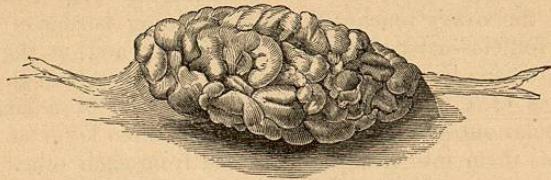


torn by the act of fecundation or of any erotic excitation, as Haller believed.

The ovaries maintain, throughout the period of menstrual life, the development acquired at the epoch of puberty. Throughout this period, also, we meet with Graafian follicles in progress to maturation, so that the question arises: Do the vesicles, found in such multitude in the foetus,

FIG. 8.



Showing Ovary in Old Age—(ad Nat.) (R. B.)

continue without change until the time when they are roused to complete development, that is, from the age of fifteen to fifty? or are these first vesicles destroyed at the end of a certain time, to be replaced by others of more recent formation? Another question, not less interesting, is whether a single vesicle arrives at maturity at each menstrual period, or whether several accomplish their full development at the same time?

These questions are not yet clearly solved. Sometimes several corpora lutea are found in the same ovary. If only a single vesicle were spent at each menstruation, it would take about 300 vesicles for the same number of menstruations, which, excluding the suspensions during pregnancy and suckling, take place during the reproductive period of life. Setting aside, therefore, the possibility of the new formation of vesicles, there exist in the ovary of the foetus infinitely more vesicles than are wanted for all the purposes of reproduction. After the critical epoch the ovary is deprived of follicles. It shrinks, shrivels, and in old age loses its ovoid form, becomes flattened, atrophied, rough, knotted, and seems reduced to its shell (see Fig. 8).

Bischoff says that in every instance the full consequences of menstruation are not necessarily carried out, but that a follicle may swell and the ovum ripen without the bursting of the follicle or the escape of the ovum. Such a condition will cause sterility notwithstanding menstruation.

The ovaries, then, are the essential organs of generation. The destruction of one ovary by disease, or its loss by extirpation, does not entail sterility; but the destruction or loss of both condemns the woman to absolute sterility.

In connection with the history of the ovary, it is convenient to describe an organ immediately contiguous—the *organ or body of Rosenmüller*. This body is placed in the thickness of the broad ligament, between the outer extremity of the ovary and the last convolution of the Fallopian tube (see Fig. 3, p. 20). It is a small tubular organ to which Kobelt<sup>1</sup> gave the name of *parovarium*. It has been described with great care by M. Follin.<sup>2</sup> It is seen when the broad ligament is put on the stretch and

<sup>1</sup> Der Nebenstock des Weibes. Heidelberg. 1847.

<sup>2</sup> Recherches sur les Corps de Wolff. Thèse inaug. Paris, 1850.

held up to the light; but is made out more clearly by removing the thin peritoneal lamina which covers it. It is situated in front of the ovarian vessels; it is of triangular shape, the summit directed towards the ovary. It is generally composed of fifteen to twenty small tubes, slightly flexuous, of unequal length, from 0.12 inch to 0.20 inch in diameter, and separated from each other by a variable space. In the adult woman this collection of tubes is attached to the outer half of the ovary; in the foetus at term, it corresponds to the upper border of this gland. One tube, that which occupies the upper border of the body of Rosenmüller, is distinguished from the rest as performing the part of a common excretory duct. In its middle it lies transversely; its two ends bend downwards at right angles, and are directed towards the upper border of the ovary. The other tubes spring perpendicularly from the transverse portion of the marginal tube, and converge slightly towards the ovary. In this course they are flexuous, of unequal calibre, and sometimes the seat of cystic or hydatidiform enlargements. Their ovarian extremity ends in a cul-de-sac. The wall of these tubes is composed of an outer investment formed of annular fibres; and of an inner tunic, having longitudinal fibres, and lined in its interior with a layer of vibratile epithelium. As an appendage to the organ of Rosenmüller, we must mention a vesicle more or less pedunculated, situated at the outer extremity of the broad ligament, and often adhering to one of the fringes of the pavilion of the Fallopian tube. This is the analogue of the vesicle of Morgagni in man. M. Follin has searched the broad ligament in order to find something analogous to the duct of Gaertner which is seen in some animals; but, like de Blainville, he has seen nothing resembling that which has been described by A. C. Baudelocque, Gardien, and others. It appears to be established that the organ of Rosenmüller is the remains of the Wolffian body, a transitory organ which very probably fulfils the functions of the kidney before the development of this gland.

## THE FALLOPIAN TUBES.

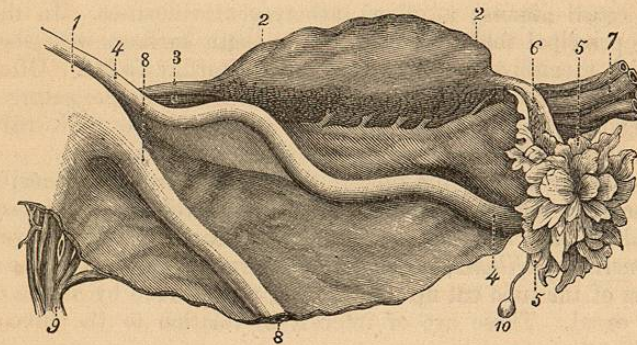
The Fallopian or uterine tubes are truly *oviducts*. They are, in fact, the excretory ducts of the ovaries, differing, however, from all other excretory ducts in being entirely detached from their proper glands. They are situated in the thickness of the broad ligaments, and extend from the superior angles of the uterus to the sides of the cavity of the pelvis. Radiating from the same point spring two other structures—the round ligament in front, the ligament of the ovary behind. The Fallopian tube lies between at the highest margin of the broad ligament, occupying what has been called the upper or middle winglet of this structure; the round ligament occupies the anterior winglet, the ovarian ligament and ovary, the posterior winglet (see Figs. 2, 4, and 9). Floating in the pelvis between the ovaries which are behind, and the round ligaments which are in front, the tubes occupy the middle wing of the broad ligaments, of which they form the upper border; they run at first transversely outwards, and, just before terminating, bend downwards, backwards and inwards, to approach the outer end of the ovary, to which they are connected by a remarkable prolongation (see Fig. 4,

p. 21). For the inner half of their course they are nearly straight, but usually describe in the rest of their length great flexuosities resembling the sinuous disposition of that part of the vas deferens which is nearest the epididymis. The broad ligament serves as a long mesentery to the oviduct, allowing it to perform very extensive movements. It is not rare to find the tube doubled up, either before or behind, and bound down by pathological adhesions. These accidental adhesions give to the pavilion of the tube a direction altogether different from the normal one. The tubes may be dragged into a hernia with the ovaries. And the uterus cannot change its position without drawing at least the inner end of the tube along with it. From its form the tube was likened by Fallopius to a trumpet; it begins from the uterus as a canal of extremely fine bore (see Figs. 2 and 4), gradually enlarges, and ends by an extremity opening out like a funnel, named the *pavilion* of the trumpet. The internal orifice, very narrow, leads into the uterine cavity; the outer orifice opens into the peritoneal cavity, and here presents the solitary example in the human organism of a direct communication between the mucous and a serous cavity. Around this free orifice, which is a little more contracted than the portion of tube immediately behind it, the pavilion is developed. This is a membranous prolongation surrounding the orifice as the corolla of a flower surrounds the stamens and pistils; it is cut or divided into fringes or irregular and folded festoons, whence the name of *fimbriated extremity*, or the quaint metaphorical designation of *morsus diaboli*. The largest of the fimbriæ are themselves subdivided or notched into smaller fimbriæ. To see this disposition well the tube must be plunged into water. The inner surface of the fimbriæ presents longitudinal or oblique folds, very prominent, and which are prolonged into the interior of the oviduct. The number and dimensions of the fimbriæ are very variable; sometimes they scarcely exist: then the edge of the pavilion looks simply festooned; sometimes they are very large, measuring as much as an inch in length, and are so numerous as to quite conceal the mouth of the oviduct. Often the base of the fimbriæ is pierced with holes. One fimbria is especially remarkable by its size; it constitutes the posterior part of the corolla, and numerous secondary fimbriæ are developed on its borders. It is turned down from within outwards, and is supported by a small ligament—the *tubo-ovarian ligament*—which extends from the pavilion to the outer extremity of the ovary, fixing the one to the other. A curious arrangement, described by Deville, is that this long and broad fringe is doubled up to form a channel open below and behind. According to Richard, the tubo-ovarian fringe is not constant. The oviduct may be divided into three portions: that which is contained within the uterine wall; the free portion or body of the tube; and the pavilion. The intra-uterine portion is about 0.4 inch long; it is straight, or describes a slight curve with an inferior concavity. Its cavity is uniform and very narrow; it prolongs outwardly the kind of horn or funnel, which the uterine cavity presents at its upper part, on either side. The orifice of communication between the uterus and the tube—*ostium uterinum*—is usually filled with thick mucus, which prevents liquid injected into the uterine cavity from passing into the cavity of the peritoneum. It forms a well-defined boundary between the uterine and the tubal mucous membrane.

The first is smooth, polished, rosy, and pierced with numerous glandular openings; the second is pale, white, and folded in its longitudinal direction.

The *body of the oviduct* springs from the summit of the superior angle of the uterus, and is immediately embraced in the middle wing of the broad ligament; it is straight at its origin for about two inches; it then forms curves variable in degree and number, generally the more marked in proportion to the youth of the subject. These convolutions are independent of the peritoneal investment; they persist, even when the tube is inflated after being stripped. The inner or rectilineal portion of the tube is narrower than the outer or undulating portion. The first, some-

FIG. 9.



The Three Winglets of the Broad Ligament—(after Sappey).

1, left side of the uterus; 2, 2, ovary; 3, its ligament; 4, 4, Fallopian tube; 5, 5, its pavilion; 6, fringe by which the pavilion is continued to the ovary; 7, utero-ovarian vessels; 8, 8, round ligament; 9, vessels of the uterus; 10, pediculated cyst attached to the fringe of the Fallopian tube.

times called the *isthmus*, has a diameter of 0.8 in. to 0.12 in.; the second, which Henle calls the "*ampoule*," is slightly flattened from before backwards, and measures 0.25 in. to 0.30 in. in diameter or more. Often it narrows a little near its termination. The transition between the two portions is commonly very abrupt. The most external convolution of the tube presents a very constant arrangement; its convexity is directed upwards and outwards: in other words, the peripheral extremity of the oviduct is turned at first downwards, then backwards, so that the abdominal orifice looks backwards and downwards. Whilst the inner portion of the tube is scarcely large enough to admit a hog's bristle, the outer portion receives easily the extremity of a moderately-sized sound. The walls of the oviduct are in contact, and the cavity, completely obliterated, presents on transverse section the figure of a star, the rays of which penetrate between the numerous longitudinal folds of the mucous membrane. In the uterine portion of the tube the bore is capillary, and it is only with great trouble that one succeeds in seeing the *ostium uterinum* with the naked eye. The tube expanding on the one side into the cavity of the uterus, and on the other into that of the peritoneum, it follows that the two cavities communicate, a disposition which has favored the development of peritonitis by permitting the passage of irri-

tating matters from the uterus along the tubes into the peritoneal cavity. It is not rare to find the abdominal orifice obliterated. In such cases the tube is dilated in the form of a cone, with its base directed outwardly; its inflexions then become very marked. The whole *inner surface* of the oviduct is of a pale-pink color, and is marked by longitudinal folds of unequal sizes, which touch by their surfaces, converting the channel of the tube into a series of capillary tubes. These folds, always parallel to the axis of the tube, begin in the intra-uterine portion by two or three small ridges, and become more numerous and prominent at the inner portion of the body of the tube, and are developed to the greatest extent in the expanded portion of the canal (see Fig. 4). They project in variable degree: some scarcely rise above the level of the mucous membrane; others are 0.9 in. in height. On transverse section they sometimes resemble cæcal glands; at others, arborescent villousities. In the latter case, the principal folds are provided on both surfaces with secondary folds, which themselves may be covered with tertiary folds. Often, also, the surface of the folds presents linear reliefs, like projecting ridges, united together, and inclosing irregular spaces or pits. No valves are met with either in the course or orifice of the oviduct.

In its narrow portion the tube is firm to the touch, inextensible, and much resembles the vas deferens; in its large portion it is collapsed upon itself, and its walls are thin and extensible. Richard has observed small *supernumerary pavilions*, formed like the terminal pavilion by the mucous membrane of the tube cut up into fringes, and pierced by a hole opening into the canal. These are of interest in relation to the tubo-ovarian variety of ectopic gestation.

The tube is composed of three coats: an external, or serous; a middle, or muscular; and an inner or mucous coat. The peritoneum supplies the serous tunic, which adheres but loosely to the tube, and only surrounds three-quarters of its circumference. The adhesion becomes closer at the level of the pavilion, the peritoneum of which clothes the outer surface, and is continuous with the mucous membrane at the free edge of the fringes. In the very loose cellular tissue which unites the serous coat to the muscular coat, small longitudinal muscular bundles are sometimes met with. The muscular coat of the oviduct forms a white membrane of dense and close texture. Richard and Robin have doubted the muscular character of the middle coat. It is affirmed, however, by Kölliker. Dr. Arthur Farre has found well-marked, smooth, muscular fibres in the genera, Simia, Bos, Cervus, and in the pregnant dolphin, and also in the human female during middle life. It is composed chiefly of annular fibres: on its surface some bundles of longitudinal muscular fibres, which seem to proceed from the muscular fibres of the uterus, are attached. Where the tube transverses the uterine wall, the muscular coat of the oviduct preserves its own character quite distinct from that of the uterus.

Sappey describes two muscular planes: one, longitudinal, a prolongation from the fibres of the uterus; it extends from the uterus to the fimbriated extremity. The other plane is circular; it is proper to the tube; it surrounds the tube like a sphincter from end to end.

The *mucous coat*, which alone forms the numerous folds of the inner surface of the oviduct, presents a *fundamental stratum* formed by con-

nective tissue and longitudinal muscular fibres, and by a *vibratile or ciliated epithelium*. It contains neither glands nor villi. The cilia which cover the free surface of the cells execute movements the effect of which is to carry on liquids and the ovum to the uterine cavity. This is one function of the tube; the other is to receive and transmit towards the ovary the fecundating principle of the male. If the tubes are closed by ligature or by disease, sterility is the consequence. The ovum may be fecundated and arrested in the tube, and be developed there, constituting tubal gestation. The pavilion of the tube is charged with the duty of embracing the ovary at the moment of dehiscence of the Graafian follicle, and of applying itself closely to the point whence the ovum detaches itself. Hence it follows that any adhesion of the ovary or of the tube which prevents this relation is a cause of sterility. The Fallopian tubes, like the uterus and vagina, result from the development of the canals of Müller, which stretch over the surface of the Wolffian bodies, with which they have no connection, and terminate at the pedicle of the allantois, uniting together in the median line. At first, the uterine tubes are relatively more developed than the body of the uterus; so much so that they seem to be continuous one with the other at their uterine ends. They preserve this relative development until the epoch of puberty, gradually departing from the type of the lower animals in which the uterus is represented by two horns.

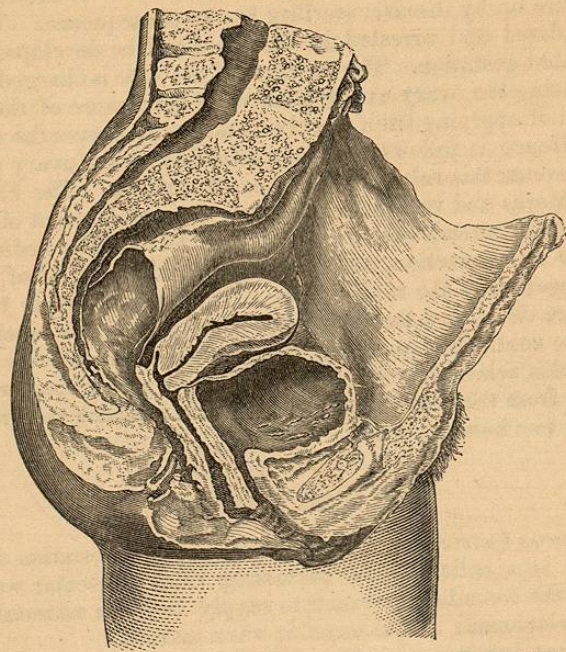
## THE UTERUS.

*The Uterus (utricle, a bag)* is the organ of gestation and of parturition. It is a hollow organ possessing thick muscular walls, destined to receive the fecundated ovum; to supply to it the materials necessary for its development; and to expel it when mature.

The uterus is *situated* in the cavity of the pelvis, in the median line between the bladder and the rectum, beneath the mass of intestines, and above the vagina (see Fig. 10). It is held in its position, slung or suspended by different folds of the peritoneum and by muscular bundles, principally situated in these folds. Closely connected also with the bladder, Fallopian tubes, rectum, and vagina, these structures all concur in maintaining the position of the uterus. The *ligaments* of the uterus are six in number, three on each side; namely, the broad ligaments, the round ligaments, and the utero-sacral ligaments (see Fig. 2). The broad ligaments are two folds, formed by the peritoneum and stretched across the cavity of the pelvis, extending from the borders of the uterus to the sides of the pelvis, and thus, with the uterus suspended between them, forming a septum which divides the pelvis into two parts. The broad ligaments are of quadrangular form, their inner border is attached to the border of the uterus, or, more correctly speaking, the two laminae which form them separate to receive the uterus in the space between them. It is to be remarked that the broad ligaments are attached on a level with the anterior aspect of the uterus, so that the whole thickness of the uterus lies behind the ligaments. Their external border is continuous with the peritoneum which lines the pelvic cavity. At the level of their inferior border the two laminae of the broad ligaments separate

to line the floor of the pelvis; a loose cellular tissue, including very little fat, is interposed at this level between the laminae, and unites them to the superior pelvic fascia. This cellular tissue is directly continuous with that which is found on the sides of the vagina and rectum below; in

FIG. 10.



Longitudinal Section of the Pelvis, made after Freezing—(after Breisky).

the iliac fossa laterally, and around the bladder in front, it also communicates through the sciatic notch with the deep cellular tissue of the nates. This disposition is of importance to bear in mind in the study of the collections of blood and pus which may form in this region. The upper border of the broad ligaments is divided on either side into three secondary folds, formed, the posterior one by the ovary and its ligament, the anterior one by the round ligament, and the third or middle one by the Fallopian tube. It is this arrangement which has caused the broad ligament to be likened to the wing of the bat (*ala vespertilionis*). (See Figs. 2 and 4.) The middle fold or winglet is the largest and the highest, and constitutes the true upper border of the broad ligaments. These ligaments are formed of two peritoneal laminae and by an intermediate layer of cellular tissue, in which run the numerous vessels and nerves belonging to the uterus and ovary, as well as a multitude of muscular fibres springing from the uterus. They also inclose the remains of the Wolffian body or organ of Rosenmüller. The *muscular fibres of the broad ligament*, according to M. Rouget, all rise from the sides of the uterus, and are directed towards the wall of the pelvis. Forming a thin sheet-like expansion it has been likened to the platysma myoides.

The *cellulo-vascular layer* between the peritoneal folds is thin superiorly, but widens from above downwards and outwards; so that at the level of the floor of the pelvis and of the sides of the uterus it attains its greatest thickness. It is traversed by: 1, the uterine artery and its first divisions, which spread out like a fan on the sides of the uterus, where they anastomose; 2, the uterine vein, the principal branches of which form at the sides of the uterus a voluminous plexus; 3, by lymphatic vessels and nerves. The fibres do not form a continuous layer, but their bundles of various sizes form a kind of lace-work or open canvas, mixed with the vascular and nervous networks, the whole covered and masked by connective tissue.

M. Rouget describes the uterus and its appendages as being inclosed in a broad muscular membrane, of which the peritoneal ligaments are a dependency. The broad ligaments do not prevent the uterus from inclining backwards or forwards. M. Richet says they oppose flexions of the body on the neck. Although never fully on the stretch, they resist lateral deviations of the uterus; but their power in this way cannot be great. They allow the uterus to be sensibly lowered without being dragged.

The structure of the *round ligament* has been carefully examined by Mr. Rainey.<sup>1</sup> He says it is a muscle rather than a ligament, and he has shown that it consists principally of striped or voluntary muscle. It arises by three fasciculi of tendinous fibres; the inner one from the tendon of the internal oblique and transversalis muscle near to the symphysis pubis, the middle one from the superior column of the external abdominal ring, near to its upper part, and the external fasciculus from the inferior column of the ring just above Gimbernat's ligament. From these attachments the fibres pass backwards and outwards, soon becoming fleshy; they then unite into a rounded cord, which crosses in front of the epigastric artery and behind the lower border of the internal oblique and transversalis muscles; it then gets between the layers of the peritoneum forming the broad ligament, along which it passes backwards, downwards, and inwards to the anterior and superior parts of the uterus, into which its fibres, spreading out a little, may be said to be inserted.

The striated muscular fibres are not confined to the surface of the round ligament, but form almost the whole of its substance, and are more particularly distinct near to its centre; nor do they extend completely to the uterus, but after passing between the layers of the broad ligament to about an inch or an inch and a half from its superior part, they gradually lose their striated character, and degenerate into fasciculi of granular fibres mixed with long threads of fibro-cellular tissue.

Mr. Rainey found a similar structure in the monkey, dog, sheep, and cow. The round ligaments contain also numerous vessels, also some nerves and absorbents. The arterial trunks are large, but the capillaries, into which they ultimately divide, have the same size and arrangement as those of ordinary muscle. The lymphatics are situated on the outer side of the ligament: their glands are sometimes of considerable length, and even pass through the external abdominal ring; connecting all these

<sup>1</sup> Philosophical Transactions, 1850.

parts together, there is a considerable quantity of areolar tissue, especially where the striated muscular fibres are absent, or are about to terminate.

Mr. Rainey, reasoning from the structure of the round ligaments, says the presence of voluntary muscular fibre proves that they are not fitted to serve as mechanical supports to the uterus; but that their real use is in some way or other to act in copulation. Considering the position of their points of attachment and the direction of their fibres, it is evident that their combined action will bring the uterus nearer to the symphysis pubis, and thus tend to draw it somewhat from the vagina, in this way tilting the os uteri upward and backward. Now the only way in which it can be imagined that these changes assist in sexual intercourse, is by their causing the semen to be attracted into the upper part of the vagina and vicinity of the os uteri. This opinion, as to the use of the round ligaments, had been enunciated by Velpeau and Maygrier.

The round ligaments also contain a great number of vessels, especially veins, which may become varicose, especially after many pregnancies, says Cruveilhier, particularly at the level of the external orifice of the inguinal canal, where they have sometimes simulated a hernia. The artery comes sometimes (Sappey) direct from the epigastric, but most frequently from the cremasteric. It is continued to the uterus, to which organ it is principally devoted. From it spring numerous arterioles, which lose themselves in the muscular bundles. In the foetus, and occasionally even after birth, the round ligaments are accompanied in the inguinal canal by a prolongation of the peritoneum, quite analogous to that which accompanies the spermatic cord. This diverticulum, known under the name of the *canal of Nuck*, sooner or later becomes obliterated. But sometimes this obliteration does not take place, and this explains the frequency of inguinal hernia in women. The round ligaments are never on the stretch, and cannot resist displacements of the uterus.

The anterior or *utero-vesical ligaments* are two lateral folds of peritoneum, containing bundles of fibrous tissue. They are found where the peritoneum is reflected forwards on to the bladder, opposite the point of junction of the body and neck of the uterus, and from the lateral boundaries of the utero-vesical peritoneal pouch.

The *posterior* or *utero-sacral ligaments* extend from the lower part of the body of the uterus to the outer sides of the sacrum, enveloped by peritoneum; they form two semilunar or falciform folds—the folds of Douglas; their inner borders are concave and sharp, and pass on to the sides of the rectum, forming an oval opening, which leads to a cavity formed by the recto-vaginal depression of the peritoneum. These ligaments, and the pouch between them (Douglas's sac), are well seen when the uterus is drawn forwards. The utero-sacral ligaments are composed of smooth muscular fibres, which spring from the uterus, and of a peritoneal investment. The experiments of Malgaigne seem to demonstrate that these ligaments constitute the principal obstacle to the falling of the womb towards the vulva. When traction is made upon the cervix uteri, these ligaments are immediately seen to be tightened; when divided, the uterus sensibly drops, but is soon arrested by the broad ligaments and the resistance of the floor of the pelvis, chiefly by the floor of the peri-

toneum, which is reflected from the walls of the pelvis over the bladder, uterus, and rectum. M. Richet believes that the utero-sacral ligaments further serve to prevent the uterus from being driven forwards upon the bladder, thus preserving this organ from the severe compression to which it would otherwise be subjected.

Notwithstanding the pathological interest attaching to the so-called *Douglas's pouch*, its anatomical features have been very imperfectly described. Led first by clinical observations, it appeared to me that the lowest part of the pouch was not directly behind the uterus and vagina, but distinctly on the left side. This has been completely confirmed by observations on the dead body, in which I have been assisted by Dr. Ewart, curator of the museum at St. George's Hospital. We find that on the right side, that is, behind the right ovary and right broad ligament, the pouch is very shallow, scarcely more than an inch deep; that, dipping obliquely towards the left, it descends behind the uterus and the upper part of the vagina; and that, still dipping, it attains its greatest depth quite on the left of the uterine neck and vagina, so that it partly lies not only behind these organs, but partly on the left upper fourth of the vagina. Thus behind the left ovary and broad ligament the sac is mainly situated, being here often three inches or more deep. All these points are demonstrated by measurements, casts and dissections. I have referred to this anatomical question in a memoir in *St. George's Hospital Reports*, 1877, entitled, "A Clinical Study of Retro-uterine Tumors." It is chiefly in elderly women, and under presumed pathological processes that the pouch is found of equal depth on both sides. In this memoir, and in subsequent parts of this work, illustrations of the pathological import of this pouch will be found. //++

When the uterus is lowered, attended by a corresponding degree of vaginal inversion, this pouch always goes along with it, so that in complete procidentia and inversion of the vagina the pouch will be external to the vulva behind, whilst the base of the bladder will be outside in front. H

The extent and directions of movement of which the uterus is capable form an important subject of study. The first question to determine is, What is the *normal position of the uterus*? A line drawn from the upper margin of the symphysis pubis to the lumbo-sacral articulation will strike the upper margin of the fundus of the uterus. Another line drawn from the lower border of the symphysis pubis to the lower margin of the fourth sacral vertebra, will touch at its middle the point of the cervix (see Fig. 1). \*

The *movements* of the uterus are limited by its connections, and are influenced by the changes of condition of the surrounding organs. The greatest amount of mobility is enjoyed by the fundus. The cervix, being bound to the bladder and vagina, enjoys a more limited amount of motion. The fundus may be thrown backwards or forwards, and thus acting as a lever it will throw the os in the opposite direction. The fundus does not move round the os exactly as upon a pivot, but the os is projected a little forwards or backwards whenever the fundus moves in the opposite direction. Distension of the bladder will throw the fundus backwards; loading of the rectum will press the fundus forwards and downwards. In retroversion of the fundus of the uterus, enlarged by gestation or other causes, the cervix may be driven so firmly against the symphysis pubis

*a line drawn fr. umbilicus down through lower end of recto-vaginal septum will pass through cavity of uterus -*

as to close the urethra; and as the base of the bladder to which the cervix uteri is attached has a certain amount of mobility, in anteversion of the body of the uterus, the cervix may be carried back close to the promontory of the sacrum, dragging the attached wall of the bladder with it. But the upward mobility of the part of the bladder to which the cervix is united is limited; hence it happens that when the fundus is thrown backwards, the cervix, held down in some degree by its vesical attachments, becomes bent, so that the os looks downwards, instead of being projected forwards exactly in a line with the axis of the fundus.

The whole uterus may be driven forwards closely behind the pubes. This takes place when a solid body gets into Douglas's pouch behind the uterus. The chief bodies so acting are, small ovarian tumors, dermoid cysts, extra-uterine gestation cysts, and intra-peritoneal blood-tumors or hæmatoceles. A fibroid springing from the posterior wall of the uterus may produce similar displacement.

In addition to the backward and forward or see-saw movement, the uterus may move to either side. Here again it is the fundus especially that is displaced. These lateral movements are restricted somewhat by the broad ligaments. It must, however, be remembered that there exists commonly a certain lateral obliquity.

Another movement is upwards or downwards. The pressure of the abdominal viscera may carry down the entire mass of the pelvic viscera towards the perineum, or the uterus may be elevated slightly by upward pressure on the cervix.

Some amount of alternate elevation and depression of the uterus takes place normally, under the influence of respiration and of voluntary muscular exertion. On inspiration the entire mass of abdominal viscera is forced downwards, pressing the uterus before it. On expiration there is a general movement of collapse towards the centre of the body, under the influence of atmospheric pressure. This of course bears most directly upon the external soft parts. The perineum and vulva are pressed upwards, and the uterus rises towards the abdomen. Under the influence of defecation, again, or of any powerful muscular exertion in which the chest-walls are fixed, the uterus is driven downwards; sometimes, indeed, so violently that complete prolapsus has been thus induced. I have known complete prolapsus of the uterus occur in a virgin, under the violent efforts of epileptic convulsions. The descent of the uterus, anterior wall of the vagina, and base of the bladder, is very obvious, if vomiting or coughing occur during an examination by speculum. The instrument is easily driven out, as the os uteri is often brought quite down to the vulva. This observation proves that the so-called ligaments of the uterus exert but a small influence in preventing prolapsus.

All these movements may be verified by manual examination. By placing the tip of a finger of one hand on the os uteri, as in examination *per vaginam*, and applying pressure upon the fundus, by the other hand, through the abdominal wall above the pubes, the cervix may be felt to move about according to the direction of the pressure applied by either hand.

*The True Axis of Movement of the Uterus.*—The centre around which the chief movements take place is, of course, its most fixed point. This

is the anterior part of the supra-vaginal portion of the cervix which is closely connected with the base of the bladder (see Figs. 1 and 10). At this part the uterus is held, whilst its two extremities, body and vaginal portion, are free. Hence the movements of which the uterus is capable are relative and general. The first order of movements are those in which the uterus inclines backwards or forwards, or to either side. The second order, or those in which the uterus moves upwards and downwards, can only be accomplished simultaneously with corresponding movements of the base of the bladder. The organs move *en masse*, preserving more or less completely their relative positions, as when the rectum is distended by fecal accumulations, or, when empty, it retreats.

*The Direction of the Uterus.*—The longitudinal axis is directed obliquely from above downwards and from before backwards, that is, it is nearly coincident with the axis of the brim of the pelvis, and forms with the axis of the vagina an obtuse angle. It follows that the fundus of the uterus looks upwards and forwards, its apex, or the os, backwards and downwards (see Fig. 10). This, the normal direction, is, however, subject to variations, which cannot be always regarded as the pathological significance.

As a general fact, it is to be observed that the connections of the uterus are loose and extensile, and permit the organ to float in the cavity of the pelvis, performing more or less extensive movements. The ease with which the uterus can be drawn down towards the vulva in certain surgical operations, and the displacement which it undergoes during pregnancy, when it rises into the abdomen, are proofs of its great mobility. This property is turned to account to facilitate exploration, and the detachment of the ovum in cases of hemorrhage in abortion. For these purposes strong pressure is made upon the fundus by the hand applied to the lower part of the abdomen.

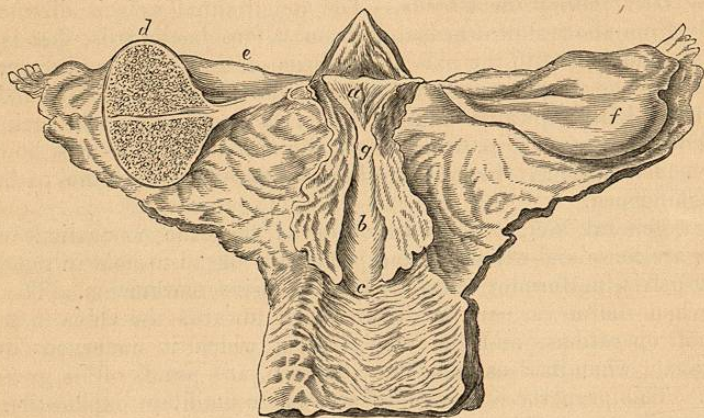
There is one deviation from the standard axis of the uterus which appears to be nearly constant; it is that in which it takes an oblique direction from right to left. It is thought to depend upon the presence of the rectum on the left side of the pelvis. Boulard, Verneuil, Follin, H. Bennet, Richet, Aaran, and others, have made very precise observations, which establish the fact that the uterine axis is not a straight but a curved line, that it is bent about the middle, presenting an anterior concavity. In introducing the uterine sound it is therefore proper to give a small curvature to the instrument, and to make the point describe a gradual curve forwards after passing the os uteri externum.

In the human subject the uterus is single; in most animals it is double. The so-called double uteri observed in the human species are, in reality, only bifid or divided uteri, depending upon an arrest of development. The bifid character may be limited to the body, or may extend to the cervix, and even to the vagina. The uterus may even be absent. In one case I failed, after the most minute exploration, to discover a trace of such an organ. But most commonly, where dissection has been instituted, a rudimentary uterus has been discovered between the rectum and the bladder.

The abnormal forms of the uterus will be described with its pathological condition.

The *size* of the uterus varies according to the age and certain physiological conditions. It is very small before puberty, the neck much predominating over the body (see Fig. 11). When menstruation sets in it grows greatly, and it enlarges a little at every period, returning during the intervals to the ordinary size. Pregnancy exerts a more durable influence; after delivery the uterus commonly retains an increased bulk. In old age the uterus shrinks, so that it is sometimes reduced to the size presented in new-born children.

FIG. 11.



Uterus and Appendages of an Infant—(after A. Farre).

*a*, cavity of body laid open; *b*, cavity of cervix; *c*, anterior lip of the cervix; *d*, left ovary opened; *e*, Fallopian tube; *f*, right ovary; *g*, internal os uteri, marking the division between the body and cervix.

The development of the uterus is sometimes imperfect. It may retain the dimensions and other characters of immaturity. This imperfection may bear upon the body or upon the cervix. In the latter case, the part which projects into the vagina is often more conoid than natural, and the os externum is a very small round opening which barely admits the uterine sound. In these cases there is also commonly present a greater curvature of the uterus, sometimes amounting to angulation at the union of the body and cervix. This condition is usually associated with sterility, dysmenorrhœa, or menorrhagia, sometimes amenorrhœa, and it may even lead to menorrhagic effusions into the peritoneum, by opposing the free natural exit of the menstrual fluid.

The *weight* of the uterus in girls at the age of puberty is from 360 to 1000 grains; from 1200 to 1800 grains in women who have borne children; it may be reduced to 100 or 200 grains in old women. At the term of gestation it may weigh from 26 ounces to 52 ounces.

The *shape* of the uterus is that of a pear, or rather of a cone flattened from before backwards; it is divided into *body* and *neck*. A narrowing or *isthmus*, marks the boundary between these two parts. This isthmus

is very marked in infants; it diminishes sensibly at puberty, and is still more indistinct after several pregnancies. The vagina being inserted on to the neck of the uterus divides it into a *vaginal portion* and a *supra-vaginal portion* (see Fig. 1).

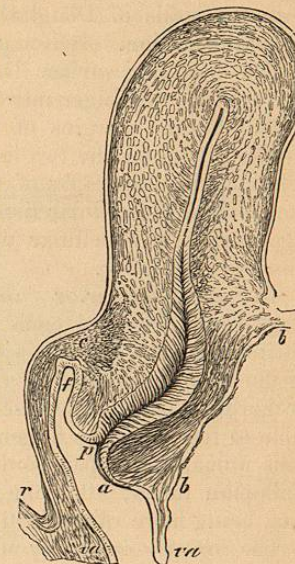
In the ordinary state the uterus is soft enough to take the impressions of the organs which press upon it. This was shown by Depaul to the Paris Anatomical Society in 1854. After death marked rigidity of tissue occurs. If steeped in water at 90° F., it recovers some of its natural softness, and resumes its erectness. When it is bent, if it is injected without over-distending its vessels, it is seen to swell, and its axis then becomes quite rectilinear. Hence the uterus is easily distorted after death. Thus, the sections taken after freezing must be accepted with the corrections indicated by the different influences of life and death.

To study the uterus thoroughly, it is necessary to describe two surfaces, the anterior and the posterior; two lateral borders, an upper border or *fundus*, and an inferior extremity, perforated, projecting into the vagina, called the *vaginal portion of the neck*, with the *os tincae*.

In its upper three-fourths the anterior surface is slightly convex, and smooth like all parts covered with peritoneum, and is in relation with the posterior surface of the bladder, from which it is often separated by coils of small intestine. When the bladder is full, the uterus is pushed away from the anterior abdominal wall; hence the precept, always to empty the bladder before exploring the uterus through the abdomen. In its lower third the anterior surface of the uterus is in direct relation with the base of the bladder, to which it is united by a loose cellular tissue. This relation explains the frequency with which cancerous affections of the uterus spread to the base of the bladder. This portion of the pelvic cellular tissue is also especially liable to become inflamed from injury received during labor, and to be the seat of abscess (see Fig. 12).

The posterior surface of the uterus is covered by peritoneum throughout its whole extent. It is in mediate relation with the anterior surface of the rectum, from which it is said to be often separated by folds of small intestine. But Claudius of Marburg<sup>1</sup> says that in the living subject the uterine sound passed into the uterus may always be felt by the

FIG. 12.



Vertical Section of the Uterus Parallel with its Lateral Border—(after A. Farre).

*a*, anterior; *p*, posterior lip of cervix; *i*, internal os uteri; *va*, vagina; *f*, fornix, or posterior pouch of fundus of vagina; *c*, loose connective tissue immediately above the fornix; *r*, point of posterior reflection of the peritoneum on to the rectum, forming the recto-uterine pouch or space of Douglas; *b, b*, line of attachment of the cervix to the bladder. The peritoneum ceases at the upper *b* in front.

<sup>1</sup> Med. Times and Gazette, 1865.