**A demonstration of specimens illustrating cysts of the female appendages / by Arthur Keith ; with notes, by Alban Doran.**

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19

# A Demonstration of Specimens Illustrating Cysts of the Female Appendages.*

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WITH NOTES.

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## Introductory Remarks.

Dr. A. Keith has kindly given me permission to publish this demonstration, and has revised the following report of it, taken from my own notes. The demonstration was founded on a series of preparations which I made between 1877 and 1884 for the Museum of the Royal College of Surgeons. Several have been described and figured in *Clinical and Pathological Observations on Tumours of the Ovary, Fallopian Tube and Broad Ligament*, and the drawings are here reproduced. The demonstration, however, specially deserves publication, not on account of the specimens, but rather for Dr. Keith's exposition of his theory of the homologies of the ovarian fimbria, which may clear up the mystery about the origin of the broad ligament cyst, a subject to which Coblenz, Bland-Sutton, Kossmann, Handley and myself devoted considerable attention in past years.—Alban Doran.

## The Demonstration.

Professor Keith, after describing the preparations above alluded to, explained their nature by aid of a diagram (Fig. 1). The mesosalpinx (1) is bounded externally by a long process from the Fallopian tube known as the ovarian fimbria (8). If these parts be examined in an eight months' fœtus or in a new-born child, it will be found that ovarian tissue runs for some way up the ovarian fimbria, including that portion where the so-called "parovarian cyst" arises. This segment of the ovarian fimbria is part of the genital ridge. The Wolffian tubules (7) run towards the mesovarium at the point where the ovarian fimbria joins it, and they enter the hilum of the ovary. The Wolffian body represents the mesonephron, the kidney of the fish, and the mesosalpinx is the mesentery of the Wolffian body.

A process, often bearing a cyst, usually runs forwards from the

* Delivered at the College, April 22 1910.

Wolffian duct or "horizontal tube of the parovarium" (Fig. 2). What is it? Most likely it is a pronephros, as in *Myxine*, rather than a prolongation of the mesonephron or Wolffian body. Two or three pedunculated cysts, instead of one, are not rare at this point, and are known as Kobelt's tubes. A junction between the anterior part of the Wolffian duct and a process from the Fallopian tube is sometimes observed, as in this specimen prepared by Mr. Alban Doran, and figured in his *Tumours of the Ovary, Fallopian Tube and Broad Ligament* (Fig. 3). The process is of the type called by some writers a "Paratube." The significance of this junction will be discussed presently.

A pedunculated process at the ostium of the Fallopian tube, the "hydatid of Morgagni" (Fig. 1, 11) is simply an exaggerated fimbria (see Fig. 6).

Small cysts require close scrutiny as to their origin, for it is not certain that pathologists are correct about the starting point of broad ligament tumours. Dr. Keith examined 34 appendages bearing small broad ligament cysts, and in no less than 28 there was no evidence that they were of Wolffian origin. On the other hand, in the 6 remaining specimens, the small cyst could be seen arising from the Wolffian body. Mr. Doran's specimen here exhibited and figured in his treatise (Fig. 4), is undoubtedly Wolffian or "parovarian." It is, however, quite small, and Dr. Keith observed that cysts of this type could never be traced upwards, through series where the cyst grew larger and larger, to the common thin-walled broad ligament cyst, a kind of tumour very well known to the surgeon. With another type of minute cyst it is otherwise. In 20 per cent. of all subjects a minute cyst is found, connected with the ovarian fimbria. By comparing the male and female genital gland, Dr. Keith finds that the fimbrial cyst is developed from homologues of the rete testis. It is really in ovarian (hilum) tissue; the histology of the ovarian end of the ovarian fimbria has been already alluded to; that end is the representative of the rete testis. In the male, the tubuli seminiferi are continued as the rete testis in the border of the genital gland, and pass on through the old kidney, mesonephron or vasa efferentia to the vas deferens. In the female, there are tubules, which tend to become cystic, in the neighbourhood of the ovarian fimbria. They correspond in position to the rete testis. As in the male, these cystic tubules are quite distinct from the mesonephron, that is to say, from the "vertical tubes of the parovarium" (Fig. 1, 7). The vertical tubes pass on to the "horizontal tube of the parovarium" (Fig. 1, 5, 5), which is the beginning of the Wolffian duct, the homologue of the vas deferens.

Thus the parovarium or Wolffian body, though closely associated with the cysts (Fig. 5), so often detected at the ovarian termination of the ovarian fimbria, is not the parent of that type of cyst. On the

other hand, a series in the Museum of the College shows the gradual development of the minute fimbrial cyst into a large cystic broad ligament tumour, which, as has been explained, must *not* any longer be called parovarian. In all, however minute or bulky, the ovarian fimbria can be traced along the surface of the cyst, lying on the mesosalpinx. Compare this specimen (Fig. 6), where the Wolffian body or parovarium is seen to be quite internal to the cyst, with this example of a small but very typical broad ligament cystic tumour (Fig. 7). The course of the ovarian fimbria is plain, the alteration of relations to the Fallopian tube itself is caused by the opening up of the mesosalpinx by the growth of the cyst, which soon touches and afterwards stretches the tube itself. But even in the enormous broad ligament cyst (No. 4589 A), presented by Mr. Bland-Sutton, the relations of the ovarian fimbria to the cyst remain the same as in the most minute fimbrial cyst. The ostium of the tube opens on the surface of the cyst, in the characteristic manner long familiar to the pathologist, and from the ostium several low ridges of plicæ run along the cyst for over nine inches, ending on the outer pole of the ovary. Those ridges represent the ovarian fimbria.

We need not neglect the Wolffian body, epi-oöphoron, organ of Rosenmüller, or parovarium, simply because it is never the parent of a big cyst. It is large in mid-fœtal life and may have some function. The six small cysts above mentioned as undoubtedly Wolffian were all derived from the vertical tubes. Dr. Keith has never detected a cyst arising from the horizontal tube, more properly called the beginning of the Wolffian duct.

The paravaginal portion of the Wolffian duct, conspicuous in some of the lower mammalia, is the structure to which the name of Gartner, a Danish anatomist,[1] has been given. It is hardly correct to apply the name Gartner's duct to the free portion of the Wolffian duct between the Wolffian body and the uterus, sometimes persistent in our species (Fig. 1, 5′).

The inferior termination of the Wolffian ducts is not represented in *Homo* by Skene's tubes, but most likely by a pair of shallow depressions in the vestibule. Lewers operated on a cyst which, in his opinion, originated in the lower part of the Wolffian duct.[2]

1. Herman Treschow Gartner. He obtained a silver medal from the Royal Danish Society of Sciences in 1822 for a treatise, "Beskrivelse over et ved nogle Dyrarters Uterus undersögt glandulöst Organ." (Description of a glandular organ examined in the uterus of certain species of animals.).—A.D.

2. "Note on a Case of Cystic Tumour of the Right Broad Ligament springing from Uterus, and apparently developed from Gartner's Duct." *Proc. Royal Soc. Med., Obstetr. and Gyn. Section*, Jan. 1910, p. 67. (It was, if really of Wolffian origin, derived from the parauterine part of the Wolffian duct, not from the terminal or vaginal segment, "Gartner's duct." See also Amand Routh, "On Cases of Associated Parovarian and Vaginal Cysts, formed from a Distended Gartner's Duct," *Trans. Obst. Soc., Lond.*, Vol. xxxvi, p. 152).—A.D.

Vaginal cysts are not rare, but as a rule, for instance, in Mr. Doran's case, preserved in the Museum, they appear to arise from Skene's tubules which are the homologues of the prostatic tubules, since they are always developed near the urethra. We cannot, however, be too careful lest we should fall into error about homologies, because great proliferation of epithelium occurs in fœtal life, clogging the vagina. Hence the cyst above mentioned, and some other vaginal cysts preserved or reported, may have been developed out of epithelial invaginations.

Thus there is much doubt about the relations of vaginal and urethral cysts to the opening of the Wolffian duct. There is, on the other hand, no uncertainty whatever about cysts which develop higher up in the vagina; some of them undoubtedly arise from the paravaginal portion of the Wolffian duct, "Gartner's duct," [1] as it is generally called in human anatomy.

In order to perfect, if possible, our knowledge of the origin of these cystic structures, it is important to study the Woffian body and its duct in the human female independently of cysts and anomalies. The parovarium, as we usually call it, is not very small. Dr. Keith found that it can be most clearly defined in the new-born subject, although Percival Cole [2] recently reported that in the fœtus the parovarium can with difficulty be distinguished by the naked eye, and that at the age of twelve, although the uterus and broad ligament and all the sexual apparatus have considerably increased, the parovarium is still a structure which might easily escape notice. Keith, on the other hand, finds, as Cole did, that the Wolffian body or parovarium reaches its highest development quite late in adult sexual life, about the 35th year. Cole, indeed, noted the most evident examples in women from 40 to 43.

There are some fine dissections recently prepared for the College Museum demonstrating the Wolffian body in the human infant and adult, and its relations to the Fallopian tube and ovary. In one specimen a minute cyst is seen on the ovarian fimbria, and another on one of the vertical tubes of the Wolffian body or parovarium. As already shown, cysts of the latter type have never been traced upwards to the common broad ligament cystic tumour; there is little difficulty in demonstrating the development of the fimbrial cyst into the cystic tumour, a series of preparations at the College displaying that development.

The development of Müller's duct is not so intricate, but the

1. See Unterberger, "Durch Laparotomie gewonnene Gartnersche Cysten," *Monatsschr. f. Geb. u. Gyn.*, Vol. xxix, 1909, p. 587; an important paper, with references. An abstract appeared in the JOURNAL, Vol. xvi, p. 123 (August 1909).

2. "The Relation of the Parovarium to Cyst Formation." *British Med. Journ.*, Vol. i, 1910 (March 24), p. 748.

homologies of the terminal portion of the Fallopian tube are still disputed. Kossmann [1] and Handley [2] ascribe many cystic bodies and papillary growths in the region of the broad ligament to Müller's duct. Dr. Keith finds that about every third or fourth subject has a "paratube" or accessory tube, whilst he could only detect an accessory ostium in 1 in 40. Whilst Kossmann has so strong a belief in the Müllerian origin of many cysts, etc., recent embryologists have shown that the free end of the Fallopian tube is not originally a part of Müller's duct. Francis Balfour found that in sharks the fimbriated end of the Fallopian tube is a derivative of the head kidney or pronephros. This pronephros is a true excretory organ, it bears three or four tubules, and opens into the cœlom by a trumpet-shaped orifice, and is provided with a glomerulus which opens into the Wolffian duct. This may explain the double connection of the cyst already exhibited (Fig. 3), the junction of a "Kobelt's tube" with an accessory hydrosalpinx, for the terminal cystic process on the front of the horizontal tube of the parovarium (Fig. 2) is, as has been explained, most likely the relic of the pronephros and not Wolffian in origin.

Dr. Keith observes that accessory ostia are often blind, and tend to become cystic, as Kossmann and Handley have demonstrated.

Thus, after careful study of specimens and consideration of the anatomy and embryology of all structures concerned, broad ligament cysts may be classified as follows:—

1. The cyst of the lower end of the ovarian fimbria, originating in a homologue of the rete testis in the male, some tubular or cystic relic in the hilum tissue of the ovary which extends into this part of the ovarian fimbria. From this cyst arises the common cystic tumour of the broad ligament, the "parovarian cyst" of gynæcologists and surgeons.

2. The cyst of the Wolffian body, developed from one of its vertical tubes. This is, therefore, truly parovarian. No authentic instance of a cyst of this type becoming a large tumour has ever been reported.

3. The cyst of an accessory tubal ostium, the "accessory hydrosalpinx" of Handley.

Lastly, the "hydatid of Morgagni," and the similar pyriform pedunculated cyst running outwards from the horizontal tube of the parovarium are neither Müllerian nor Wolffian, but are relics of

1. "Anatomie und Pathologie des Nebeneierstöcke." Martin. *Die Krankheiten der Eierstöcke und Nebeneierstöcke*, Pt. iii.

2. "On the Origin from Accessory Fallopian Tubes of Cysts of the Broad Ligament situated above the Fallopian Tube." JOURNAL, Vol. iv (1903), p. 456.

the pronephros. To the same origin Kobelt's tubes may probably be traced. Dauber's case [1] may be of this type. Otherwise no instance of the origin of a large cystic tumour from an accessory hydrosalpinx or a "hydatid" of the fimbriæ or parovarium has been recorded.

1. "Case of Double Symmetrical Cystoma of Unusual Origin and Connections." *Trans. Obstet. Soc.*, Vol. xlvi, 1904, p. 341.

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## A DEMONSTRATION OF SPECIMENS ILLUSTRATING CYSTS OF THE FEMALE APPENDAGES.

By Arthur Keith, M.D., F.R.C.S. (Eng.).

### ILLUSTRATIONS.

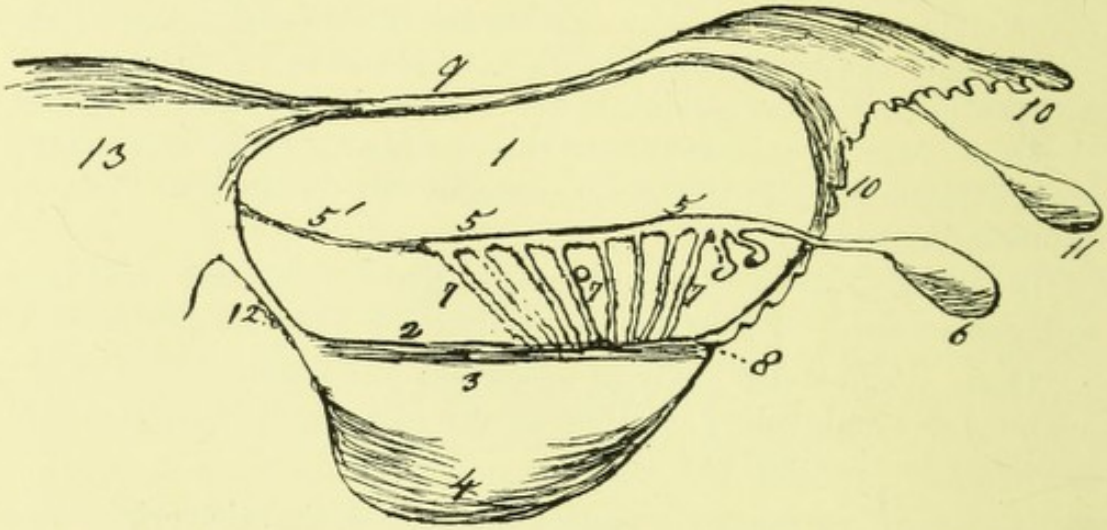


Fig. 1. Diagram of the Structures in and adjacent to the Broad Ligament.

1. Mesosalpinx.
2. Mesovarium (shaded line).
3. Hilum of ovary.
4. Ovary proper.
5. 5. Beginning of Wolffian duct, "horizontal tube of parovarium."
5′. Relics of free portion of Wolffian duct.
6. Cystic process from Wolffian duct, probably a relic of the pronephros, and not of Wolffian origin.
7. 7, 7. The Wolffian body, parovarium, epi-oöphoron, or organ of Rosenmüller.
8. Ovarian extremity of the ovarian fimbria of the Fallopian tube. It is partly made up of ovarian tissue, and includes tubular or cystic relics, homologues of the rete testis. The common broad ligament cystic tumour, the so-called "parovarian cyst," arises from a cystic relic of this type.
9. Fallopian tube, developed from Müller's duct.
10. 10. Fimbriated extremity of Fallopian tube surrounding cœlomic ostium, 11 "hydatid of Morgagni." N.B., 10, 11, and probably 6, are developed from the pronephric tubules and not from Müller's duct.
12. Ovarian ligament.
13. Uterus.

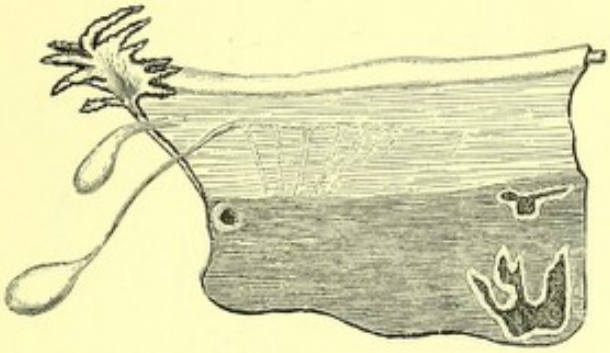

FIG. 2. A PEDUNCULATED CYST running forward from the Wolffian duct or "horizontal tube of the parovarium," probably not of Wolffian origin, but developed from the pronephros. The smaller cyst on a shorter pedicle may be of the same origin, or may be an "accessory hydrosalpinx" (Kossmann, Handley) of Müllerian origin. From Doran, "Tumours of the Ovary," etc., p. 46.

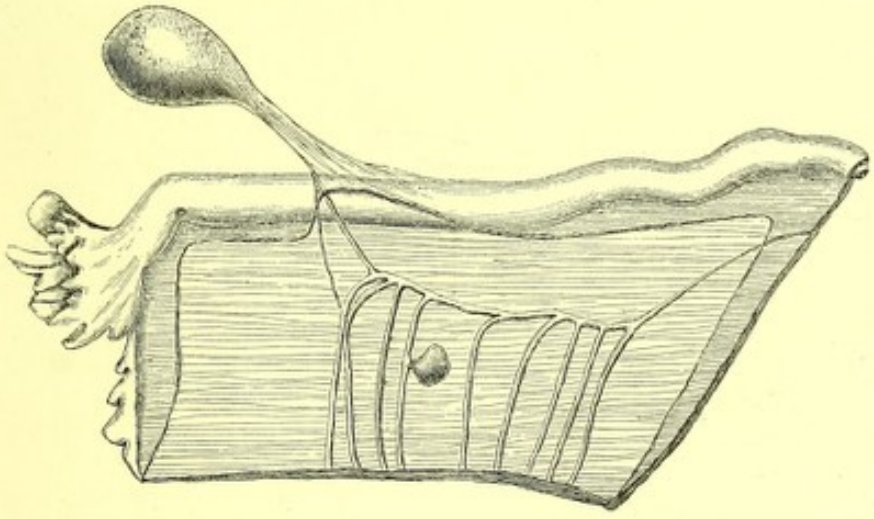

FIG. 3. WOLFFIAN BODY, PAROVARIUM, Epi-oöphoron, or Organ of Rosenmüller displayed by the removal of the posterior layer of the mesosalpinx. The free part of the Wolffian duct, running from the parovarium to the uterus, is unusually distinct. The vertical tubes are well-developed. The pedunculated cyst running forward from the "horizontal tube" is probably pronephric, as in Fig. 2; it is connected with the Fallopian tube, and thus may represent, according to A. Keith, the former close relations of the pronephros with the Wolffian and Müller's ducts. *Loc. cit.*, p. 43, Preserved Mus. R.C.S., Path. Series, No. 4586 A. (There is also a minute cyst connected with the Wolffian body and evidently of Wolffian origin.)

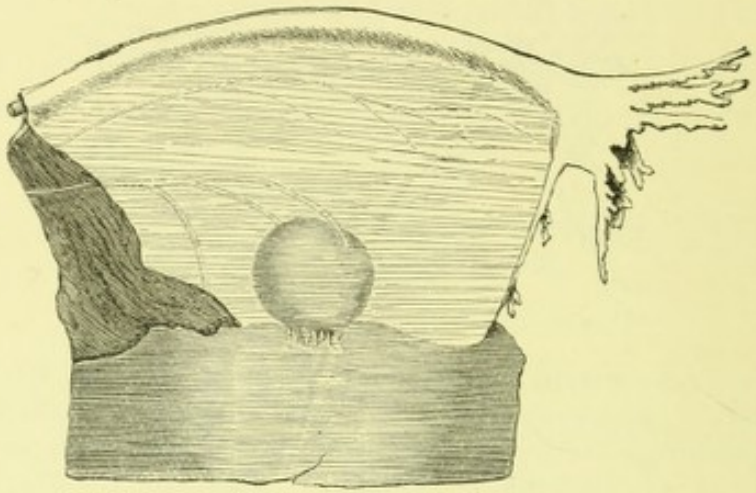

FIG. 4. CYST OF THE WOLFFIAN BODY or true "Parovarian cyst." The outermost vertical tube passes in front of it. The cyst is quite independent of the ovarian fimbria of the Fallopian tube. This true parovarian cyst is, according to A. Keith, not the origin of the so-called parovarian cystic tumour; it never attains a large size. *Loc. cit.*, p. 47.

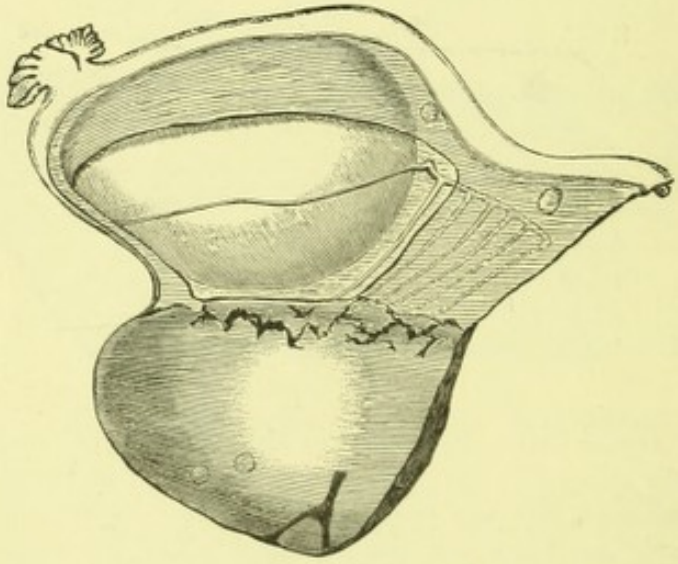

FIG. 5. WOLFFIAN BODY OR PAROVARIUM, with a thin-walled cyst developed in association with the ovarian fimbria, and not Wolffian. The outermost vertical tube of the parovarium crosses over the cyst and joins the ovarian fimbria, an unusual conditon; but originally the pronephros and Wolffian body are in close relation. The fimbrial cyst probably arises in a homologue of the rete testis (see text). *Loc. cit.*, p. 47.

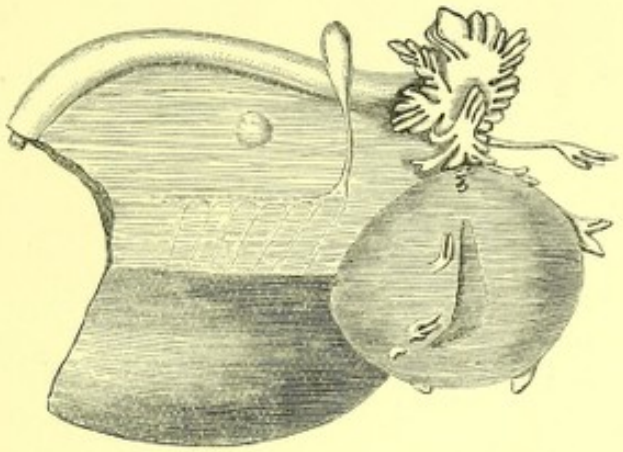

FIG. 6. CYST OF THE OVARIAN FIMBRIA. The secondary fimbriæ are stretched over the cyst and parted widely from each other. An incision made in the capsule exposes the cyst-wall. The capsule is formed from the mesosalpinx. A pedunculated pronephric cyst (see Figs. 2 and 3) springs from the Wolffian body. The "hydatid of Morgagni" (Fig. 1, 11) is here not cystic but fringed. The fimbrial cyst probably arises in a homologue of the rete testis. *Loc. cit.*, p. 53.

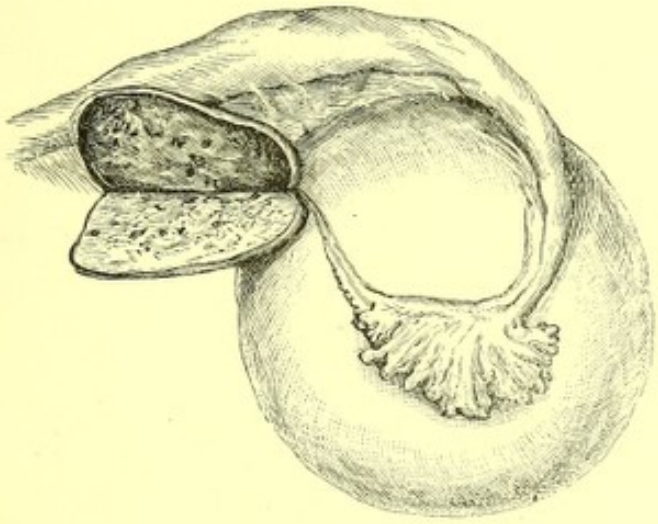

FIG. 7. A BROAD LIGAMENT CYST, incorrectly called "parovarian," but really arising in relics, homologues of the rete testis, at the point of junction of the ovarian fimbria and the ovary. It is in close relation to the ovarian fimbria, and through the opening up of the layers of the mesosalpinx it is beginning to come in contact with the Fallopian tube itself. *Loc. cit.*, p. 54.