

**THE ARTICLE UTERUS AND ITS  
APPENDAGES: FROM THE  
CYCLOPAEDIA OF ANATOMY  
AND PHYSIOLOGY. PP. 546-725**

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**ARTHUR FARRE**

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THE ARTICLE

# UTERUS AND ITS APPENDAGES

FROM THE

*Cyclopaedia of Anatomy and Physiology.*

COMPRISING THE

NORMAL AND ABNORMAL ANATOMY, PHYSIOLOGY

AND

DEVELOPMENT

OF THE

UTERUS, OVARY, PAROVARIIUM, FALLOPIAN TUBE, VAGINA,  
VULVA AND PLACENTA.

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1858

influence, especially during pregnancy, upon other parts and organs. The diseases and accidents to which it is liable are more numerous, and are attended by greater danger to life than those which affect any other portions of these structures, whilst its several morbid states, as well as its natural condition, may be ascertained during life with a degree of precision which virtually removes the uterus from the category of internal parts.

But it is only in a practical or obstetric point of view that the uterus can be regarded as the most important of the generative organs. Physiologically considered, it is by no means entitled to the foremost place; for although the presence of the uterus is necessary to the completion of the generative act in its regular course, yet reproduction to a certain extent may be accomplished without it. The uterus is necessary to reproduction, first, as affording the only channel by which the seminal fluid can obtain access to the ovum; and next, as constituting, together with the vagina, the only natural passage for the exit of the fully matured ovum, which requires this contractile organ to effect its expulsion by that passage; such expulsion not being essential to the generative act because the fetus may be extracted, by the Cæsarean section without necessary loss, of life either of the parent or offspring, while ~~left~~ ~~parts~~—the Fallopian tubes for example—may, to a certain extent, perform the offices of a uterus in all that relates to the protection and nutrition of the ovum. Moreover, the entire removal of the uterus may have no other effect upon the individual than that of preventing impregnation and menstruation by the simple abstraction of the parts necessary thereto.

On the other hand, the ovary, though constituting only a small portion of the reproductive organs, is nevertheless that part to which all the rest are subservient. It is the organ which furnishes the generative element essential to the reproductive act. It is that part which, in a great measure, regulates the growth of the body, and determines the distinctive characters of the sex. It is the organ upon the presence of which depends the sexual passion and the process of menstruation; whose congenital deficiency is indicated by the absence externally of all signs of a secondary sexual character; whose artificial removal entirely unsexes the individual, and the decline of whose functional activity, as age advances, is the cause of the generative faculty being lost in the female long before the ordinary term of life has expired, and at

Fig. 368.

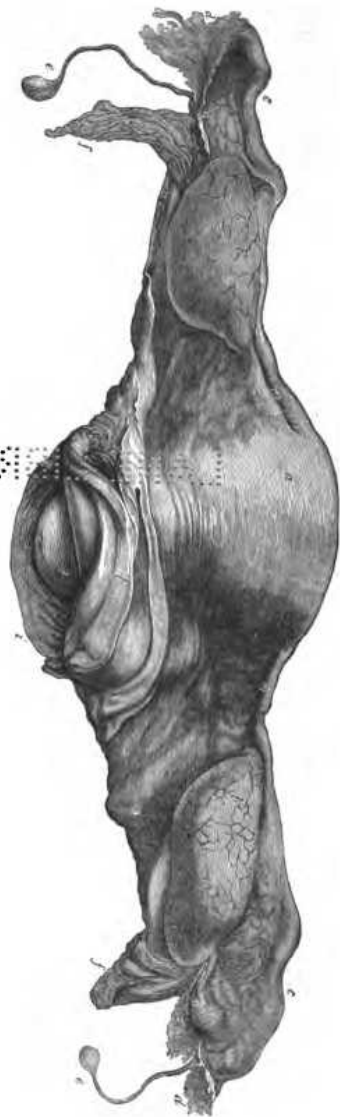


Fig. 368.

*Uterus and appendages of an adult virgin, posterior aspect. (Ad Nat.)*

*a*, uterus; *bb*, ovary; *cc*, Fallopian tube or oviduct; *dd*, fimbriated extremity or infundibulum of the tube; *ee*, terminal bulb of the duct of Müller; *ff*, portion of broad ligament and blood-vessels; *g*, vaginal portion of cervix uteri; *h*, os uteri externum; *i*, anterior and *l* posterior wall of vagina; *m*, ligamentum ovarii; *n*, tubo-ovarian ligament.

a much earlier period than that at which the power of procreation ceases in the other sex.

In a physiological sense, therefore, the uterus, as well as every other part of the generative apparatus, must be regarded as an appendage of the ovary; and the title "Uterus and its Appendages" is employed, in accordance with ordinary usage only, as the heading of this Article, in which it is proposed to consider the structure and functions of the entire female generative organs as they exist in Man.\*

OVARY.

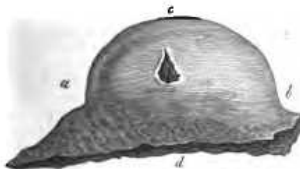
NORMAL ANATOMY.

(*SYN. Ovarium, Testis Muliebris, Lat.; Ovaia, Ital.; Ovaire, Fr.; Eierstock, Germ.; Eijerstok, Dutch.*)

The ovaries (*fig. 368, b, b*) constitute two follicular glands appropriated to the formation of the female generative element. They are perfectly closed, resembling in this respect the ductless glands. Each, however, is furnished with its proper excretory duct, (*fig. 368, c, c*) between which and the gland a temporary connection is established, at certain intervals, during that period of life over which the reproductive faculty extends.

*Form.* — The ovary is not usually fully developed until some time after the establishment of puberty. It is then of an oval form

*Fig. 369.*



*Ovary of a young adult virgin before the surface has become scarred by repeated discharges of ova. (Ad Nat.)*

*a, distal, and b, proximal extremity; c, superior, and d, inferior border. In the centre is laid open a Graafian follicle from which an ovum had recently escaped by spontaneous rupture.*

(*fig. 368, b, and fig. 369.*), flattened on its sides, and somewhat resembling the testis in figure, but rarely or never, in a state of health, attaining to the full size of that organ.

The following division may be made of its

\* For the comparative anatomy, as well as for the general treatment of the subject of generation, the reader is referred to the articles, GENERATION, ORGANS OF; GENERATION; and to those descriptive of the different classes and orders of the animal kingdom throughout this Cyclopaedia. The occasional introduction here of illustrations from comparative anatomy and physiology is employed for the purpose of elucidating those questions which cannot be clearly explained by observations made only upon the human subject.

superficies; viz., into two sides, situated anteriorly and posteriorly with regard to the body; two extremities, outer and inner; and two borders, superior and inferior.

Of the two sides, that which is directed anteriorly (*fig. 370, c*) is both shorter and less

*Fig. 370.*



*Vertical section of ovary. (Ad Nat.)*

The posterior surface, *f*, more rounded than the anterior, *e*; at *h* are numerous blood-vessels divided; *gg*, Graafian vesicles; *d*, place of entrance of vessels between the layers of the broad ligament.

convex than the posterior, which is generally rounded and gibbous (*fig. 370, f*). In this respect the ovary resembles the uterus, whose posterior surface is always more rounded than the anterior; by attention to this peculiarity the right ovary may be readily distinguished from the left after these organs have been detached from the uterus.

Of the two extremities, the outer or distal (*fig. 369, and fig. 372, a*) is usually rounded and bulbous, whilst the inner (*figs. 369, and 372, b*) becomes gradually attenuated until its outline is merged in the proper ligament (*fig. 368, m*) by which the ovary is attached to the uterus. The upper and lower borders also differ from each other. The former (*fig. 369, c*) is convex, and forms a segment of a circle, whose diameter is continually diminishing as age advances. The latter is straight or slightly concave, constituting the base of the ovary, or the line by which it is connected to the posterior duplicature of the broad ligament (*figs. 369, and 370, d*).

*Dimensions and Weight.* — The ovary of a healthy adult measures from 1" to 2" in length, from 6" to 12" in depth or perpendicular diameter, and from 3" to 6" in width or transverse diameter.

These dimensions, which vary considerably in different individuals, exhibit a much wider range when the observations are extended to different epochs of life. The organ is then found to undergo far more remarkable changes in bulk and figure than are observable in the corresponding male organ.

The following table, giving the highest, lowest, and mean dimensions of twelve healthy ovaries, taken indiscriminately from women in various conditions during the period of fertility, will serve to exemplify the first of these variations: —

	Longitudinal.	Perpendicular.	Transverse.
Highest	2"	1" 1"	6"
Lowest	1"	6"	3"
Mean	1" 4"	9"	4½"

Another and more accurate method of estimating the bulk of the ovary consists in weighing. The following are the extreme and mean weights of five ovaries taken from healthy adults: viz., greatest weight, 135 grs.; least, 60 grs.; mean (of five examples), 87 grs. On comparison of these results with Krause's estimate of the weight of the testis, which gives the mean weight of the male organ, also in five instances, as 354-4 grs., it appears that the ovary, though furnishing the larger portion of the generative element in the act of reproduction, has an average bulk of less than one quarter of that of the corresponding male gland.

*Position and Connections.*—The ovary is so intimately connected with the uterus, in whose changes of position, both normal and abnormal, it necessarily takes part, that it cannot be said to have any fixed or definite seat. It is most commonly found lying somewhat deeply in the lateral and posterior part of the cavity of the true pelvis, concealed from view by the small intestines, and in part covered by the Fallopian tube of the same side. Relatively to the uterus, the ovary is placed on either side of that organ, at a distance varying from 4" to 18", and behind and a little below the level of the point of entrance of the Fallopian tubes (fig. 368.).

Each ovary is invested by a layer of peritoneum derived from the posterior lamina of the broad ligament, to which the ovary is thus attached by a kind of mesentery.

Besides this indirect connection with the uterus, through the intervention of the broad ligament, the ovary has also another and more direct attachment by the aid of its own proper ligament (*ligamentum ovarii*), which serves to bind it more securely to the uterus. (Fig. 368. m.)

The ovary is further connected at its outer extremity to the mouth of the Fallopian tube by one of the processes of the pavilion, which serves to keep the organ always in close proximity to its excretory duct (fig. 368. n.).

The distance which intervenes between the ovary and the uterus varies considerably on each side, not only in different individuals, but also in the same subject, where it is very rarely found to be equal; the right ovary, so far as my observations have gone, being farther removed than the left in the proportion of nine out of twelve instances.

During pregnancy, the ovary suffers frequent changes of position. As the uterus expands, it carries the ovary along with it into

the abdominal cavity, at the same time the relative situation of these parts is materially altered, the fundus uteri gradually expanding and rising above the former level of the ovaries, whilst the latter appear to be bound down more closely to the side of the uterus, until at term their position is usually found to be below the centre of that organ.

*COMPONENT PARTS.*—The ovary is composed of, 1st, protecting parts, or tunics; 2nd, a parenchyma, or stroma, in which are imbedded; 3rd, the proper secreting structures, in the form of closed sacs or vesicles, containing the ova; 4th, vessels and nerves.

1. *The Protecting Parts or Tunics.*—These are two in number, and correspond precisely, both in structure and derivation, with the analogous coverings of the testis.

*The peritoneal covering* (fig. 371. a) constitutes the outermost of these coats, and consists of the layer of peritoneum derived from the posterior lamina of the broad ligament, which serves to connect the ovary with the parts adjacent. Except at its base, the ovary is so closely invested by this peritoneal lamina, that no effort with the scalpel will suffice to detach it from the tunic beneath. This intimate union, however, of the two coats ceases at the base of the ovary, where a white, irregular, and somewhat elevated line is observed on either side, extending in a horizontal direction, and rising higher on the anterior than on the posterior surface of the gland. In its intimate texture, this covering of the ovary differs in no respect from the peritoneum covering the viscera generally.

*The tunica albuginea, or tunica propria*, (fig. 371. bb) constitutes the special or proper covering of the ovary. It serves to give form and solidity to the organ, and to protect the ovisacs and ova from injury. This coat has a nearly uniform thickness of ½", and forms a complete investment for the ovary, except at its lower border, where the fibres are either very thinly scattered and interlaced, or are altogether wanting, leaving a longitudinal space, termed the hilum or vascular fissure, by which the vessels and nerves enter the organ. This space measures 3"–4" in width, and extends along the entire base of the ovary.

The tunica albuginea has been commonly regarded as a more condensed portion of the stroma, or parenchyma, of the ovary; but from this it is readily distinguished, not only by its clear white colour, and dense and almost cartilaginous hardness, but also by its microscopic characters. On account of its extreme toughness, this tunic is not very easily separable into fragments sufficiently minute for microscopic examination. But when small portions have been so obtained, the margins of the fragments exhibit numerous close-lying and irregularly arranged fibres of developed connective tissue, projecting from a dense, structureless matrix interspersed with granules, which serves to connect the fibres together, and to which apparently is due, in a great measure, the peculiar toughness of this membrane, while its remarkable whiteness is

\* See art. TESTIS, Vol. IV. p. 576.

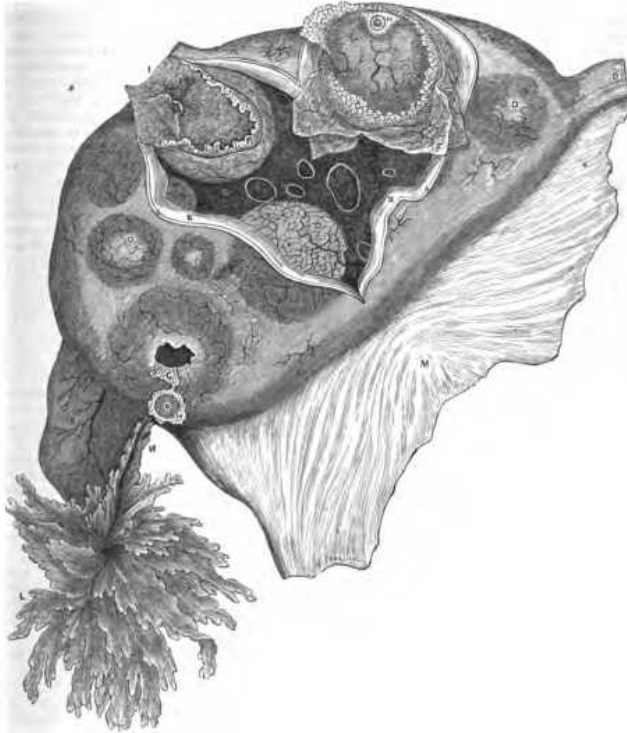


explained by the much smaller number of blood-vessels that it contains, as compared with the general parenchyma of the ovary. The tunica albuginea, therefore, is not merely a more condensed form of the ovarian stroma, but appears to result from a development of tissues which exist in the stroma in an elementary or embryonic form, as well as from a more close conjunction and blending of those tissues.

2. The *Parenchyma or Stroma*, (fig. 371. c, and fig. 372. s) constitutes the proper tissue of the

ovary. It lies immediately beneath the tunica albuginea, and fills up the whole of the intermediate space between the ovarisacs, to which it acts as a germ bed, protecting the ova from injury, and serving for the conveyance of blood-vessels to the ovarisacs. This tissue is sometimes of a pale-pink, but more often of a bright-red colour, from the large number of blood-vessels which it contains, whose arrangement proceeding from within, and radiating outwardly in all directions, gives to this tissue, when viewed by the naked eye or by

Fig. 371.



Ovary enlarged four diameters. (After Coste.) Dissected to show,

A, peritoneum; B, tunica albuginea; C, stroma; D D D D, Graafian follicles in various stages of growth; K K, outer coat of the follicle (tunic of the ovarisac); F F, inner coat of the follicle (ovisac); O O O, epithelial lining (membrana granulosa); N N, ovum and cumulus; I, orifice by which the follicle has discharged an ovum; K, Fallopian tube; L, fimbriae; M, posterior ala of broad ligament or mesentery of ovary; S, tubo-ovarian ligament; O, ligamentum ovarii.

a common lens, the appearance of being formed into bundles or laminae.

The microscope, however, serves to resolve this tissue into its true elements. When so examined, the stroma is found to be composed mainly of blood-vessels, to which a great part of its strength and toughness is due, the intermediate spaces being filled up by a fibrous structure not separable into bundles, like ordinary connective tissue, and having no distinct fibrillar arrangement, its chief elements being single white fibres of ordinary connective tissue, numerous fusiform embryonic fibres, and elliptical and round cells or granules, the whole being coherent and strongly united together.

3. *The Graafian Vesicles. Folliculi ovarii, s. Graafiani, s. Ovisacci.*—When the substance of a healthy ovary is divided by a clean incision, if the subject be not too advanced in life, the section will be found to have included several vesicles varying in diameter from 4''' down to sauculi of microscopic minuteness. These

to a very recent date it appears to have been assumed that their number was limited. They were usually estimated at 12 to 20 in each ovary; and it was generally supposed that, when these were exhausted by child-bearing and miscarriage, the power of procreation of necessity ceased. More recent and careful observation, however, has shown that the number of vesicles in each ovary amounts in healthy organs to 30, 50, 100, or even 200; whilst in very young subjects their numbers exceed all power of accurate computation.

The vesicles are most easily displayed in the adult ovary by making a perpendicular section through the organ in the direction of its longer axis. In this way the largest number will have been divided by one incision; and such a section, as in *fig. 372*, will often suffice to exhibit 8 to 12 vesicles of different sizes. On submitting the section, however, to the microscope, others of a smaller size, which had previously escaped attention, will be brought into view; and in continuing the incisions in various directions, fresh vesicles will be laid open of various sizes and in different stages of development. If the ovary of an infant be selected for observation, the organ should previously have been hardened by maceration for several days in spirit. A clean section is thus easily obtained by a sharp knife; and if this be examined by a 1-inch object glass, the little spherical ova, coagulated by the action of the spirit, will be readily seen, each one lying in its proper ovisac, by which it is immediately surrounded, and the whole so closely set and so numerous that a single section suffices to display several hundred of them at one view (*fig. 373*).

*Fig. 372.*



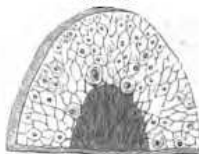
*Longitudinal section of adult ovary. (Ad Nat.)*

a, distal; b, proximal end; s, stroma; g, Graafian follicles of the ordinary size before enlargement; h, stellate remains of follicles which have burst and shrunk after discharging their ova.

vesicles, familiarly known as the ova of De Graaf, although the credit of antecedent observation is certainly due both to Vesalius \* and Fallopius †, are variously distributed through the ovary according to the age of the individual. In infants and young subjects, the ovisacs are found only at the periphery of the organ, where they form a thick rind, the interior of the ovary being occupied only by blood-vessels and stroma. But after puberty the division into a cortical and central part becomes less distinct, the ovisacs becoming buried deeper in the stroma, so that occasionally, in making sections of the part, they are encountered as deep as the base of the organ. They are always, however, most numerous near the surface.

The number of developed vesicles contained in each ovary, and visible to the naked eye, varies considerably in different subjects. Up

*Fig. 373.*



*Section of part of the ovary of an infant, aged 20 months. The central portion consists of stroma and blood-vessels only. The lighter peripheral part is composed entirely of close-set ovisacs, containing ova of various sizes. (Ad Nat. x 16 diam.)*

The Graafian follicle, when not subjected to pressure from surrounding parts, or from adjacent vesicles, is spherical or oval in form, (*fig. 371. dd*, and *fig. 372. g*) and consists of certain tunics and contents. The number and composition of its coats have been variously described by recent observers; and upon this subject a difference of views would be of comparatively little importance, if upon a right solution of this question did not depend the clear comprehension of those changes which occur in the Graafian follicle during preg-

\* De Corpora humani Fabrica, lib. v. cap. xv. p. 452.

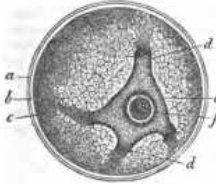
† Obs. Anat., Op. omnia, 1696, vol. i. p. 106.

nancy, and which result in the formation of the body termed the *corpus luteum*.

Without entering upon the question of the number of laminae into which the walls of a Graafian follicle may be split by skilful manipulation, it will suffice to consider those only as distinct membranes or coats, which exhibit obvious differences of structure and relationship, during the various phases of development and decay which the follicle undergoes from its first formation to its final disappearance. In this view the walls of the Graafian follicle must be regarded as being composed of three membranes; and indeed but for the importance attached to the use of the third or innermost of these, which in any case is hardly more than a thin layer of granules, it would have sufficed if the coats of the vesicles had been enumerated as two only.

The external fibrous or vascular coat (fig. 374, *a*, fig. 371. *e*) constitutes the *tunic of the ovisac* of Barry, the *tunica fibrosa*, *S. theca folliculi* of Baer. It forms no portion of the original ovisac, but is a superadded part, derived from the parenchyma of the ovary. This coat closely embraces the ovisac, and partakes

Fig. 374.



Graafian vesicle of the rabbit  $\times 100$  (?) diameters. (After Barry.)

*a*, outer coat or tunic of the ovisac; *b*, ovisac; *c*, epithelial lining or membrana granulosa, a portion of which has been removed in order to display *dd*, retinacula (here too distinctly marked); *e*, tunica granulosa of Barry immediately surrounding the ovum, consisting of *f*, zona pellucida, within which is the yolk and germinal vesicle and macula.

in its spherical figure; it carries numerous blood-vessels, which pass from the ovarian stroma to become expanded in a vascular network over its walls (fig. 371. *d*).

Examined by the microscope, this membrane is seen to be highly vascular. It is composed of a fine membrane, containing few fibres, but everywhere abundantly studded with oval nuclei, visible without the aid of acetic acid, and probably, in part at least, due to the presence of so many blood-vessels in its tissue. This coat contains no oil globules. Its chief use appears to be to give increased support and protection to the true ovisac which it surrounds, and to convey blood-vessels from the ovary for its nutrition, and for the supply of the fluids which the ovisac contains.

The second or internal coat, as it is commonly termed, of the Graafian follicle is the ovisac itself. It constitutes at first an inde-

pendent structure; but receiving afterwards the before mentioned investment from the ovarian parenchyma, the two coats unite to form the Graafian follicle. The ovisac is

Fig. 375.



Structure of ovisac. (Ad Nat.  $\times 350$ .)

composed of embryonic fibres of connective tissue (fig. 375, *a*), of rounded cells or granules, *b*; and of a large proportion of minute oil globules, *c*. The embryonic fibre-cells lie parallel with each other, and together with the granules form the bulk of the tissue in nearly equal proportions. The oil drops are very numerous; and after the preparation has been under examination for some time they are seen to float up to the surface of the drop of water in which it is placed, and to collect upon the under side of the glass disc used for covering it. In addition to these there is found a small quantity of developed fibres of connective tissue, which appear to give firmness to the whole. The Graafian follicle thus composed, contains, in close contact with its inner wall, a stratum of nucleated cells, forming an epithelial lining, termed the *membrana granulosa* (fig. 374. *c*, fig. 371. *c*). The cells or granules which give a name to this membrane are so lightly held together that it has been doubted whether the stratum which they form is really entitled to the denomination of a membrane. Nevertheless this structure appears to play an important part in regard to the ovum, which is always found lodged within a portion of it. At the commencement of the formation of the ovisac, according to Dr. Martin Barry, these peculiar elliptical nucleated cells or granules are nearly equally diffused through the fluid which it contains, the ovum lying in their centre. But about the time at which the ovisac unites with its covering or tunic to form the Graafian follicle, these granules are found to have become separated into little groups, leaving interspaces filled by fluid. Further, as this separation advances, the granules arrange themselves in such a manner as to constitute three distinct structures. The principal portion collects upon the inner surface of the ovisac forming the *membrana granulosa* just described (fig. 374. *c*). A second portion becomes aggregated upon and around the ovum, taking its form and constituting a special investment for it. This is the *tunica granulosa* of Barry (fig. 374. *e*). A third portion collects to form a structure composed of a central mass in which the ovum with its tunica granulosa is imbedded, corresponding with the *cumulus* (fig. 371. *n, n*) of Baer, and of certain cords or flattened bands, from two to four in number, which pass off from the central mass outwards, to become united with the layer of granules lining the follicle. These radiating bands or cords are termed by Barry the *retinacula*, (fig. 374. *d, d*)