Small superficial cysts.

substance of the epididymus. These little vesicles occuring in the position of the hydatids and of the Cord which I have described above are no doubt formed by distensions of them, and so are consequently traces of that part of Müller's Duct which lay alongside of the Wolffian Body.

M. Gosselin who was unaware of the origin of the great mgority of these cysts, seems to have been much puzzled to account for them and was obliged to fall back upon the idea, that as they occured most frequently in old people, they must have some connection with the diminished activity of the testes occuring at the more advanced periods of life. Nature, he thought, had endowed this organ with a secretory motivion, which when not employed in the production of semen, employed itself in another way, in giving rise to these vesicles.

Gosselin's theory of the cysts

— Of course I do not mean to say that all serous cysts are connected with foetal remains, but I am convinced the majority are so! — some doubtless occur just as they would in any other organ. To the rest M. Gosselin's theory may be applied or not, as his readers think fit—

Ueber. E. H. Zusätze zur Lehre vom Baue und den Verrichtungen der Geschlechtsorgane.
Leipzig 1846.

so much then for the upper part of Müllers Ducts, as far as the origin of the Gubernaculum; that is to say of that part of them which in the female forms the Fallopian Tube and its Fimbriated extremity. Let us now see what becomes of the rest of them, of that part of them which should correspond to the Cornua and Body of the Uterus and to the Vagina.

(e.) The Vesicula Prostatica or Weberian Organ—

Ever since the most ancient times, anatomists have been endeavouring to discover in the male mammal some indications of a structure analogous to the uterus;— and by some the Vesiculae Seminales, by others the Prostate Gland has been so regarded, but it was reserved for the Weber to clear up this much disputed point— Has been long sought for.

Supposing ourselves to be entirely ignorant of the existence of the body which we now know to be the Analogue of the female uterus and vagina, let us try to see, whether, by a knowledge of the Development of the Genital system, we could point to a spot in that system, where in the male, they, by rights, should exist.— Now, Müllers Ducts were seen in both sexes to unite together in the Genital cord Probable locality

and enter the Sinus urogenitalis (i.e. part of the urethra) along with the excretory ducts between which they lay: — we would therefore look for a male Uterus and Vagina, somewhere between the points of entrance of the Vasa Deferentia into the urethra and in that situation is found the Vesicula prostatica or the Weberian Organ, so named after its celebrated discribed. I do not intend here to enter into any minute or detailed description of this singular organ, as it is now familiar to all anatomists and has been most amply treated of, not only by Weber himself, but by Huschke, Theile Duvernay &c. and more especially by Leuckart. Suffice it to say that it is a small flask-shaped vesicle lying between the openings of the Vasa deferentia, under the superior wall of the urethra and covered in by the Prostate Gland. It terminates in a round blind end, whose extent is limited by the middle lobe of the prostate and it possesses a constriction or neck by whose mouth it opens into the urethra from under the Verumontanum. In the Weberian corpuscle of two new born infants Meckel found a special

P. 6. f. 1.
P. 3 f. 6

Vesicle in man
P. 11. f. 1
P. 10. f. 14.

variety of structure. It became narrow in its ascent so as to be only permeable by a hogs bristle and ended as a solid thread which separated by Bifurcating— I made sections of one or two of them, in infants hardened in spirit, through their whole extent from below upwards, but two varieties of conformation did not happen to be present in any of them. Abnormality in the child-

The organ has now been dissected and described in a great variety of animals and to its appearance in a few of these I would now call attention as being indicative of its Morphological value.

In the Beaver, as first described by Brandt and Ratzeburg, the Weberian organ forms a simple cavity only at its anterior extremity, where it opens into the urethra and very soon splits into two horns which ascend in the peritoneal fold between the two Seminal Ducts and finally after dwindling to a mere threads, become united with these and are traceable along with them as far as the Testes— The horns measure as much as two and a half inches and the lower portions of them In the Beaver

contain spacious cavities – Its describers, from the mere resemblance in form, were led to compare this organ to the uterus bicornis of the female, though they imagined its function to be that of a kind of supplementary seminal vesicle.

In the Horse, the opening of the Weberian organ is sometimes divided by a median bridge into two apertures or is even completely closed up at its lower end and in the Feræ this latter condition seems to be constant. In the goat, it consists of a cylindrical body, ascending between the two seminal Ducts, to which in its lower half, it is strongly united by areolar tissue. After a course of 1/4 inches it splits into two horns which are apposed to the seminal ducts and continue with these to the testicles where they pass into the covering of the epididymus.

In the Horse.

In Feræ

In the Goat

– In Dolphins, Leydig and Leuckart have both observed that at the opening of the Weberian organ a papilla often projects from its lower surface, whose apex was sometimes united with the opposite margin, so as to divide the opening into

In Dolphins.

two fissures — In the Hart, it is in the form of a cylinder about two inches long which is distinctly bi-cleft at its upper extremity, the cavity being prolonged into these cornua — In a large number of animals, indeed in the majority of those which have been examined, the organ bears traces of having a bifurcated extremity.

In the Hart

Morgagni mentions that the inner lining of this organ was a mucous membrane, and Huschke and Leydig have succeeded in verifying the existence of a number of small glands therein; — which in many animals, are actually similar to those of the uterus of the female of the same species.

Lining membrane

As the Vesicula Prostatica is evidently an organ which possesses no physiological use, or almost only a very unimportant one, (witness its absence in many animals) the probability is that it must be one of that class of structures to which belong the Organs of Rosenmuller, Giraldès and Gaertner, whose presence does not depend upon their functional value, but upon the original typical

Has only a morphological importance

Leuckart. On the vesicula Prostatica -
Todds Cyclopedia - Supplement -

Wahlgren. Ueber den Uterus Masculinus (Weber) bei
dem Menschen und den Säugethieren -
Müllers Archiv. 1849. p. 688 - Translated into
German from the Swedish by Dr. W. Peters -

plan on which both male and female are formed.
Its position, shape and structure all tend to shew that it is formed from the united Müllerian Ducts which in the female increase greatly to form the vagina and uterus, but in the male, who has no need of such organs, do not increase to any thing like the same extent, but simply form the rudimentary seccule, which remains as an evidence of the primary type of formation which prevails in the embryo of either sex. The opinion of Leuckart (who has devoted very great attention to this point and has greatly extended the observations of Weber) and also of Wahlgren who in 1849 published an Inaugural Dissertation upon it, is that the Weberian organ represents the whole female Genital Canal - both uterus and vagina. Weber himself, and the great mass of authors succeeding him, believed that it only corresponded to the Uterus: - and recently H. Meckel (though he has since recalled his opinion) held that it was the analogue of the vagina alone -
The opinion of Leuckart is, I think, the correct one and so, the termed Uterus Masculinus applied

I. is formed from the united Müllerian Ducts,

Leuckarts opinion

Weber's opinion of it.

Meckel's.

to the Prostatic vesicle is clearly a misnomer.
That the organ certainly includes the vagina
in its Morphology, is shewn thus:- If only the
Uterus be represented by A, then the vagina
must exist somewhere lower down; in other words
A must be that portion of the urethra which
lies below the opening of the Verumontanum
i.e. a very small piece of the Prostatic and all
the Membranous part. But at page 172 I have
shewn that these parts were distinctly formed
from the Sinus Urogenitalis, and thus, if Weber's
theory were correct, it would necessitate the vag-
ina being developed from the Sinus urogenitalis
whereas the latter, at most, simply forms the Ves-
tibulum vaginae and does not enter into the
construction of the Vagina Proper. But we may
may employ another phase of the same line of
argument:- for the Gaertner's Canals (Excretory Ducts)
open into the Vestibulum vaginae (Sinus urogenitalis)
and not into the vagina proper which lies above
their openings:- in the male, then, the Vasa Def-
erentia (Excretory Ducts) whose mouths are on each

I includes the Vagina

(Vide diagram at P. 70.)

side of the orifice of the Prostate beicle, would accordiny to Uebers theory, open into the vagina, but this would be a violation of the laws of development, and they, in reality, open into the Sinus urogenitalis, while above them, lies the true vagina, that is to say the Uebersan organ.

It is thus clear that that organ must include the vagina, and now what facts shew that it includes the uterus too. The sections made through the Genital cord strongly tend to prove this, for by them it was evident that in both sexes Müllers Ducts, from their point of meeting in the cord to their opening into the sinus urogenitalis, melted together to form a single canal and not for some time did this canal in the female shew any signs of a division, by means of a cervix, into uterus and vagina. Now we have only to suppose that this division does not take place and we have the Prostatic vesicle in its most common form viz a cylindrical body terminating above in two horns. But we do not even need to employ this slight sketch of imagination for Leuckart has figured and describes several newly born Hermaphrodite goats in which

Includes also the Uterus

the Weberian organ was separated, by the devel-
-opement of a formal Os Tincae, into Uterus and Vagina which were nearly as large as the same structures in the female of the same age- P. 11. f. 3 & 4 -

It moreover possessed long hollow cornua. In these highly interesting specimens, the testes remained in the abdomen, being in one case possessed of Alae Vespertilionis, and lay at the ends of the cor-
-nua of the Weberian organ, whose outer covering passed into the sheath of the Epididymis. The Vas Deferentia lay in front of them all the way up to the Epididymis and in one case their lower ends were completely embedded in the walls of Weber's Organ just as Gaertner's Canals are in the walls of the Vagina and Uterus. The Seminal vesicles developed in these Vasa Deferentia were very small. Hermaphrodite Goats of Leuckart

In the Weberian Organ, then, there can be no doubt that the long sought for Vagina and Uterus of the male exist - and if this be admitted it is obvious that a finishing blow is dealt to the opinion of Follin and others, that Müller's

Simpson's Obstetric works—
Article. Hermaphroditism. Vol. II. p. 269—

Ducts are in both sexes the Developing canals. For in the Hermaphrodite Goats above mentioned, both the Ducts of the Wolffian Body have gone on developing and as far as plain as possibly can be, that the Anterior (or Excretory) have now become the Vasa Deferentia and the posterior (or Mullerian) the Vagina and Uterus.

Vesicula prostatica is analogue of both Uterus & Vagina

Follin says indeed that his view is capable of explaining all the abnormalities of Hermaphrodism, but it is a very curious fact that in the whole course of his work, which includes almost every topic connected with the formation of the Genital System, he never makes mention of a single case of Hermaphrodism or shows us how his theory would explain it. –

But the cases of Leuchart are not by any means the only, though they are certainly by very convincing, evidences of the truth of the views which, in this paper, I have endeavoured to support.

Proved by cases of Hermaphroditism

In the elaborate and exhaustive Treatise of Professor Simpson on Hermaphroditism, numerous cases are citing tending to prove the

some points – The celebrated case published by Professor Ackermann of Jena in 1805 is highly interesting. It occurred in an infant which lived about 6 weeks after birth. On dissection, two testicles were found, one in the scrotum or Labium, the other in the Groin, both being perfectly formed. In the situation of the uterus were found a hollow pyriform organ, larger than the proper size of that viscus and having its coats firm and thinner. Duplicatures of peritoneum, resembling the Ligamenta Lata, connected this imperfect Uterus, with the sides of the pelvis. and its cavity opened into a kind of short vagina which soon united with the urethra and formed one common canal with it, – vagina Urethralis (Sinus urogenitalis or vestibulum in the normal subject) – The vasa Deferentia ran from the testes towards the upper angles of the uterus and penetrated into its substance at the points where the Fallopian Tubes are usually placed, and passing down under the internal mucous-like membrane of the uterus and vagina terminated by two very small orifices in the vagina urethralis. – Ackermann's case

* Text

In 1850 Betz described a very interesting case of a large prostate vesicle, about the size of the normal uterus having however only one Fallopian Tube – The Vasa Deferentia ran down its walls imbedded in them. — P. 11. f. 2.

Betz. Ueber den Ductus Masculinus – Ein Beitrag zur Entwickelungsgeschichte der Geschlechtsorgane – Müllers Archiv 1850. p. 65

Mayer in a foetus of the fourth month found a two-horned uterus terminating in a vagina which opened into the posterior part of the Urinary Bladder and also two male testes with their epididymes from the left one of which a contorted Vas Deferens arose and ran down to the vagina the right vas Deferens was shorter and becoming threadlike disappeared near the corresponding cornu of the Uterus. Mayer's case

Gurlt, in his Handbook of Pathological Anatomy mentions the case of a goat in which all the Internal Genital Organs were found with the exception of Cowper's Glands. There was also present an uterus, provided with long but narrow and curved cornua, that accompanied the vasa deferentia and testicles through the Abdominal rings and ended blind at the epididymis.* Gurlt's Case.

Finally, Kobelt gives a beautiful engraving at the end of his work, of a young calf in which regularly formed testes were found in the scrotum — a distinct two horned uterus was present, along whose anterior walls and Roberts monstrosity — Calf.

Hinters Works by Palmer - Plate XXXIII

and coma the Vasa Deferentia arched up be-
-fore descending to the testes, resembling ex-
-actly the Canals of Gaertner. The Coma were
prolonged as membranous filaments down
along with the vasa Deferentia and were lost
on the Caput epididymus.

Hunter long ago shewed, in those singular
monstrosities the Free Martins, how the exist-
-ence of both male and female internal genes-
-ative organs was in them the rule and not the exception and without knowing the true ex-
-planation thereof has given plates of them which serve to confirm the cases above mentioned, especially Plate 33 where the fragments of the vasa Deferentia are seen running down in front of the Coma Vesicæ: and also plate 32. But in this latter plate, however, there is an error committed in its Explanation: for in the Large Vesiculum Seminale which, in the animal represented, exists below the orifice of the Urethra, and which is correctly enough termed the "Common Vagina", there are drawn

Free Martin's of Hunter.

two openings (designated in the Explanation E. E.) "Orifices of the Ducts of two glands [The" "Glandular Canals of Malpighi and Gaertner]" — But immediately above the Meatus urinarius and at the termination of what is called the "True Vagina" are seen the two openings of the Vasa Deferentia, in a position much more resembling that of the two openings of Gaertner's Canals, than that ascribed to them in the explanation. In truth, in such a hermaphrodite as is represented, where a Uterus as well as male organs is present, the Vasa Deferentia are the real Gaertner's canals, and it is quite impossible for them to have two other openings further down. The error, doubtless, arose from the openings of Bartholini's glands being larger than usual and being mistaken for Gaertner's Canals. — I have thought it right to mention this, for Hunter's works are greatly referred to, even now by anatomists and such a mistake might be productive of much confusion —

Error in explanation of one of Hunter's Plates

In order to bring them clearly before the Eye, I append a Tabular view of the Analogous parts in the Male and Female, which have been considered in the second part of the paper -

In the male.	In the female.
The Wolffian Body Itself.	
Fragmentary tubes and canalicules dispersed in neighbourhood of Parovarium.	Organ of Giraldés. & Some of the tubules adhering to Exc.t. Duct, forming the Vasa Aberrantia.
New Structure on Summit.	
~~Globus Major~~ Parovarium.	~~Parovarium~~ Globus major.
Müller's Ducts.	
Ampulla forms the Imbricated eschemity of Fallopian Tube	Ampulla forms the Hydatid of Morgagni.
From Ampulla to R.o. Lig.t forms the Fallopian Tube itself	From Ampulla to Gubernaculum forms small cysts running from Morgagni's Hydatid down along side of Epididymus.
From R.o. Lig.t to Gen: Cord forms Comua Uteri -	From Gubernac: to Gen: cord forms Comua of Weberian organ
When united in Gen. cord form Uterus & Vagina	When united in Gen: cord form Weberian Organ
Excretory Ducts.	
Gaertners Canals	Vas Deferentia, Body and Globus major of the Epididymis.
Diverticula in them	Broad & accumulated ends of the V. Deferentia (?) -

External Organs.

Clitoris	Penis
Pars Intermedia	Corpus Spongiosum
Labia Majora	Scrotum
Bulbi Vestibuli	Bulb.
Labia Minora	Cutaneous covering of the Urethra.

Sinus Urogenitalis

Vestibulum Vaginae	Membranous part of the urethra.

Part Third.

Pathology of the Remains of the Wolffian Body.

1. In the Female. The only pathological condition which is seen in connection with the remains of the Wolffian Body, is the formation of Cysts, and as these are seldom, of great size or cause much suffering, they are comparatively innocuous. P. J. f. 243. Cysts of the parovarium.

In the female some of the canals of the Organ of Rosenmüller, not unfrequently get distended with fluid, yet the greatest magnitude, which they have ever been known to attain, is that of

an egg or an orange, and they are not liable to de-
-generation by the formation of Secondary Cysts
and Morbid Secretions in their Interior.
The only danger, if such it can be called, which
can arise from them, would be the rupture
of their walls and discharge of their contents
into the peritoneal cavity, or the giving way
of the pedicle which supports such of them
as are of the pendant variety. But they give
rise to some little trouble in diagnosis by
being mistaken for True Ovarian Cysts in
their early stage. Best, however, believes that
cysts of the Wolffian Body of a size sufficient
to be distinguishable during life are of very great
rarity, while, for such cysts, to exceed the di-
-mensions of an orange is rarer still, and he de-
-duces from this, the practical rule that,
when a tumour is discovered in the abdomen
which has attained a greater size than
of the doubled fist, that circumstance

(Are not dangerous)

may be taken as in itself affording almost conclusive proof that the cyst is a true Ovarian one.

2 In the Male. Morgagni's Hydatid offers but little scope for pathological enquiry, but still there are some curious points about it- For instance, it is often suspended by the merest thread of a pedicle, and it has been suggested that the breaking of this and the consequent falling of the Hydatid into the Tunica Vaginalis might prove a cause of Hydrocele by the irritation set up by the loose body. That it does sometimes fall off, is a fact, for M. Gosselin has found it lying detached from its pedicle, in the new-born child- Every now and then, too, we find in the sac of the Tunica, curious little bodies like cartilages- of one of which, taken from a man of 60, I gave a representation. The Hydatid was absent from its normal site, and the patient had a hydrocele on his other side, which, I unfortunately did not see opened so cannot say if there was a loose body there too or not-

P.9. f.15.

Formation of loose bodies in Tunica Vaginalis

P.13. f.3.

Cauley says they are very frequently found in hydroceles and I think a very probable that many of them are hydatids which have fallen off and become hardened:- Sir Astley Cooper had an idea that this was the case also. Cause of Hydrocele

The hydatid itself is really the seat of true cystic Enlargement, Gosselin himself only seen it seven times and then it occured in old people:- the contents in these cases were of a slightly yellow colour and never contained spermatozoa

Müllers duct(in its upper part) as stated before seems to form the greater number of those small superficial cysts ~~in~~ which are so common in the Testicle, and which certainly have no communications with its tubes, as Gosselin has shewn, that injections never by any chance pass into them. Their envelope is of a fibro cellular nature and usually very delicate and their contents, though sometimes clear, sometimes opaline, never contain seminal fluid Gosselin is most positive on this point and I have examined a good many of them myself, Small cysts never seminal ones.

Bell on the Hydrocele - 1794.

and never found spermatozoa in them; but only granules and young pavement epithelium, exactly the same as what I saw in one or two cysts from the Parovarium.

(a) Cysts of the Organ of Giraldés

Probably the most interesting morbid changes are those which occur in connection with the Corps Innominé. Giraldés observed that cysts were very frequently formed by this body and he expressed the opinion that in many instances these were probably the beginnings of what are termed Encysted Hydroceles of the Spermatic Cord, first, I believe, described by Percival Pott and well known to Bell and the surgeons of last century. I have not myself met with any of these cysts in the act of formation, but I see no reason to doubt M. Giraldés' statement. Encysted Hydroceles of the cord have been said to originate almost always from a partial or imperfect obliteration of the prolongation of the peritoneum drawn down at the period of descent of the Testis, and no doubt this is

Encysted Hydroceles of Cord.

Carling - On the Diseases of the Testis. p. 204 -

probably the origin of by far the greater number of them. But many of them occur close down near the head of the Epididymis under the Tunica Vaginalis (peritoneum) which lies, for a certain way up, in front of the cord, and such cases could not have originated from the non-obliterated peritoneal sac:- as they are too low down for that and are moreover beneath the peri-toneum. These then may very likely be due to the saccules of the Corps Innominé getting distended with fluid and forming cysts. Cur-ling mentions having on two or three occasions found small, thin, delicate, serous cysts in cellular tissue of the cord, which, he thinks, very probably originated independantly and had no connection with the obliterated pro-cess of peritoneum - Now this is just the sort of cyst which one would expect to form from the Corps Innominé, and if they enlarged consid-erably they would be considered by the Sur-geon as Encysted Hydroceles -

Cysts of Organ of Giraldès.

Before concluding the subject of cysts

Liston. A few observations on Encysted Hydrocele -
Lond. Med. Chir. Transactions. 1843. Vol. 26. p. 216.

Lloyd. On the presence of Spermatozoa in the fluid
of Hydrocele - Same volume - p. 368.

Dalrymple. On the cause of Spermatozoa in com-
-mon Hydrocele - Do. — Vol. 27 — 1843.

I may mention an idea which occured to me as a possible explanation of some of those which contain seminal fluid. The question with regard to these has all along been, How do the Spermatozoa get into them?, and many fanciful hypotheses have been offered to solve the problem.

Liston, in 1843, seems to have been the first to notice the presence of semen, having been induced by the milky colour of the fluid drawn from a Hydrocele (?) to examine it microscopically; and there followed in the same year, similar descriptions by Lloyd and Dalrymple of spermatozoa occurring in (supposed) Common Hydroceles. Dalrymple made a vain endeavour to prove that they were caused by some accidental puncture of the seminal tubes by the trochar during the operation of tapping and he advocated this opinion (1) from the rarity of the occurrence of such cases and (2) from the fact which Lacpa had long before pointed out that in Hydrocele the position of the cord, vessels and epi-

(1. Seminal Cysts

Explanation of Semenalcysts

Paget- Examination of a Seminal Cyst.
Lond: Med: Chir: Trans. Vol 27 — 1844.

-didymus being considerably altered, the Vas De-
-ferens was very likely to be wounded.— But
it is perfectly obvious that no mere puncture of
a trocher could ever permit of the escape in a
few seconds of such myriads of spermatozoa
as have been sometimes found in these cases: in
fact, in some, more spermatozoa have been seen
than the whole testes and epididymes could
ever at one time contain.
In the following year Paget's examination of
such a case on the dead body, proved that there
was no <u>common Hydrocele</u>, but that the semen
was contained in a distinct Cyst situated on
the upper part of the epididymes. He could not
however trace the seminal Tubes entering it
and he therefore concluded that it was quite
isolated from them. To explain how the
semen got into it he suggested the somewhat
startling idea that the mere proximity of
such cysts to the testicle might enable them
to acquire the power of secreting the seminal
fluid, and he tried to support it by references

Paget's theory

Kohlrausch. Ueber den Bau der haar- und zahn-
haltigen Cysten des Eierstocks.
Müllers Archiv. 1843 - p. 365.

to those curious ovarian Cysts, which occasionally contain bones, teeth, hair, fat &c.
But no physiologist, will, I am sure, acquiesce in the idea, that the semen, the most highly elaborated secretion in the human body can ever be poured forth by the walls of a testicle and all but structureless cyst. Moreover his analogy between the Ovarian and seminal cyst is not correct. The description given by Kohlrausch of one of the former is most interesting and well worth perusing. The walls of that cyst corresponded almost exactly in their structure to that of the skin and contained hair follicles with their hairs, and also sweat glands perfectly developed, while in an irregularly shaped piece of bone, lying in the wall (which possessed very few bone cells) several teeth were found in various stages of developement. But it must be observed, that the imperfect bone and teeth, hair, skin &c. found in these cysts, all partake, more or less, of the nature of the horny or dermoid tissue and are not a distinct

secretion like semen, but have been formed under certain abnormal conditions of the development of primary cells in many parts of the body. No one ever found a seminal cyst in the heart yet pieces of bone, with actual bone cells, (not mere calcified plates) have been found both there and in other muscles, and hair has often been seen in abnormal localities. That such cysts derive no special properties from their proximity to the ovary is seen by the fact that hair and bone containing cysts have actually been found in or near the testicle Cooling has noticed but bone cells in one of the loose bodies in the Tunica vaginalis which had become ossified -

M. Gosselin gives descriptions of many seminal cysts and I have found one or two myself. They seem to be nearly all connected with the head of the epididymis, but, unlike the serous variety, are deep seated and not superficial. Cause of seminal cysts. P. 13. f. 1 -

M. Gosselin, just like M. Paget, was however unable to detect the precise spot where the seminal tube entered them, and although I

dissected the one or two specimens which I found, as carefully as I could, I was not more successful. Nevertheless, though it may be very difficult indeed to point out precisely the aperture by which the semen entered, I think from their intimate union with the seminal canals in respect to position at least, the general opinion is correct:- viz that the cysts have their origin in dilatations of these canals. Whether the dilated tube ruptures into the surrounding tissues and these form by pressure the cyst, is not quite clear, but I think this is not very likely for the cyst wall is generally too well organized and too clearly defined to be a mere condensation of cellular tissue and moreover there is not enough cellular tissue distributed between the vessels of the Globus Major to make a cyst. What greatly increases the probability that they are dilated seminal tubes, is the fact of their favourite site being the upper and back part of the Caput Epididymis where the tubes (convoluted)

are not nearly so tightly and compactly bound together as in the body of the testis and where there is thus more chance of their walls giving way — Again, the caput epididymis is very liable to obstructions of its tubes, the result of deposit or other effects of venereal or lymphatic disease, and the seminal fluid accumulating behind these obstructions might aid in causing the dilatation of some of them — As to not finding the exact foramen by which the spermatozoa entered, we know that these singular bodies are capable of the most extraordinary power of insinuating themselves into the most minute nooks and crannies! — witness their ~~occasional~~ ascent up the Fallopian Tubes and their impregnation of the ovum. How? It may happen that these cysts heavy become full of them, the orifice by which they entered may close up and see nothing to prevent them remaining there alive for long periods —

But there is another though much rarer kind of seminal cyst, of one of which, Cooselin

gives an excellent description. Examining one day a case of Spermatic Cyst, supposed to be of the usual variety, projecting into the Tunica Vaginalis, he found to his astonishment, that it in reality lay quite outside of that cavity and he found the testis lying in the normal and healthy cavity, entirely to the inside of this cyst ~~entirely~~. Here then was a cyst full of spermatozoa at too great a distance from the testicle to admit easily of its being a dilated seminal tube:- how got the semen there?- The case of the young man narrated at page 126 whose testicle I examined, suggested to me this explanation, viz; that such cysts were formed by an enlargement of the dilated end of the Vas Aberrans. This duct lies quite outside of the Tunica Vaginalis, and having no support to its delicate walls, might well be the subject of cystic dilatation, while if it is capable of being easily injected with mercury, I see no reason why spermatozoa should not also find their way into it - I offer this, of course

Rare form of Seminal Cyst on the Cord -

P.12 f.1-
P.5 f.5.

Explanation of it -

as a mere hypothetical explanation, but in the absence of all facts one way or the other, it is better than none.—

General Conclusions.

1.— The Wolffian Bodies do not enter into the construction of the Genital System, ~~but~~ and form no part of it whatever.

2. In connection with them are found two Ducts, which open below into the Sinus Urogenitalis:— (1) The Excretory Duct, receiving the component tubes of the organ (2) Müller's Duct, a tube quite unconnected with it through lying upon it, and terminating above by a free extremity.

3.— At a certain period, there forms on the summit of the Wolffian Body, a new structure, distinct and separate from its tubules, though apparently continuous with it.— This structure is a distinct formation and is not an altered condition of the upper tubules of the Wolffian Body.— In the male this forms the Globus Major of the Epididymis and in the female, the Parovarium.

4 In the male, the Excretory Duct of the Wolffian Body forms the Body of the Epididymis, Globus Minor and Vas Deferens, and its upper end merges into the new structure on the Summit of the Wolffian Body and becomes connected with the tubules in that structure, which form the future Coni-Vasculosi — A chord cord passes from the New Structure to the Head of the Testicle, which is at first solid, but afterwards splits up longitudinally to form the Vasa Efferentia. In the female the Excretory Ducts form the Canals of Gartner.

5. ——— In the female the upper parts of the Müllerian Ducts form the Fallopian Tubes and in animals the Cornua Uteri - and their lower parts melt together into one canal, and form the Uterus and Vagina - In the Male, the upper parts form the Hydatid of Morgagni & certain small superficial cysts along the course of the epididymis and their lower united ends, the Vesicula Prostatica.

6. The Hydatid of Morgagni is the analogue of the Fimbriated extremity of the Fallopian Tube

and not of any vesicle or vesicles found thereon - the Parovarium is the analogue of the Globus Major - and the Vesicula Prostatica that of the Uterus and Vagina -

7 The Sinus urogenitalis forms the Vestibulum vagina of the female, and the Membranous and a very small part of the Prostatic portions of the urethra in the male -

8 The remains of the Wolffian Body proper are to be found as small fragmentary tubules & granules scattered about in the neighbourhood of the Parovarium :- in the male they form the Organ of Giraldès and some of the tubules still remaining in connection with their Excretory Duct (the Body of the Epididymis) form the Vasa Aberrantia of Haller -

9. The majority of seminal cysts are to be found on the caput epididymis and are probably formed from Dilatations of the tubules of that body - those found on the spermatic cord may possibly result from the dilated ends of the Vasa Aberrantia -

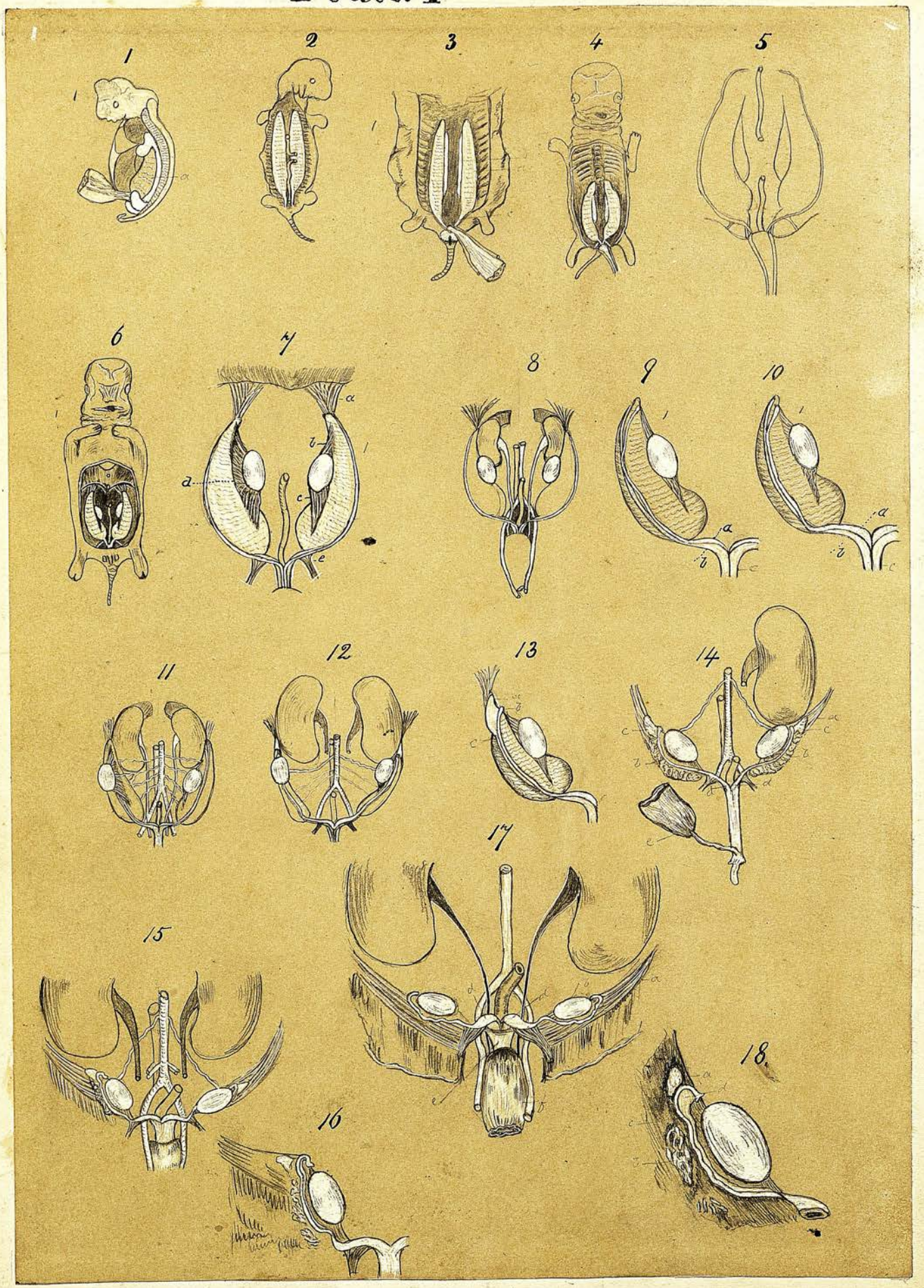
10 The Organ of Giraldès may give rise to cysts on the spermatic cord, which, however, never contain spermatozoa -

Drawings accompanying Thesis on the Wolffian Bodies.

W. Mitchell Banks.

1864.

Plate. I



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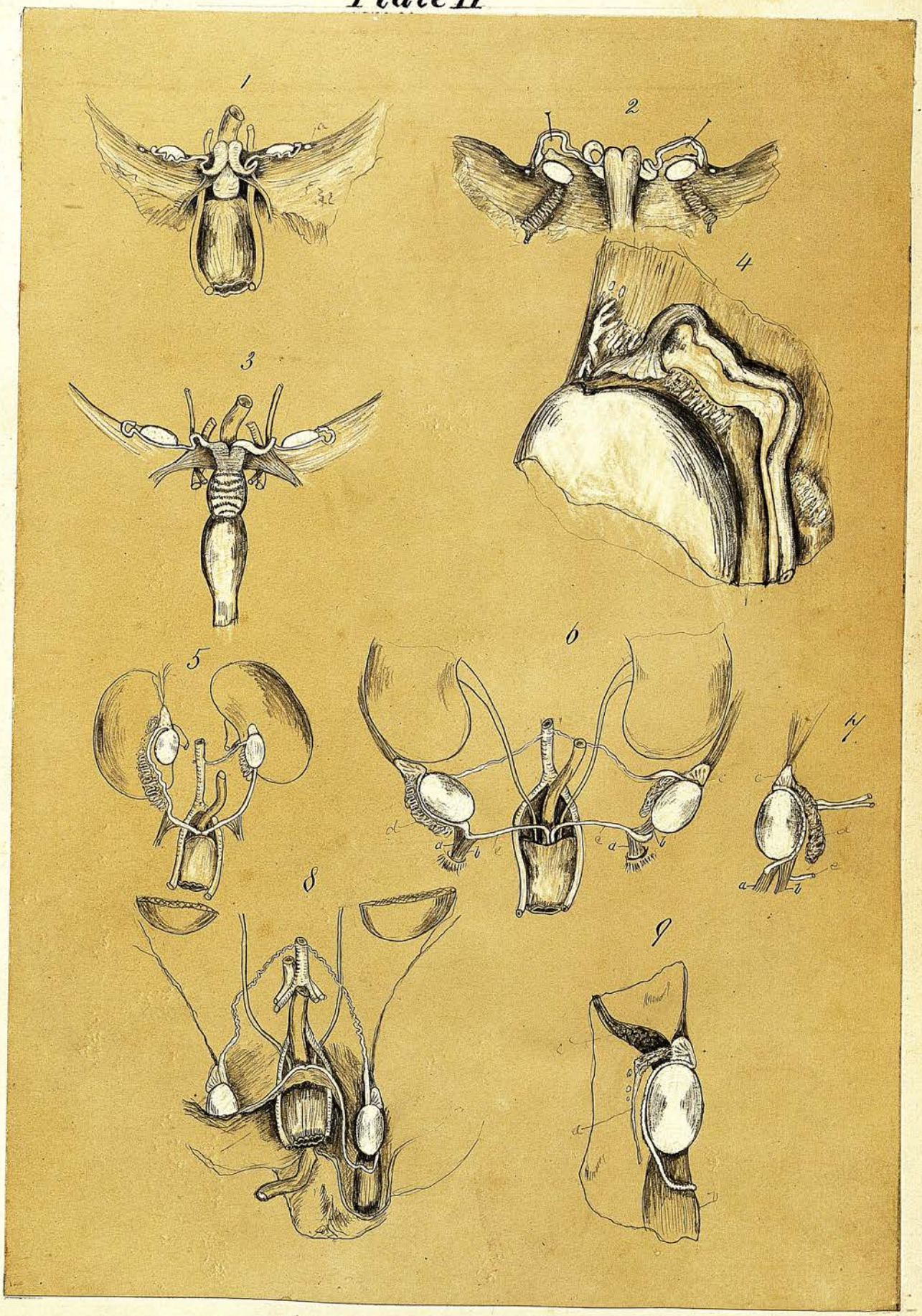


Plate III

Plate IV.

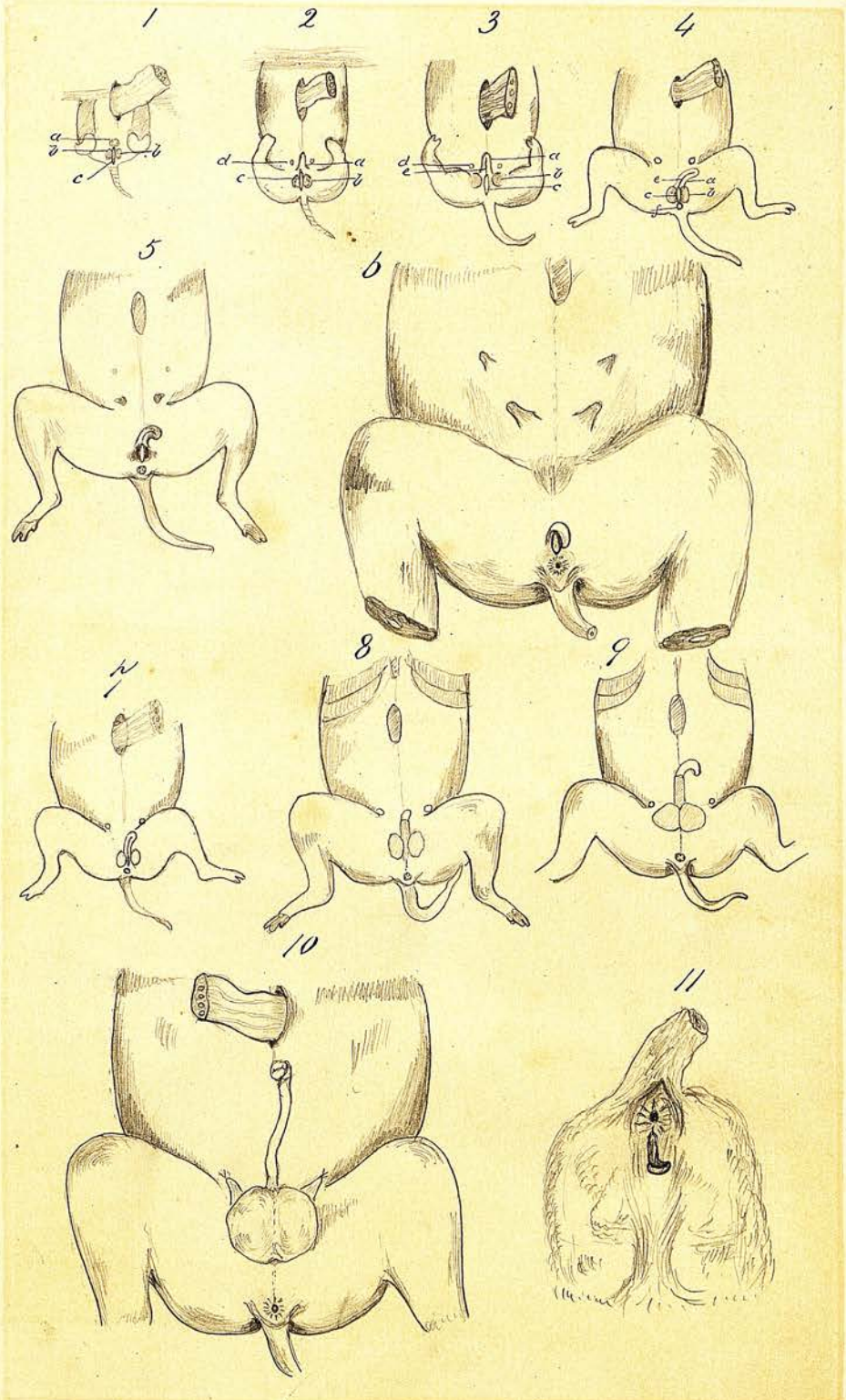
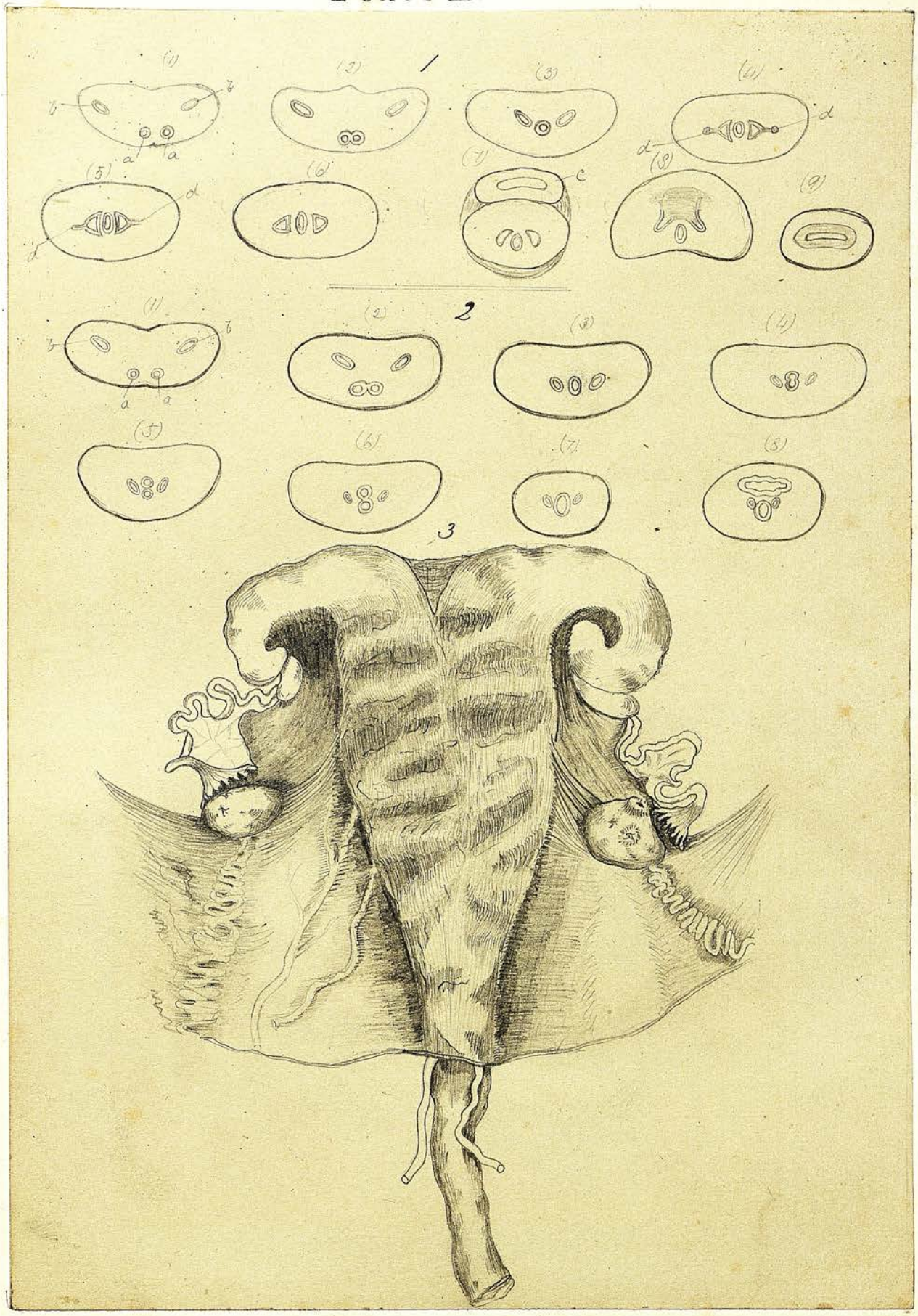


Plate V.

Plate VI.



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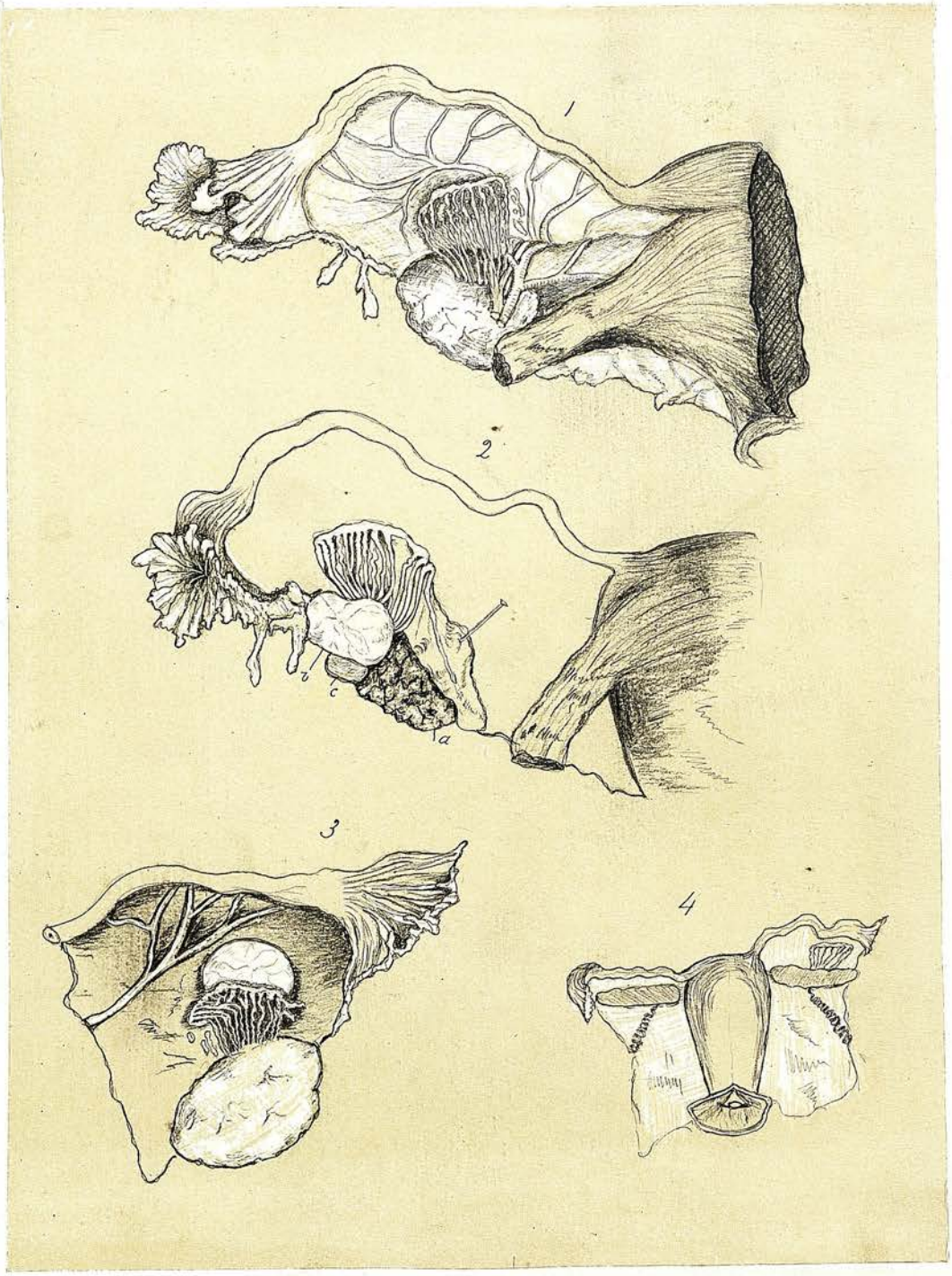
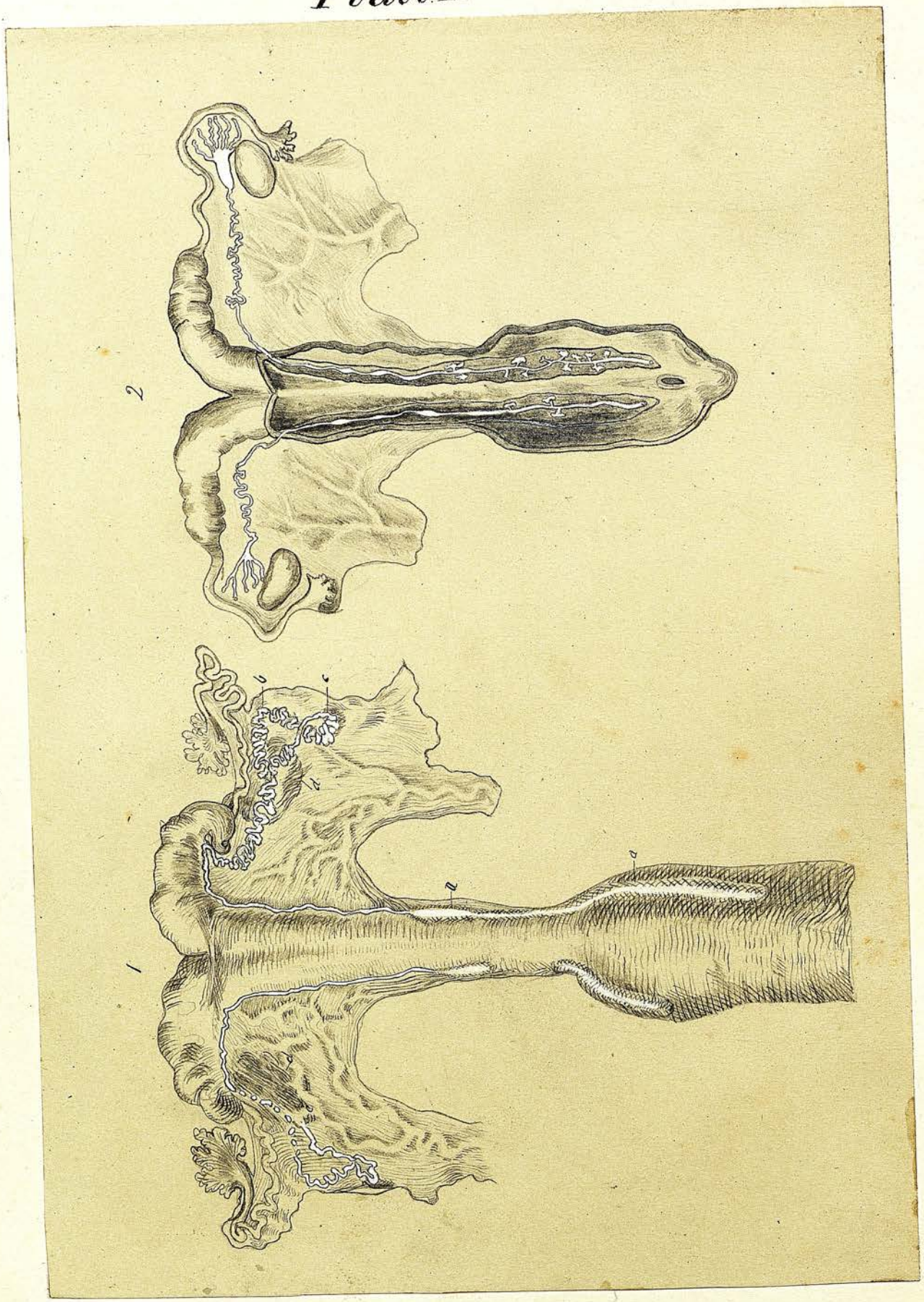


Plate VIII.

Plate IX.



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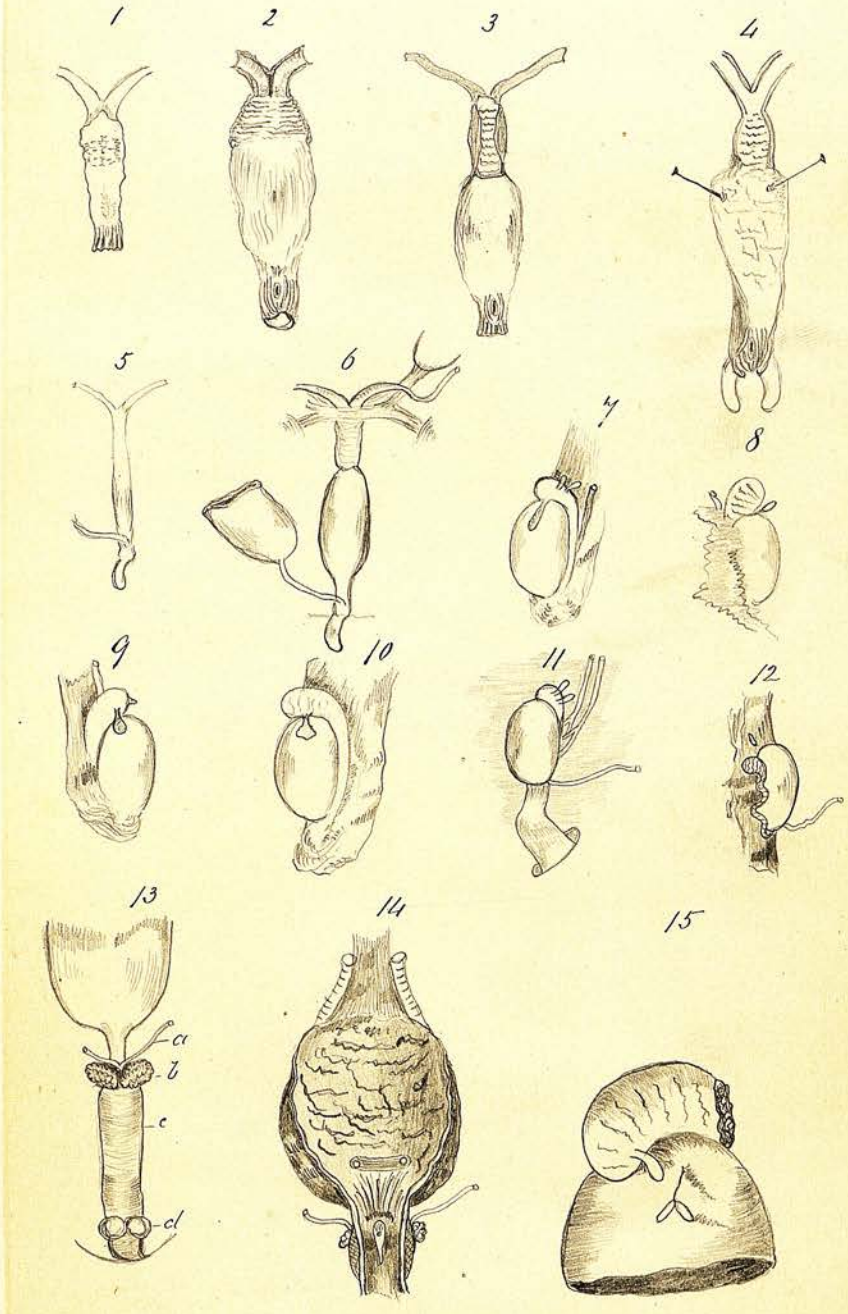

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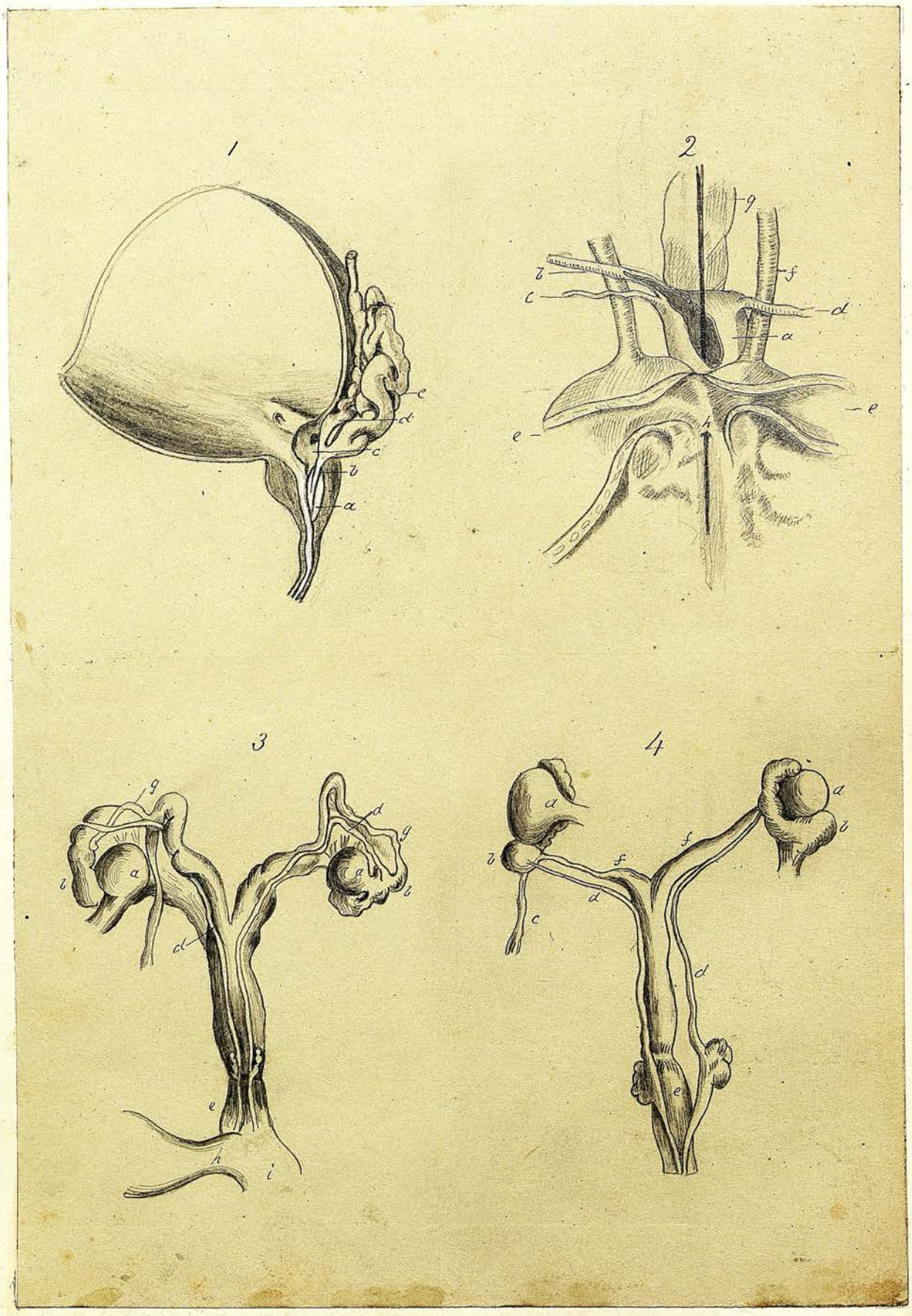

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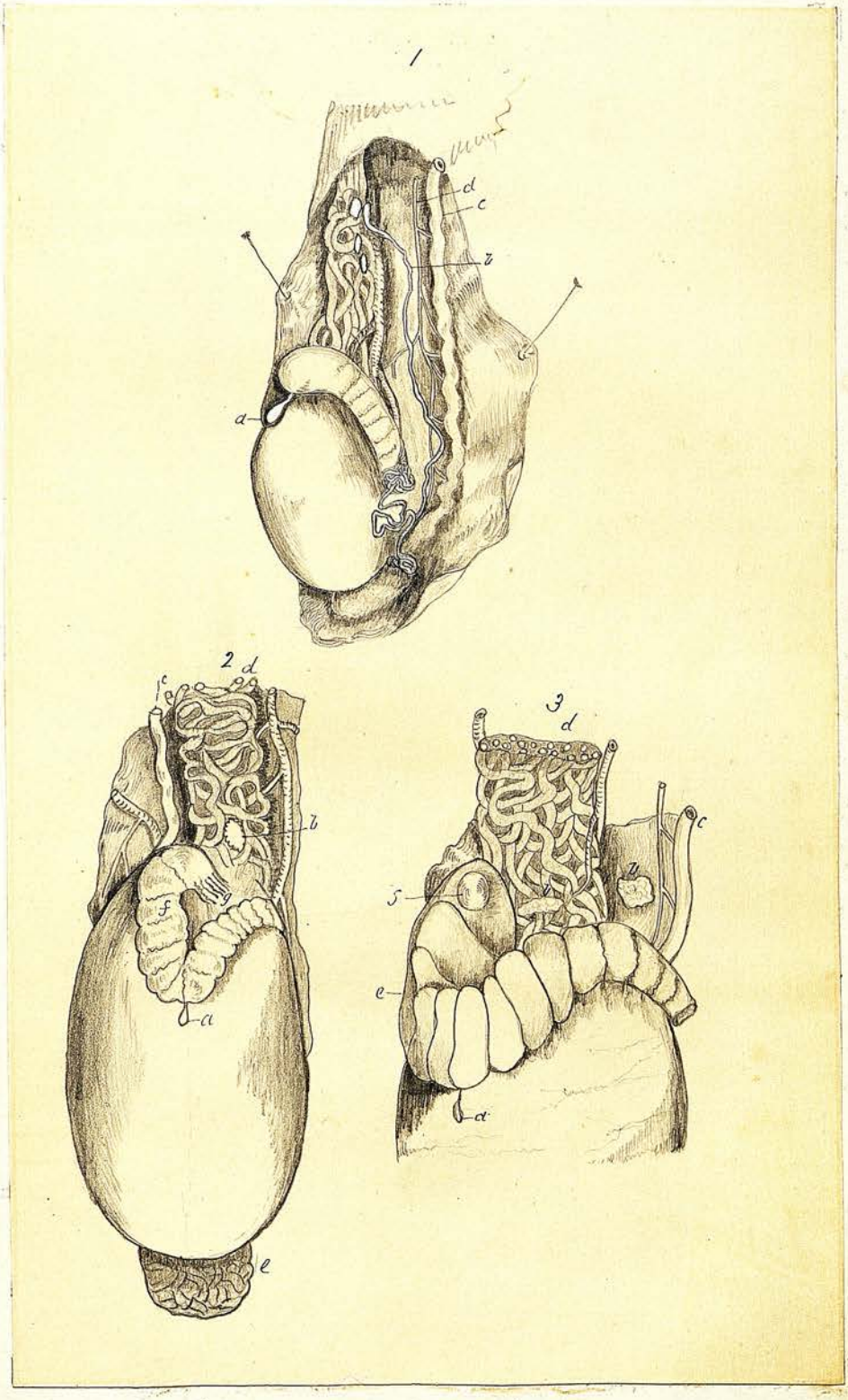

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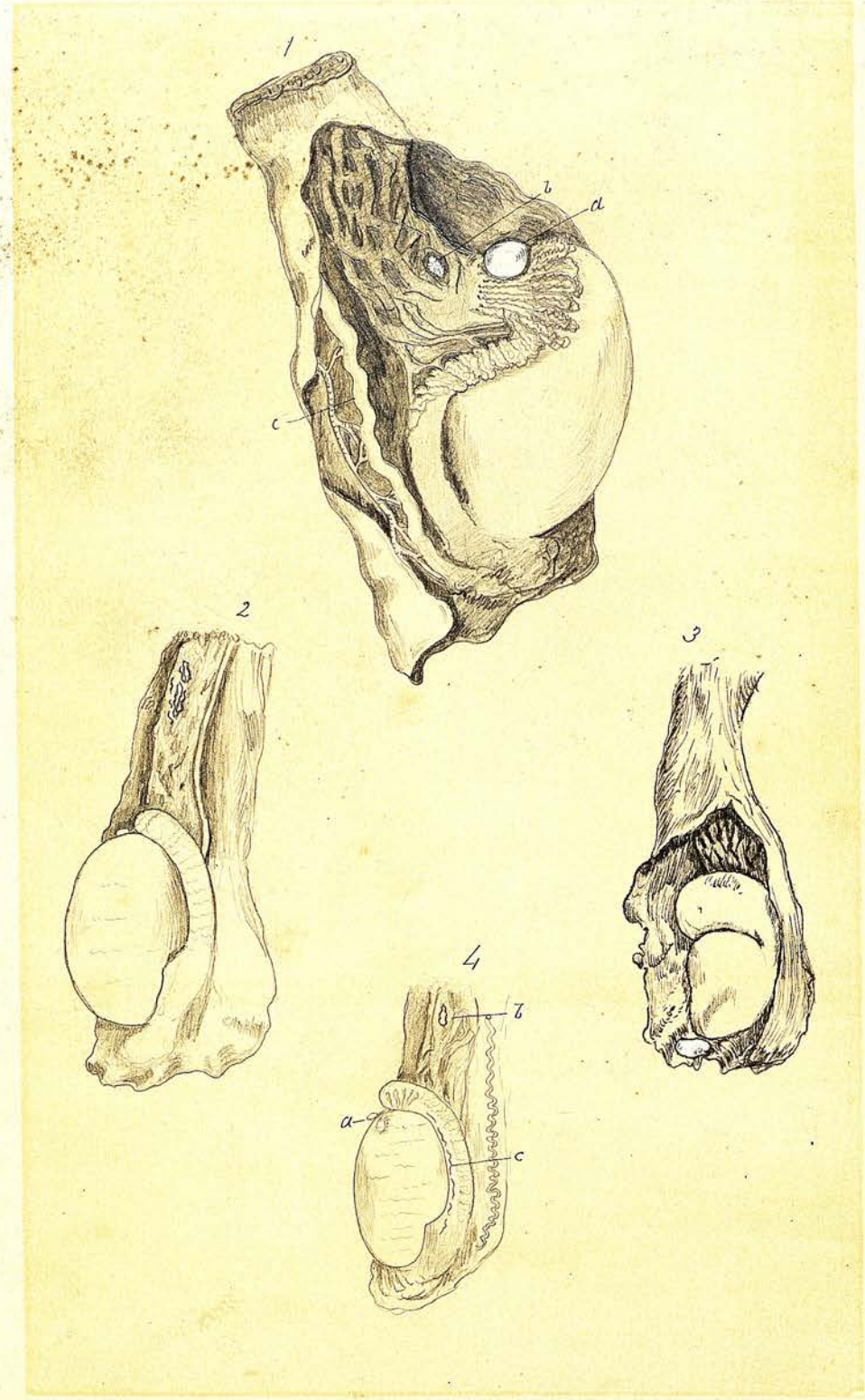

Plate XIV


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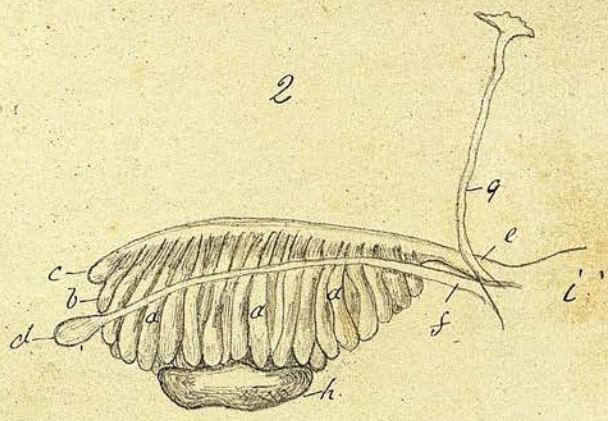
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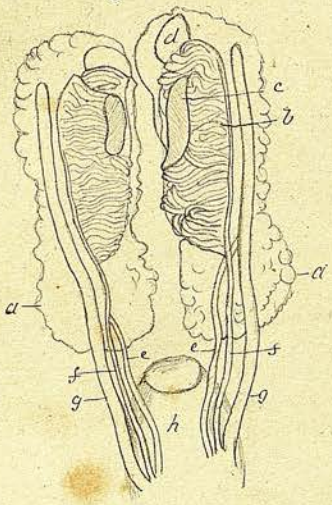
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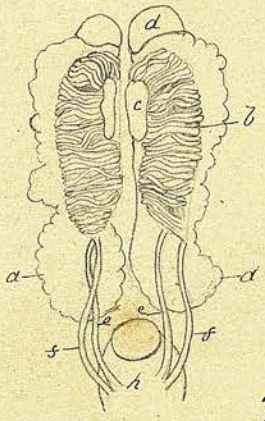
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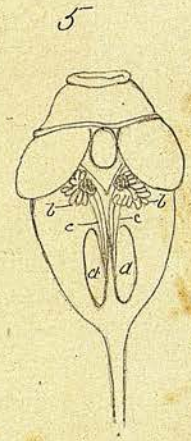
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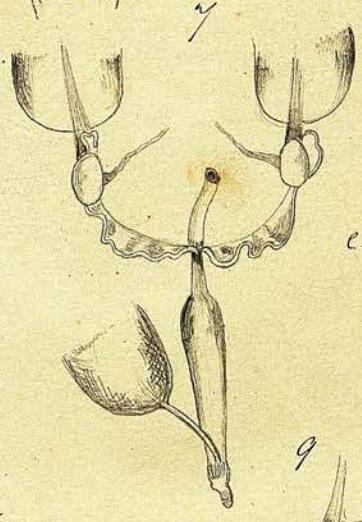
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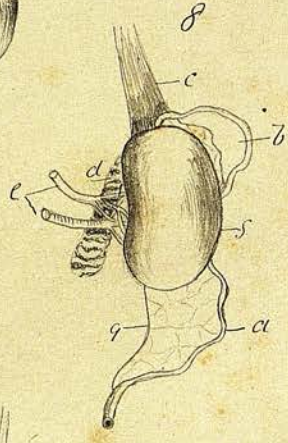
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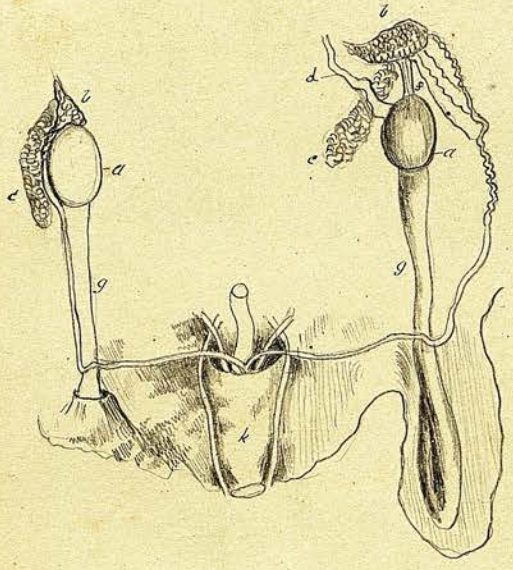
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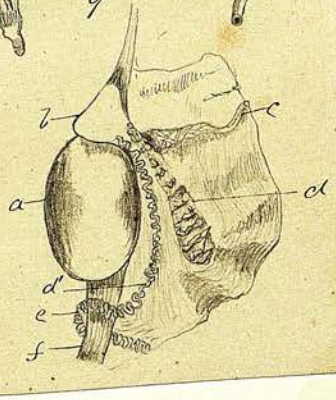
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Plate I

Fig. 1.

Foetal pig - natural size 3/8ths of an inch.

Fig 2.

Foetal sheep of same size - all the organs removed except the Wolffian Bodies, which extend nearly the whole length of the animal - their Excretory Ducts are seen, but the Allantois was torn off.

Fig. 3.

Foetal sheep - 5/8ths of an inch - Wolffian Bodies shorter & shewing a tendency to become oval - The Genital glands appear as two white streaks on their inner sides - The Excretory ducts opening into the allantois.

Fig 4.

Embryo almost 1 inch long - Wolffian Bodies have almost assumed their proper shape, and Genital glands are more oval.

Fig 5.

Enlarged view of 4 - White streak running along outer margin of Wolffian Body - which is seen to consist of two parts -

Fig 6.

Embryo 1/8th of an inch. The Wolffian Bodies and Genital gland have assumed their full & perfected shape -

Fig 7. The Ligaments - a. The Diaphragm Ligament - b. The Upper "Bauchfellfalte" - c. Lower Do. - d. The Mesorchium or Mesovarium - e. The future Round Ligament or Gubernaculum Testis

Fig 8. Foetal sheep about 2 inches long -

Fig 9. Wolffian Body in a male of 2 inches - a. Muller's Duct - very fine thread, of a pure white colour, running upon & to the inside of the Excretory Duct - slightly wavy in some specimens - terminating above in a bulbous extremity or ampulla, which is quite free - b. The Excretory Duct, larger than the Müllerian, but darker in colour & not so easily seen - It merges into the gland substance at its upper end, or at any rate does not terminate by a free extremity like its companion tube - The two ducts

from each side are seen to unite into the Genital cord, the Müllerian lying behind, the Excretory in front—

Fig 10.

Female of the same size. The only difference between male and female, is that the Müllerian Duct, (the one which developes here) is larger in the latter than in the former—

Fig 11.

Embryo of 2½ inches long.— Shews the manner in which the Wolffian Bodies seem to revolve on their own axes, so that the Ducts come to lie, not at their sides, but in front of them— Numerous vessels seen running to the Bodies, and one especially forming in the Mesorchium & joining an artery of the Wolffian Body, constitutes the future Spermatic artery (Right side)—

Fig 12. The Wolffian Bodies are now beginning to atrophy, & their Ducts are coming to lie almost on their inner sides. The vessels are disappearing, all but the Spermatics—

Fig 13. To shew the New Formation on the summit of the Wolffian Body— of a pure white and colour and somewhat triangular shape. The Excretory Duct enters it— but the Müllerian lies between it & the upper end of the Wolffian Body proper.

Fig 14.

Female of 5 inches— The Broad Ligament is seen forming from the Diaphragm. Band. Wolffian Bodies considerably atrophied and disorganized— the new Structure seen on their summit. The Excretory Duct has disappeared and the Müllerian alone remains— The Two Müllerian Ducts having united are seen to form one tube, the Genital canal, which is not yet divisible into uterus and vagina.

Fig. 15.

Female of 5½ inches.— The ovaries lie more horizontally now, and the Broad Ligaments are distinctly formed—

Fig. 16. Enlarged view of the same subject - Wolffian Bodies now in a perfectly fragmentary condition - The new structure, tho' very small compared with the male, is still perceptible - The Müllerian Duct has now plainly formed the Fallopian Tube, and along its inner edge a fine membrane is seen forming.

Fig. 17 -

Female of 7 inches - The various parts have almost assumed their permanent form - The ovaries are all but horizontal, The Fallopian Tube is getting convoluted & the Round Ligaments are seen plainly - they are slightly united by transverse bands passing in front of the body of the uterus.

Fig 18. The same subject - Wolffian Body almost disappeared, but the new structure still remains, tho' difficult to observe in the real subject - The upper end of Müllers Duct is opening out into the Pavilion the Middle forms the Fallopian Tube and the lower the Cornu uteri - The membrane along its inner edge has increased and at its upper part forms a sort of veil or net for the ovary -

Plate II.

Fig 1. Uterus, ovaries, Fallopian Tubes &c. of a foetal sheep on which wool had begun to appear - Front view.

Fig 2. Posterior view of same subject - The only remnants of the Wolffian Body to be seen are two small specks at the mouth of the Fallopian Tube, in the Broad Ligament. These are the New Structures, (not the Wolffian Bodies proper) and are in the situation of the future Parovaria -

Fig 3. Embryo of the Calf - 6 inches long - Right cornu uteri turned up - shews vagina & cervix, both of which are

very large while the Body of the uterus is comparatively small-

Fig 4. The same greatly enlarged- Shews the gradual process of disappearance of the Wolffian Body, while the tubules of the New Structure at its upper end are forming the Parovarium- The veil attached to the Fallopian Tube is well seen.

Fig 5.

Male sheep of 6 inches- The Testes and Wolffian Bodies had got glued to the front of the Kidneys- Müller's ducts have gone, & the Excretory ducts are here seen forming the Vasa Deferentia- Being a male subject the New structure is much larger than in the female and has mounted on to the summit of the Testicle- after being joined by the Excretory Duct-

Fig 6.

Male sheep of 6 inches- Left testicle has turned over in process of descent- Gubernaculum is very distinct & seems composed of two parts (a) The original "Leosten-band" & (b) The Lower Bunch fellfatte- The New structure is plainly the Caput epididymis & the Excretory Duct as far as the Gubernaculum is getting connected to form the Body of the Epididymis- The Spermatic vessels increase near the Testicle, to form the so-called Vascular Tumour- The Wolffian Body is much atrophied & seems as if dehendiny from the New structure. (Caput Epididymis)

Fig 7- Enlarged view of the same-

Fig 8. Male sheep of 7 inches- left testicle in scrotum and right in abdominal rings.

Fig 9. Vascular Tumour large- Wolffian Body much reduced in size & at its lower part, reduced to a mere thread-

Plate III.

Fig I -

Male sheep. woolly down appearing on it - Both testes are in scrotum - The Diaphragm Ligament is seen as a mere thread running up thro' the slit-open abdominal ring on to the abdominal wall. The Vascular tumour is very large -

a. Tunica vaginalis laid open.
b. Opposite half of scrotum.
c. penis, cut short - d. Bladder.
e - Artery of Vas Deferens
f - remains of the original arteries of the Wolffian Bodies reduced to mere threads.

Fig 2. Testicle of the same enlarged. Wolffian Body reduced to a mere fragment, lying in front of the Vascular Tumour + constituting the Corps Innominé.

Fig. 3. Section (longitudinal) of the upper part of the Wolffian Body and the new structure on its summit including the Excretory Duct: In the sheep —
a - The Tubules in the new structure converging to a point and bound together by a cord or tube running round their outer ends - b - The tubules of the Wolffian Body proper, distinct from the above - They are seen to have separated from the Excretory Duct (c) - at this stage -

Fig 4. Section of the same parts in a more advanced foetal sheep. The New Structure now rests on the top of the Testicle (a) - and from the one to the other passes a short, thick cord (b) towards which the tubules (c) converge - This cord splits into the Vasa Efferentia; - and is already striated longitudinally.

Figure 5. Section of the same parts in a more advanced foetus - The new structure is now plainly the Caput Epididymis, and the Tubules in it have formed distinct coni vasculosi, while the connecting cord is splitting up into Vasa Efferentia -

Fig. 6. A Transverse section through the Wolffian body - to shew the appearance of the two ducts -
a - Müller's Duct, very small - b. The Excretory duct much larger -

Fig 7 — Shews the abundant supply of vessels to the Organ of Giraldés.

Fig 8 - The Corpus Innominé in a man of 60 -

Fig 9 & 10. — Do. - in children -

Plate IV.

Fig 1. a. The Genital Prominence - } Foetal sheep -
b. The Sexual Folds - } 3/4 ths of an inch.
c. The Cloaca -

Fig 2. a. The Sexual prominence now the Genital member -
b. The Sexual folds -
c. The Cloaca -
d. The Mammillae -
Foetal sheep of 1 1/4 inches in length.

Fig 3. — Sheep slightly larger than the preceding -
The Sexual Furrow (e) is now quite distinct -

Fig 4. Female Sheep -
The Cloaca has divided into rectum and vagina - the Genital member forms the Clitoris -

Fig 5. Older Female Sheep.
Clitoris distinct now; - The Sexual folds do not form proper Labia Majora as in the human species, nor do the edges of

the Sexual Furrow develops into Labia Minora.

Fig 6. Female Sheep of 6¼ inches long.

Parts are now fully formed. The orifice of the vagina is a simple opening without Nymphae or Labia Majora, and the Clitoris never becomes drawn within it.

Fig 7. Male sheep. Cloaca has divided here and the Sexual Folds & Furrow are seen. It is in fact indistinguishable from the female in Fig. 4.

Fig 8. Male sheep of 1¾ inches long.

The Sexual Furrow has closed in to form the part of the urethra in the penis. The Genital member or penis is elongating considerably, upwards under the skin of the abdominal wall. The Glans is seen, and the Sexual Folds are increasing in size. Mammillae are present.

Fig 9. Male Sheep of 2¼ inches

Penis is much elongated & the Sexual Folds have increased so as to lie almost together.

Fig 10. Male sheep of 6 inches

The Parts are now perfectly formed. Penis is long and reaches almost to umbilicus, with a very short Glans and Prepuce. The Sexual Folds have united together and now form the Scrotum, at whose anterior margin the two mammillae are seen.

Fig 11. Female Sheep at full time.

Shews the vagina as a simple elongated opening, with the clitoris (somewhat boat-shaped) at its lower extremity.

Plate V.

Double uterus of a sheep. The vagina was cut off just below the cervix, so that I cannot say if it also was Double.

Plate VII

Throughout the Diagrams, which represent sections through the Genital Cord at various levels, (a) represent the Müllerian, (b) the Excretory Ducts and (c) the Bladder – (d) The Vesiculae Seminales –

The first series ~~are~~ is from a Male, & the second from a female Genital cord –

Fig I. The whole 4 ducts are separate, the Excretory lying in front, being oval-shaped and having fine walls: – the Mullerian lying behind, being round in form & having thicker walls –

Fig 2. Müller's duct in the act of uniting.

Fig 3. Müller's duct united into one canal, & the Excretory Ducts approaching ~~them~~ it.

Fig. 4. The Excretory Ducts now lying on each side of the united Mullerian, having the diverticula projecting from their outer sides which are to form the Vesiculae Seminales.

Fig 5. The same a little Lower down –

Fig 6. Section lower down: – the diverticula have gone now.

Fig. 7. Bladder now seen in section: Excretory duct lying in front of the united Müllerian.

Fig. 8. Excretory Ducts or Vasa Deferentia entering what afterwards becomes the Urethra, on either side of & slightly in front of the United Müllerian Ducts or Vesiculae Prostatica –

Fig 9. The Sinus uro-genitalis alone seen –

Fig 10: 11 & 12 are the same as 1. 2 and 3. in the male – No 12 is taken from a point in the Genital cord where the cervix uteri forms –

Fig 13. Müller's Ducts again separating –

Fig 14 & 15. Müller's duct are quite separate in 14 &

in 15 have again began to unite – The Excretory ducts lie on each side of them as in Figs. 4. 5 & 6 of the Male Genital cord. – but they are growing gradually smaller and no diverticula are seen forming from them.

Fig 16. Müller's duct quite united again, at the lower end of the vagina –

Fig 17. Bladder seen in front – The Excretory Ducts have dwindled down to a very small size & occupy the position of Gaertner's canals, lying in front of the united Müllerian Ducts which now form one Genital Canal, the future uterus and vagina –

From the 2nd series it is obvious that in the female Müller's Ducts meet together first, at two points, viz. when the cervix forms and at the lower end of the vagina – In more advanced specimens they are, of course, united all the way down –

Fig 18. Uterus of the adult sheep, in the first period of pregnancy –

Plate VII

Fig I. Uterus and Broad Ligament of young woman aged 20. The Parovarium is seen, with small fragments scattered about it –

Fig 2. Uterus and Broad Ligament of an old woman aged 60 – (a). The ovary, shrunken, hard & corrugated from old cicatrices (b) A fine, delicate cyst, connected with the

Parovarium (c) a small hard tumour growing from the ovary.

Fig. 3 Shews the Parovarium of a young woman with a cyst connected with it.

Fig 4. Ovaries and Parovarium of an Infant at time of Birth—

Plate VIII

Fig I. Abdominal cavity of human foetus of 6th month laid open to shew the Testes.

Fig 2. Testes of same subject enlarged— (a) The Vascular Tumour with the remains of the Wolffian Body which form the Organ of Giraldès lying upon it— (b) The Vas Deferens. (c). The Gubernaculum.

Fig 3. Testes of full-grown infant, with anterior part of Tunica Vaginalis removed— Shews the Corpus Innominé lying in front of the Vessels.

Fig 4 Part of the Broad Ligament of the adult sheep with Ovary & Fallopian Tube— Shews the peculiar veil or net which exists, in sheep, cows & pigs, lying along the Fallopian tube as far as the Pavilion— The position of the Parovarium is seen at the outer side of the ovary.

Figs 5. 6. & 7— Represent various forms of the Par-ovarium in Sheep— Two small cysts have formed in No. 7—

Plate IX

Fig I. Is Taken from Kobelt's Treatise.

Exhibits Gaertner's canals in a calf of 3 weeks—

a.a. The swellings

a.a. The swellings or Dilatations of the canals on the Vagina and Cervix uteri.
b. Convolutions of the canals in the Broad Ligament corresponding to the Body of the Epididymis in the male. c Loop formed by the canal of the left side, corresponding to the Bend of the Vas Deferens. d.d. Position of the Ovaries. e. Sinking of Gaertners canal into the covering of the Ovary.
On the right side the Canal is imperfect.

Fig 2. Taken from Follin's Thesis.

Canals of Gaertner in the Sow.

This drawing represents the vagina laid open and the Canals injected and dissected out from their anterior walls. Their openings close beside the Orificium Urethra are seen; - their divergent course and their Dilatations: - and also their very flexuous upper ends.

Plate X

Fig I. Genital canal of female sheep of 5 inches in length slit open to shew the rugae beginning to form which mark off the Cervix uteri

F. 2. Do. of Do. of 7 inches. Cervix very large with well-marked transverse rugae. Cavity of Body of Uterus very small, with septum forming in it. Breadth of Vagina quite disproportionate. Longitudinal rugae at its lower end with opening of the urethra in their centre.

Fig 3. Do. Do. of 5 1/2 inches.

Fig 4-
Do —— Do of 6 inches-

Fig 5. Eoclernal appearance of genital canal of female sheep of 2 inches with urethra opening into A- No distinction between Vagina Uterus seen.

Fig. 6. Eoclernal appearance of Cervix uteri and Vagina in sheep of 5¼ inches- Shews the crossing of the Round Ligaments in front of the uterus- Bladder, urethra & clitoris are represented.

Figs. 7. 8. 9. 10 & 11 represent the Testes of five new-born children- Shewing the positions of Morgagni's Hydatid, and of other similar, small projections from the Caput Epididymis.

Fig. 12. Testicle of Male Human infant at the 9th month, shewing the Ayan of Giraldés.

Fig. 13. Posterior view of Bladder &c of Male Sheep about 7 inches long-
a. Vas deferens - b. Seminal vesicle. c Prostate gland.
d. Cowpers Glands.

Fig 14. Bladder and Prostatic portion of the urethra of a Male human infant of 9 months slit open to shew the Vesicula Prostatica.

Fig. 15. Testicle and Caput Epididymis of a young man of 25- Shews two Hydatids of Morgagni - one of which, of a double-leaf shape, is attached by the slenderest possible pedicle-

Plate XI

Taken from Weber's Essay on the Prostatic vesicle-

Fig I. Represents the Bladder. Prostate Gland &c of man-

(a). The Vesicula Prostatica distended with air.
(b) – The common Ejaculatory Duct.
(c) – The Middle Lobe of the Prostate.
(d) – Glandular end of the Vas Deferens.
(e) – Left Vesicula seminalis.

Fig. 2. Taken from Betz' paper on the Uterus Masculinus.
Internal Genital organs of a Male Infant.
(a) The uterus masculinus.
(b) – The Cornu uteri
(c) – Right Vas deferens (d). Left. Do. –
(e). The Bladder slit open.
(f.f). The Ureters. (g). The Rectum.
(h). Urethral opening of the Uterus Masculinus.

Fig. 3. From Leuckarts Essay on the vesicula prostatica
Internal Genitals of a Male Hermaphrodite goat.
(a-a) Testicles with (b.b). Epididymis
c. Gubernaculum Testis.
(d.d). Vasa deferentia with the seminal vesicles.
(e). Vagina (f.f). Cornua uteri.

Fig. 4. From the same author.
Internal Genitals of a Male Hermaphrodite Goat.
(a) to (f) as in Fig. 3
(g.g) Fallopian Tubes (h) urethra (i) Uro-genital canal

Plate XII

Fig I. Testicle of a young man aet. 25. Tunica vaginalis slit up.
(a) The Hydatid of Morgagni.
(b). The Vas Aberrans Halleri, terminating above by a bulbous eschemety on the Vascular Tumour, near the Corpus Innominatum and below, joining the Body of the Epididymus, a portion of which is unravelled (c). Vas Deferens (d) Its entery –

Fig 2. Testicle of a young Ram-

a. The Hydatid of Morgagni-
b. The Organ of Giraldès-
c. The Vas deferens (d) The Vascular Tumour
e. The Globus minor. f. Globus Major and (g) the Vasa Efferentia.

Fig 3. Testicle of Ram.

a. Hydatid of Morgagni - b.b. Corps Innominé divided with two parts - c The Vas deferens - d Vascular Tumour e. The Lobes of the Caput Epididymis - f a small cyst on the Caput.

Plate XIII

Fig I. Testicle of a man aet 35. Tunica vaginalis slit open. The Caput Epididymis and part of the Body, is dissected and the Coni Vasculosi & Vasa Efferentia are unravelled

a. Seminal Cyst, in a very common position for them.
b. The Corps Innominé - c Vas deferens with its artery

Fig 2. Testicle of a man of 60.

To shew the Hydatid of Morgagni and the Corps Innominé in its most usual site - In this case it consists of so called particles.

Fig 3. Testicle of a man aet 58.

This patient had Hydrocele on the other side -
The Caput Epididymis is disproportionately large and there is no Hydatid of Morgagni - At the lower end of the Testicle is seated a cartilaginous loose body -

Fig 4. Testicle of a child of 6 years.

a. Hydatid of Morgagni
b. The Corps Innominé.
c. A partly atrophied cord, the remains of a portion of the Müllerian Duct -

Plate XIV

Fig. I. From Kobelt Theses -

a - The Middle Culs-de-sac of the Wolffian Body, now the Coni Vasculosi

b. The upper set transformed into Hydatid on the Epididymus -

c. The upper end of the Excretory Duct changed into another Hydatid -

d. Upper end of Müller's duct, now Morgagni's Hydatid.

e - Cysts formed from the Mullerian duct.

f. The Excretory Duct now forming the Epididymus and Vas Deferens -

g -. Lower set of Culs-de-sac forming Vasa Aberrantia -

Fig. 2. From the same author.

a - Middle set of Culs-de-sac of the Wolffian Body -

b. The Upper Do. -

c - Upper end of the Excretory Duct -

d - Upper end of the Müllerian Duct -

e. The Excretory Duct of Müller's Duct -

g - Its position (allied to the horizontal) in the adult -

h. The Genital gland - i. The Canis Urogenitalis.

Fig 3. & 4 After Muller -

Shews the Wolffian Bodies, Kidneys and Organs of Generation in (3) a male, and in a female embryo of the chick (4) —

a. The Kidneys (b) The Wolffian Bodies (c) The testes in the male, and the ovary in the female - d The Supra-Renal Capsules - e. The ureters - f the Ducts of the Wolffian Bodies - g. The Fallopian Tube h. the Cloaca

Fig 5 — After Müller

The Larva of a frog — Irein of the posterior part of the

of the cavity of the Trunk - (a) The Kidneys (b) The Wolf-
-fian Bodies (c) The Excretory Ducts.

Fig 6 — Taken from Clelands Thesis -

a.a. The Testes. b.b Masses composing the coni vasculosi: the left side shews some of the individual tubes joining the epididymis - c.c Remains of the Wolffian Bodies - d Spermatic artery. f. Abrupt cord joining the testis & coni vasculosi and becoming split into the vasa Effegentia -

Fig 7. Appearance of the Internal Generative organs in the pig of 5 inches long (Foetal)

Fig 8 - The same enlarged -

a. Müllers Duct or the Fallopian Tube -
b. The Veil or Net attached to a -
c. The Diaphragm Ligament or Broad Ligament.
d. The Remains of the Wolffian Body -
e. The Ovarian vessels - f. The Ovary - g Part of the Broad Ligament -

Fig 9 - Male pig of the same size as the above -

a. The Testicle b. The New structure on the top of the epididymis which forms the Caput Epididymis (Wolffian Body)
c - The Spermatic vessels forming the Vascular Tumour
d - The remains of the Wolffian Body
d' - The Excretory duct (Body of the Epididymis.
e - The Globus Minor - f. The Gubernaculum.

William. Mitchell. Banks.
April. 1864.