

Coe. (H.C.)

ovaries, diseases and new
growths of the.



entitled Climate (vol. ii., pages 185 to 191). The exception just alluded to concerns only the data standing in columns A and AA. The hours of the tri-daily observations of temperature are not identical with those given in the U. S. Signal Service charts. For the careful preparation of this chart I am indebted to the Hon. Charles Carmael, Superintendent of the Canadian Meteorological Service, and also to the Hon. H. Beaumont Small, of Ottawa, who assisted me in so obtaining it.

Huntington Richards.

Boe (E. C.)

OVARIES, DISEASES AND NEW GROWTHS OF THE. It is impossible for anyone to appreciate the nature and extent of morbid changes within the ovary, unless he has familiarized himself with the normal variations in its physiological anatomy. These variations are so great, the structure and functions of the organ are so complex, that it becomes of vital importance for the surgeon to be provided with positive criteria of its health and disease, since upon his hasty decision at the operating-table often hangs the question of its removal. During the period of sexual activity the exterior of the organ presents a generally smooth, pearly, glistening appearance, relieved by occasional vesicular projections, which represent matured Graafian follicles, or by brownish spots and whitish depressions or cicatrices, the sites of ruptured ovisacs. It is important to note that, when congested (as during menstruation) an ovary may increase in size, assume a more spherical shape, and a pinkish or bluish hue, while the senile gland is small, irregular, of a dead white color, and frequently of a semi-cartilaginous consistence. These facts should be borne in mind in connection with the diagnosis of acute or chronic ovaritis.

Theoretically, it is difficult to find an ideal ovary, or one in which a careful microscopical search does not reveal evidences of circumscribed disease. Practically, however, we may be content to assume that an organ is normal which discharges its functions normally and shows no morbid changes sufficient to impair its general integrity. It is important to become thoroughly acquainted with the appearance of the normal ovisac, in order to form an intelligent idea as to the presence of diseased conditions. It is by no means easy to decide how large a Graafian body may become within normal limits, or what amount of fluid may collect within it before the diagnosis "hydrops folliculi" becomes justifiable. The presence of several vesicles as large as peas on the surface, or within the substance, of an ovary does not warrant us in asserting the existence of functional impairment, until we have carefully examined the stroma for other evidences of disease.

Is it possible to distinguish the normal ovary by the vaginal touch? Opinions differ on this point. In thin subjects a practised hand may, indeed, be able to detect the organ by the bimanual, or, better still, by the rectal or vesical touch; but the writer has no hesitation in affirming that it is only under exceptional circumstances that this can be accomplished. Schultze directs that the patient be placed upon her back, with the thighs flexed and rotated outward, so as to render the psoas muscles tense; the inner edges of the latter form guides to the ovaries, which lie at points equally distant from the muscles, Fallopian tubes, and cornua of the uterus. The organs may also be displaced downward by making traction on the uterus with a volsella, and are then accessible through the anterior rectal wall. The information gained is, of course, negative; we have not yet acquired sufficient diagnostic skill to recognize slight variations in the size of an ovary which still retains its position at the level of the pelvic brim.

The symptomatology of ovarian disease is by no means clearly defined, as will be inferred by a review of the following paragraphs on that topic. Just as we have every reason to anticipate many new discoveries in the field of ovarian pathology, so there is no doubt that we may yet ascertain the true origin of symptoms now referred to disease of the ovaries.

The element of *pain* in connection with affections of the pelvic organs is one on which great stress is laid, yet

it is not uncommon to find that the peculiar pain described in the text-books as distinctly "ovarian" may co-exist with perfectly healthy organs—in short, that it may be due to disease of the tubes, or to the presence of peritonitic adhesions. Even "ovarian dysmenorrhœa," so clearly defined in many treatises on gynecology, is coming to be regarded by thoughtful men as more or less a confession of ignorance, since it is a matter of daily experience that pain recurring at every monthly period may be due to several causes, some of which are still problematical. I believe that in the almost unexplored field of functional nervous diseases lies the solution of many problems in gynecology which have so long vexed the minds of the inquiring.

The various symptoms usually referred to disease of the ovaries will be described and commented upon in their proper place. I only desire, in these introductory words, to guard the reader against the disappointment which he may feel at the brevity and apparent vagueness of the sections devoted to symptomatology. A writer on general medicine would be severely criticised if he described a set of symptoms as *possibly* belonging to a certain disease. Why, then, should not a gynecologist, who draws largely upon his imagination, be held equally accountable?

In view of the present domination of the operative tendency in gynecology, it may seem necessary to offer an excuse for dwelling upon the palliative treatment of ovarian disease. The topic is not a popular one, but, as this article is written for general practitioners, I cannot resist the temptation to remind the reader that such treatment is not entirely hopeless, and that the diseased ovaries are not necessarily shrouded in a mystery which only the laparotomist can penetrate. The surgical side of the question is not the only one, and there is hope for the patient in the office, as well as on the operating-table. But this question, also, is in a transition stage, and until it is settled a middle course is the safest.

I. AFFECTIONS OF THE OVARY NOT RESULTING IN THE FORMATION OF TUMORS.—1. *Malformations.*—Abnormalities in the development of the ovaries are seldom recognized during life. There may be a complete absence of one or both organs, or, more commonly, they may be present in a rudimentary condition. Rarely, a third ovary may exist.

Etiology.—Congenital absence of both ovaries nearly always co-exists with absence or arrested development of the pelvic organs. One ovary may be absent without the existence of any abnormality in the uterus, but, as a rule, the corresponding half of the latter organ is rudimentary, or the tube is defective in its outer portion. Arrested development of both ovaries is the most common of these conditions, and is generally, though not always, associated with pelvic organs of an infantile type and with retarded puberty. The individual has never progressed beyond the state of childhood. The primary cause of this phenomenon is unknown. It does not appear to be due either to heredity or to the general health of the woman, which is usually excellent. The influences which govern the development of the embryo are too subtle to allow of theorizing on the subject. Tait calls attention to a class of cases in which the growth of the ovaries is stunted as the result of zymotic diseases during childhood, especially of scarlet fever. The pelvic organs retain their infantile type, as in cases of congenital arrest of development. Arrest at a later period is probably the result of ovarian disease, and will be considered elsewhere. The presence of an accessory ovary has been explained in different ways; by some the extra organ is considered as a cotyledon or outgrowth from the original ovary, while others regard it as the result of a pathological process. Peritonitis in the fœtus (usually of syphilitic origin) leads to the formation of bands which separate, and eventually cause complete detachment of, certain portions of the gland.

Gross Anatomy.—A rudimentary ovary either preserves the elongated shape of the fetal organ, or resembles the adult gland, but is small and shrunken. It is important to distinguish such an ovary from one that has become

presented by the author

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atrophied physiologically, or as the result of disease. I have found ovaries buried in old adhesions, and so shrunken that it was almost impossible to identify them. The rudimentary condition of the other pelvic organs will serve to confirm the diagnosis. A few well-authenticated cases are on record in which a third ovary existed; in one instance, Sinéty found no less than half a dozen small pedunculated bodies growing from the ovary of an infant, only one of which, however, presented the normal structure of the gland.

Minute Anatomy.—The histology of a rudimentary ovary points clearly to an arrest of development, as shown by the absence or imperfect character of the Graafian vesicles. Klebs has called attention to the fact that in certain cases in which ingrowths of germinal epithelium have been isolated in the midst of the stroma, without the formation of vesicles and ova, the histological structure resembles that of the testicle, so that if portions of the ovary became separated from the rest of the organ (as by long-continued constriction by bands of adhesions), doubt might arise as to whether the subject was or was not an hermaphrodite. It is easy to see how much importance might attach to this question in a medico-legal light.

Clinical History.—A woman whose ovaries are entirely absent is essentially a child. Aside from the imperfect condition of her sexual organs, she will present a physical and mental development corresponding to that age. This is not invariably the case, as I have seen a woman whose internal genitals were entirely wanting, yet the pudenda were of normal appearance, and the patient did not differ greatly from others of her age and condition. Sexual feeling is, of course, absent, or nearly so, menstruation does not appear, and the growth is stunted. In some instances the subject presents some of the characteristics of the male type—masculine tone of voice, absence of the feminine contour, growth of hair on the chin and upper lip, etc. Women with rudimentary ovaries may be assigned to two classes—those who do not menstruate at all, and those in whom the function is developed only to be arrested after a few years, or to be exercised at infrequent intervals. The history of the former is almost identical with that of the patients in whom the glands are entirely wanting, except that the infantile type is almost invariable. Epileptic attacks are common in such unfortunates. More commonly we meet with the following history: Puberty is delayed (to the sixteenth or eighteenth year), its approach being heralded by pelvic pains which seem to indicate an effort on the part of nature to establish the function. After a few months these may cease entirely, and no indications may exist of the returning periods; or a scanty flow may appear at irregular intervals, and then cease entirely. Other women may menstruate with some regularity for three or four years, although the amount is scanty, and then cease. The physical development of such subjects is imperfect, while sexual feeling is nearly always wanting.

In Mr. Tait's opinion, the largest class of patients whose ovaries may fairly be regarded as non-developed consists of women whose general physical condition is good, but whose menstruation is delayed, and then appears with fair regularity for eight or ten years, the flow being normal in quantity but accompanied by pain. Not only is the menopause premature in these cases, but some slight cause (a chronic disease, mental anxiety, etc.) which would not affect the function in other women, may arrest it temporarily or completely. In other words, many ovaries, although not strictly rudimentary, may never become sufficiently developed to maintain their activity during the ordinary period of sexual life, especially if the stimulus of marriage is wanting. Such patients as those last described do not, of course, present the same general evidences of arrested development as do those who have never menstruated, and the results of treatment are widely different. The symptom of amenorrhœa being the most important one, it is evident that much care must be exercised in discriminating between amenorrhœa due to non-development, and that arising from general or local disease.

Diagnosis.—Having obtained such a history as the one above described, we should note the general appearance of the patient, remembering that anæmia is a common cause of amenorrhœa. The evidence afforded by a digital examination is mainly negative; while the existence of an infantile condition of the vagina and uterus, or an entire absence of these organs, will readily be recognized; little information will be gained regarding the ovaries, even though the patient is examined per rectum and under anæsthesia. The absence of tenderness on palpation, or of any appreciable enlargement of the glands, may justify the inference that the menstrual irregularities are due to imperfect development rather than to disease.

We have no certain means of ascertaining during life the presence of accessory ovaries, or the absence of one organ; the persistence of menstruation after the removal of both ovaries is no longer regarded as an evidence that a third exists. We decide that rudimentary ovaries are not functionally useless, not only from the fact that menstruation persists, but from the *tout ensemble* of the individual, and the degree of development of the uterus, a question to be established by a careful bimanual examination and measurements with the sound. The evidences of some disease which might retard menstruation should be sought for.

Prognosis.—It is evident that encouragement can only be offered to such patients as have shown some manifestations of sexual activity, *i. e.*, to those in whom the other pelvic organs are not rudimentary.

Treatment.—This has for its object the stimulation of the pelvic circulation and with it the awakening of the dormant activity of the ovaries; it will be successful according to the extent to which nature has already succeeded in establishing the menstrual function. An attempt should be made to build up the general condition, if it is poor, by the use of tonics, especially iron, massage, electricity, and a careful attention to diet. Aside from the drugs which are usually administered for the purpose of determining an increased flow of blood to the pelvic vessels (iron and aloes pill, apiol, binoxide of manganese), hot hip-baths, and vaginal douches at the time of the expected period, applications to the uterine cavity, the introduction of tents, the sound, etc., have been recommended.

Electricity is doubtless the most valuable agent which we possess. A large flat sponge connected with one pole of a faradic battery should be placed over the sacrum, while the other pole is applied alternately over either ovary, a current of moderate strength being used. This should be repeated two or three times weekly, the treatment being continued for months if necessary. A still better way is to introduce a rheophore into the uterine cavity, while the other pole is placed over the fundus and the ovary. If the faradic current produces no result, galvanism may be tried. The so-called "galvanic stem-pessary" has been much lauded in connection with the treatment of amenorrhœa of ovarian origin, but it is by no means certain that this instrument accomplishes anything more than an irritation or stimulation of the uterus; the existence of any distinct galvanic action is doubtful. The same objections exist in the case of these stems as in that of other intra-uterine pessaries, and I cannot see any advantage which they possess over the rheophore. Marriage has been recommended as a means of developing immature ovaries and arousing proper sexual feeling; but this step should not be taken without a full understanding on the part of all parties that it is purely experimental. It is true that many women who menstruated imperfectly or not at all before marriage have apparently matured afterward, and have not only had a normal flow, but have become pregnant. But there are not a few instances in which neither the menstrual function nor sexual feeling is quickened, and disappointment and domestic unhappiness result.

2. **Displacements of the Ovary.**—(a) **Hernia.** Hernia of the ovary is generally a congenital displacement, the inguinal canal being the most common location. Kivisch reports a rare case, in which the ovary was found in the obturator foramen, while Leopold removed an ovary and

the left cornu of the uterus which formed a hernial protrusion. An acquired hernia of the ovary may also be vaginal, crural, or even umbilical, and is usually associated with hernia of the omentum or intestine. A ventral hernia after laparotomy may contain the uterus and its appendages.

Etiology.—The congenital displacement of the ovaries into the inguinal canal, or even into the labia majora, is explained by reference to the descent of the testes—in fact, in many recorded cases of supposed hernia of the ovary the organs were really testicles, so that the question of hermaphroditism might readily arise. Acquired hernia can only occur when the attachments of the ovary are unusually long or relaxed; the tube is commonly displaced at the same time. The displacement may occur simultaneously with an inguinal hernia as the result of a strain or fall. Weinlechner (*Wiener med. Wochenschrift*, 1877) mentions an example. It is somewhat apt to occur during the general relaxation of the pelvic organs and of their attachments, after delivery. Tait has described cases of congenital absence of the broad ligaments; under these circumstances the range of mobility of the ovaries might be considerable.

Gross Anatomy.—When situated in the inguinal canal (the congenital variety is confined to this region) or labia majora, the ovaries appear as small tumors about the size of a pigeon's egg, and closely resembling testicles in shape and consistence. Sometimes they are readily reducible, but more often they are fixed by adhesions. Strangulation is not a rare accident. If intestine or omentum is present in the sac, the presence of the ovary may not be suspected. The coverings of the hernia are, of course, the same as those of the omental or intestinal variety. English found the hernia double in one-third of the reported cases. The displaced ovary may undergo cystic or even carcinomatous degeneration, or it may become atrophied.

Minute Anatomy.—The identity of the ovary will be revealed by the microscope. The presence of Graafian vesicles and ova will clear up any doubt which may exist as to the true sex of the subject. It should be remembered that not only do these displaced ovaries bear a close resemblance to testicles macroscopically, but the minute anatomy of the former, if these are undeveloped, is quite similar to that of the male organ. That a hernial ovary may remain functionally perfect is proved histologically as well as physiologically.

Clinical History.—A patient with this displacement of the ovary will ordinarily state that she has long noticed a small lump in one or both groins or labia, which may remain stationary or disappear when she lies down. The swelling may not have attracted her attention until puberty, when she began to notice that just before the appearance of the menstrual flow it became enlarged and tender, returning to its previous condition after menstruation. Pressure on the tumor, she has noticed, causes a peculiar, sickening pain, or even nausea. Facts regarding the sexual feeling will mainly be negative. With this history we should be led to suspect the nature of the enlargement. The displaced ovary may become the seat of inflammation, or it may become incarcerated, when the symptoms will be more grave.

Diagnosis.—This will be based upon the location and character of the swelling, the manner in which it is affected by the menstrual nixus, its tenderness on palpation, and the reflex symptoms which may result from pressure upon it. Thus, nausea has frequently been noticed, and in one instance Routh ("Trans. Royal Med. and Chir. Soc.," *Lancet*, January 28, 1882) caused marked sexual excitement by pressing on the inguinal tumor. In examining a supposed hernia of the ovary we have not only to differentiate it from an ordinary hernia and from hydrocele of the round ligament, from parietal and peritoneal tumors, but to decide whether the hernia consists of the ovary alone (with the corresponding tube), or of the ovary plus intestine, omentum, or inflammatory adhesions. An ovary situated near the external ring, or in the labium, can nearly always be felt as a distinct circumscribed tumor, dull on percussion and without any

impulse on coughing. If it is readily reducible, of course the diagnosis of hernia of the ovary is rendered highly probable. A careful bimanual examination of the uterus will sometimes throw light upon the question; if this organ be moved by means of the hand or a sound, traction will be made upon the hernia. The physician may be called upon to decide whether the hernial protrusion is an ovary or a testicle, *i.e.*, whether the subject is an hermaphrodite or not. The decision, as before stated, is sometimes difficult; if the pelvic organs are well developed, and if the menstrual disturbance is present, there can be no reasonable doubt as to the true sex.

As regards the various forms of acquired hernia of the ovary, it must be acknowledged that the diagnosis is often doubtful, especially if the gland cannot be isolated. Acquired hernia is usually reducible, congenital hernia seldom; the ovary in the former case may, however, become incarcerated together with intestine or omentum. The periodical pain and enlargement of the imprisoned mass should lead one to think of the possibility of its containing an ovary. Vaginal hernia (*ovariocele vaginalis*) is really an exaggerated degree of prolapsus; in order that the gland may sink down behind the vagina and form a protrusion in the posterior wall of that canal, it is necessary that there should be a rupture or relaxation of the deep pelvic fascia. The diagnosis is not so easy as it may seem to be, especially if the enlargement appears near the vulva; it may be mistaken for a small scybalous mass, a cyst, abscess, or tumor of the vaginal wall.

Prognosis.—Congenital hernia of the ovary, being situated in the inguinal canal or at its termination, and being irreducible, are subject to some of the same complications as the ordinary variety. As the gland is subject to periodical congestion, as well as to disease, the tendency to which is increased by its abnormal position, it can readily be understood that strangulation may occur and may lead to a fatal termination. Cystic degeneration may occur, and an ovarian cyst has been removed from the region of the external inguinal ring.

The prognosis in acquired hernia differs in different cases; the hernia is generally reducible, but inflammatory complications sometimes occur, leading to suppuration and peritonitis. If the ovary is adherent to a displaced organ it will share in the accidents to which that organ is liable. A vaginal hernia is exposed to frequent injury, so that the ovary is liable to become inflamed, especially if it is irreducible.

Treatment.—This may be described as palliative and radical or curative. If the hernia is reducible taxis should be employed, a suitable pad or truss being adjusted; it is hardly necessary to add that manipulation of a displaced ovary should be as gentle as possible. If taxis has been tried unsuccessfully, it is well to apply continued pressure (hydrostatic, or by sand-bags). If the ovary cannot be replaced, it must be protected by a concave pad or a truss, pain being relieved by the usual means. Local applications should be used with circumspection during the menstrual period, lest the physiological be converted into a pathological congestion.

In the operative treatment of this displacement the surgeon will be governed by two considerations, the relief of pain, and the saving of life. Even the most conservative will admit the wisdom of removing ovaries which are practically useless and are prone to become diseased, if they are not already so, especially as the operation is not as dangerous as laparotomy.

(b) *Prolapse of the Ovary.* Reference has been made, not only to the attachments of the ovary, but to its normal range of mobility, as determined by the distention of the bladder as well as by the enlargement of the uterus during pregnancy. The reader's attention is also called to the physiological variations in size and weight which the gland presents during the menstrual and puerperal periods. Bearing these facts in mind, he will readily see how a disturbance of the delicate adjustment of the organ, by an abnormal increase in its weight, a weakening or relaxation of its supports, or an unusual traction upon it, may cause it to change its position, and sink downward toward the pelvic floor. Prolapse arising from an en-

largement of the ovary is the result of causes to be studied subsequently in connection with diseases of the organ; unlike hernia, it is secondary to, or symptomatic of, some pathological condition of the pelvic organs.

Etiology.—An ovary may become prolapsed because its weight increases to such an extent as to overcome its natural supports; the ovarian ligament may be stretched during pregnancy and may fail to regain its former tone after parturition (the ovary increasing in size at the same time); or the organ may be drawn out of place by the adhesions resulting from localized peritonitis. Displacement from these causes is independent of changes in the position of the uterus. The ovarian attachments are frequently over-stretched by the weight of a retroverted or prolapsed uterus, while in complete inversion of that organ the ovaries may be dragged downward into the infundibulum. An intra-pelvic growth may displace an ovary, but it is a question if this is an example of true prolapse. Although prolapse is a frequent accompaniment of retroflexion, the ovaries are felt in Douglas's pouch in acquired antelexion more frequently than is commonly supposed. In general, I have noticed that the ovaries are most often displaced in connection with flexions which are clearly caused, or aggravated, by peri-uterine inflammation, so that it would seem as if the traction of adhesions was an important factor in producing the displacement. In a small number of cases the condition may be regarded as congenital.

Anatomy.—In true or primary prolapse (called by Olshausen, *descensus ovariorum*) the ovary sinks below its normal plane, while the uterus remains in position. In lesser degrees of dislocation the organ may be only slightly, if at all, enlarged, while the infundibulo-pelvic ligament is longer than usual; in more marked cases the ovary will be found behind the uterus, lying just above the level of the sacro-uterine ligaments in that portion of the posterior fossa which Polk has called the "retro-ovarian shelf." In extreme dislocation it will lie at the bottom of Douglas's pouch. I have rarely, if ever, found the ovaries exactly in the lateral pouches unless they were fixed there by adhesions. The left ovary is more commonly prolapsed, not only because it is more subject to disease, but by reason of its greater enlargement during pregnancy. Several influences tend to produce this condition, chief among which is the valveless state of the left spermatic vein, whereby that vessel is affected by an obstruction in the general circulation. The conformation of Douglas's pouch allows the left ovary to sink to a lower level than the right, and hence to be more accessible to the examining finger. This may account to some extent for the comparative frequency with which prolapse is detected on that side. Simultaneous primary dislocation of both ovaries is not common. The ovary is rarely found in front of the uterus or between the uterus and the bladder; this displacement is nearly always the result of a former peritonitis. As regards the condition of the displaced organ, it may be said, broadly, that it is usually the seat of disease, but it is not always easy to affirm whether the disease existed *before* the prolapse, or was caused by the continued congestion resulting from obstruction of the ovarian vessels; it is generally safe to assume that disease originally existed and that it was aggravated by the abnormal position.

Subinvolution of the uterus is a frequent cause of retroversion; as the heavy organ inclines backward, decided traction is exercised upon the infundibulo-pelvic ligaments, the ovaries being drawn backwards and downwards, so that they lie near the uterus and somewhat in front of it. Quite different is the condition if the ovaries are fixed (together with the uterus), by adhesions which compress their vessels, hinder their periodical enlargement, and imprison the organs at the bottom of Douglas's pouch against the rectum, where they are constantly subject to disturbing influences (defecation, coition, etc.); they will then invariably be found to be diseased, and the disease may fairly be regarded in this instance as secondary to the displacement. A curious condition sometimes encountered at the examining-table (less often by the pathologist) is imprisonment of an otherwise movable ovary

beneath the fundus of a retroflexed uterus; if the latter can be raised the ovary may be liberated.

Dislocation of one or both ovaries as the result of peritonitis, or associated with disease of the tubes, is frequently observed at autopsies; the pathological conditions are often so complicated that it is impossible to trace the sequence. The uterus may or may not be displaced. It is a question how far many of these displaced ovaries can be regarded as prolapsed, since it is impossible to say whether they originally sank below their normal plane as the result of enlargement due to disease, or were drawn downward by peritonic adhesions.

Clinical History.—Since prolapse is a consequence of disease, and not a disease itself, many of the symptoms are those of chronic ovaritis and will be described in detail subsequently. The subjective symptoms referred to the mechanical condition will readily be understood on recalling the relations of an ovary when lying in Douglas's pouch. From its close proximity to the rectum, it is liable to be affected by the passage of feces, especially when constipation exists, as it usually does in women. The patient will complain of darting, sickening pains during defecation, which may persist long after the bowel has been emptied. Nausea, or even sexual excitement, may be caused by the presence of hardened fecal masses. The unfortunate patient looks forward with dread to every movement of the bowels, and feels completely exhausted for hours afterward. Reflex disturbances (especially frequent micturition, vesical and rectal tenesmus) are often present. Exposed as the sensitive organ is to injury from the side of the vagina, dyspareunia—painful coition—is a common symptom. Locomotion is attended with sickening pain in the sacrum and inguinal region, especially the left, the pain shooting down the thigh along the genito-crural nerve. General reflex neuralgiae are often noticed, the breast being a common seat of this distressing complication. In my experience mammary neuralgia is usually confined to the side on which is the affected ovary. Dysmenorrhœa, as may be inferred, is more or less marked. As a result of her sufferings the mind of the unhappy woman may be affected and suicidal tendencies are sometimes noted. This brief picture represents the main symptoms of a well-marked case of prolapsed and diseased ovary; the reader must not suppose that these are invariably present. I have seen many cases in which the condition would not have been suspected from the subjective history. It is the enlarged tender organ, fixed by adhesions above the vaginal fornix, that occasions such distressing phenomena; the small movable ovaries which follow a retroverted uterus in its ascent and descent are not so likely to give trouble, unless one of them happens to be caught between the fundus and the sacrum, as Goodell suggests. I cannot believe that this is a very frequent accident. It is not always easy to differentiate the uterine from the ovarian symptoms, such as menorrhagia, which might be ascribed to chronic inflammation of either organ.

Diagnosis.—This is seldom difficult. It involves the practice of the most elementary principles of gynecological examination. With the exercise of ordinary care every physician ought to be able to detect a prolapsed ovary, even if he has never felt one before. With the patient on the back, the examining finger is introduced into the vagina and determines first the position of the uterus—whether the fundus is anterior or posterior; in the former case the finger-tip is slipped backward over the cervix into the posterior fornix, where a body will be felt, generally on the left side, varying in size from an almond to an English walnut. It may slip away from the finger, or remain fixed; pressure upon it produces a peculiar, sickening pain, which may be intense and attended with the phenomena above described. If the uterus is retroverted or retroflexed, the ovary will be felt below, or a little to one side of it. If the posterior fornix is deep, or the ovary small and not completely prolapsed, it may be overlooked, even by an expert, especially if the patient is examined only upon the back. It is a good routine practice to explore the posterior cul-de-sac while the woman is in the left lateral post-

ure, as the perineum can be pushed upward at least half an inch, so that the finger reaches that additional distance along the posterior vaginal wall.

A prolapsed ovary may be mistaken for a mass of hardened feces, an inflammatory exudation, the fundus of a retroflexed uterus, or a small subperitoneal fibroid, and *vice versa*. Scybala, high up in the rectum, may closely simulate ovaries, and I do not regard the error as entirely inexcusable; it will be noticed that the former lie behind the uterus rather than to one side of it, and that if one of them is imprisoned between the finger-tip and the sacrum, it is soft and compressible, while an ovary either slips away, or pressure upon it causes the characteristic "ovarian" pain. But some displaced ovaries are remarkably insensitive, while nervous patients may complain of severe pain when the rectal wall is touched. A small pelvic abscess, or the remains of a former inflammation, may resemble an ovary. Palpation may cause pain, but it is rather of a sore, aching character; the enlargement is more diffuse than that of a prolapsed ovary, and the patient allows firmer pressure to be made upon it without flinching. The fundus of a retroflexed uterus is directly continuous with the cervix; the cautious use of the probe (*not the sound* at the first examination) will throw light upon the question. By placing the patient upon the hands and knees, or even in Sims's posture, the uterus may be replaced, when the tumor will disappear. A pedunculated subperitoneal fibroid must be distinguished from an ovary by its greater hardness and the absence of pain on pressure; when the fibroid growth is surrounded by recent peritonitic adhesions a differential diagnosis from the examination alone may be impossible. Several complicated conditions might be mentioned in which a positive opinion is withheld by the most experienced. Cystic degeneration of the displaced ovary, accompanying enlargement of the tube, etc., may complicate simple prolapse. The question of the diagnosis of salpingitis has been discussed elsewhere (vol. iii.), but I would simply add, in passing, that the daily experience of both the laparotomist and the pathologist proves that a small tumor behind, and a little to one side of, the uterus may be an enlarged ovary, or tube, or both, or—neither. The reader should bear in mind the possibility of anterior dislocation of the ovary, when the organ will be felt through the anterior fornix.

Prognosis.—As regards the displacement, simply as a displacement, the prognosis concerns the possibility of reposition of the ovary to its normal plane and its maintenance there. If the uterus is retroverted at the same time, and can be replaced, the prognosis for an ultimate cure is good; under any other circumstances I have no hesitation in saying that, in spite of the vast amount that has been written on this subject, gynecologists have not met with very flattering success in their attempts at curative treatment. A patient with a prolapsed, tender, immovable ovary offers a discouraging prospect to a specialist whose tendencies are not especially surgical. We may assure such a patient that with strict attention to hygienic measures, as well as with local treatment, she may improve in the course of a few months so that her life will become more bearable; but it would be either foolish or dishonest to promise her that her ovaries could ever be completely replaced. When the additional element of tubal disease is introduced, the prognosis becomes still more gloomy, because now the woman's life, in addition to her comfort, is in danger.

Treatment.—This is essentially local, and, unfortunately, the results are not particularly brilliant. If oöphoritis is present, that condition should receive due attention; a diseased ovary, when resting in Douglas's pouch, is, of course, more accessible to treatment than when it is higher up in the pelvis. Disturbing elements are to be eliminated as far as possible; the bowels must be moved daily by mild laxatives or enemata, the general health must be improved, and physiological rest must be maintained, especially at the menstrual periods. Sexual intercourse, if permitted at all, must be duly regulated; when the act is attended by severe pain and an increase in

the local tenderness, the physician will do well to see the patient's husband and to explain to him that without his co-operation treatment is almost useless. The bromides sometimes appear to exercise a happy sedative effect, while ergotin tends to relieve congestion if administered before and during the periods; Tait recommends highly a combination of the latter with the bromide and chlorate of potash, while Goodell administers one-twenty-fourth of a grain of corrosive sublimate with five grains of chloride of ammonium thrice daily.

As regards the local treatment, it may be stated briefly, that if a prolapsed ovary is movable it should be lifted out of harm's way by means of an appropriate pessary; if it is fixed, a fair trial should be made of palliative measures, such as hot vaginal injections, applications of iodine, galvanism, and the introduction of glycerin-tampons, before the last resort is tried—laparotomy. When the uterus is retroverted, the replacement of the organ is often sufficient, without any special appliance for keeping the ovaries in position; it is generally advisable to throw the fundus well forward, and to this end a sharp curve is given to the upper portion of the pessary, or the posterior cross-bar is made broad and thick (bulb-pessary), so as to distend the posterior fornix to its greatest extent, and thus to elevate the displaced organs. Unfortunately, the latter are often so sensitive that they will not tolerate the pressure of the cross-bar; the gynecologist is driven to his wit's end in such cases to devise some means of keeping up the ovaries without exercising direct pressure upon them. The rectum and sacral nerves may also resent continued pressure. The cross-bar, or the entire instrument, may be made of soft rubber, or an air-cushion or Gariel pessary may be introduced with advantage; we thus lessen the pressure, but at the expense of the actual supporting-power, since soft-rubber pessaries soon lose their shape. Sometimes a hard-rubber instrument may be moulded in such a way that there is an indentation at the point where it is liable to press upon the ovary. By this simple expedient a patient is enabled to wear an ordinary bulb-pessary, after she has tried every variety of supporter in vain, while the attendant who succeeds in overcoming the difficulty will receive no little credit. In some cases it is impossible to keep the ovaries elevated, even when the uterus is in position. They descend behind the cross-bar and are nipped between it and the rectum. The remedy is sometimes so much worse than the disease that patients prefer to endure the distress occasioned by retroflexion and prolapsed ovaries rather than wear an instrument. Dr. Campbell's method of pneumatic reposition of the displaced organs, by placing the patient in the knee-chest position and opening the vagina to allow the air to distend it, may be applied with advantage to cases in which the ovaries are freely movable. By repeating this manoeuvre, at least twice daily, the strain upon the relaxed ligaments and vessels is relieved, so that the latter tend to recover their tone, while the patient experiences a decided amelioration of her symptoms. A firm tamponade is another temporary expedient for elevating prolapsed ovaries, in the hope that they may eventually remain out of harm's way; the advantages of the cotton tampon is that it accomplishes the same result as a pessary without exerting the same painful pressure. Bozeman's method of packing, or "columning," the vagina, with the patient in the knee-chest position, offers superior advantages, since it includes the two elements—pneumatic reposition and firm, continued pressure.

The Weir Mitchell rest-cure is another indirect method of treatment in these cases, for the details of which the reader is referred to that author's works. In a certain proportion of cases of prolapsed ovaries the question of operative treatment will naturally arise. The reader will be governed by the urgency of the symptoms, the solicitations of the patient, and by his own conscience. Remembering that a *movable* prolapsed ovary is always susceptible to palliative treatment, the general practitioner (who will generally be found on the side of conservatism) will be slow to recommend a radical operation; when the organ is *fixed*, it is another matter, as we shall see. An in-

genious operation has been devised, and successfully performed, by Dr. Imlach, of Liverpool; it is, in effect, a bold application of the process of shortening the round ligaments for the cure of uterine displacement. Oöphor-rhaphy, as it is termed, consists in opening the abdomen, shortening the relaxed infundibulo-pelvic ligament, and suturing it anew to the hilum of the prolapsed ovary, which is thus maintained in its normal position. While the displacement is thus corrected, no guarantee is offered that the organ will remain permanently elevated, nor is there reason to believe that it will be cured if actually diseased. Few operators at the present day would possess sufficient self-restraint to stop short of actual extirpation.

When an ovary has become fixed in an abnormal position as the result of peritonitis, the prospects of success from palliative treatment are not very encouraging. The gynaecologist whose tendencies are non-surgical must acknowledge that his resources are as crude as they are limited. Two indications are clearly present—to raise the prolapsed organ and to diminish its tenderness. The first will be accomplished (if it can be accomplished at all) by a persistent, systematic use of the tampon, the latter by hot vaginal injections, local applications to the fornix, and cotton soaked in some emollient. Electricity, it should be emphasized, is a valuable adjuvant; local massage is, from the nature of the case, practically out of the question. The following brief outline of the *palliative* treatment in a supposed case of prolapsed ovary which is adherent at the bottom of Douglas's pouch, is suggested for the benefit of the general practitioner. Explain the patient's exact condition to her at the outset, giving an extremely guarded prognosis, and causing her to understand that her treatment is to be an affair of months, not of weeks. In order to fortify yourself, it may be well to state to her frankly that she might consult many of your colleagues who would advise an immediate operation, but that you wish to make a fair trial of less heroic means first. Do not promise a *cure*, but a probable relief of the distressing symptoms. If the woman will not consent to receive treatment at least twice a week, it will not benefit materially either the patient or your own reputation; if conservative gynaecology is to hold its own at all against operative, it must have a fair trial. Having given due attention to the patient's general condition as regards the treatment of anaemia, gastric troubles, constipation, etc., the correction of bad habits (especially the habitual use of stimulants and narcotics), caution her against such things as might aggravate her local trouble, chief among which are immoderate indulgence in sexual intercourse and over-exertion, especially at the monthly period. Insist upon the employment of a copious hot vaginal douche twice daily, observing all the details upon the importance of which Dr. Emmet lays so much stress. Supposing the patient to visit your office twice a week, paint her posterior vaginal fornix with tincture of iodine or equal parts of the latter and tincture of aconite root, and then apply a tampon of absorbent-cotton soaked in pure glycerin, tincture of iodine, tannin, chloral and glycerin (gr. xx. to $\frac{5}{8}$ j.), or boro-glyceride, after which pack the vagina with balls of cotton, so disposed that they fill the posterior pouch and exert firm, even, and continuous pressure upon the prolapsed ovary. By placing the patient in the knee-chest position, not only is the vagina thoroughly distended so that each tampon may be placed exactly in its proper place, but the physician can work without the aid of a nurse. Once a week, or twice, if possible, pass a mild galvanic current (best measured by a galvanometer) through the affected ovary, the negative pole being a flat sponge placed over the corresponding inguinal region—the positive, a ball-electrode inserted into the posterior fornix (at the site of the prolapsed organ); begin with a *séance* of ten or fifteen minutes and prolong it gradually to half an hour. A blister applied over the ovarian regions at intervals of two or three weeks may be of some benefit. If the local tenderness is sufficiently lessened to allow it, before making the application to the vault, insert one or two fingers and make steady pressure

upon the prolapsed organ, with the view of raising it towards its normal plane. Since there may be an undetected pyosalpinx attached to the ovary, this manipulation is not to be generally recommended. You have now begun a line of treatment which aims to meet the indications simply and rationally. Encourage the patient to persist with it for at least six months before entertaining seriously the question of laparotomy. Unsatisfactory as this treatment may appear, it is not by any means to be despised. Every gynaecologist has met with cases in which an enlarged and prolapsed organ, tender as the ball of the eye, lying immovable at the bottom of Douglas's pouch, the seat of intolerable neuralgia, has been sensibly diminished in size, and has been elevated in the pelvis until it could barely be felt by the examining finger, while the woman, before an invalid, was able to walk about comfortably—all this as the result of patient routine treatment. Doubtless this measure of success is the exception, but it is well to rid ourselves of the idea that for prolapse of the ovary with fixation there is no possible relief except in extirpation of the offending organ. As to the indications for this *dernier ressort*, these will be considered more properly under the treatment of oöphoritis, although they have essentially been described already. It may be added, in this connection, that vaginal oöphorectomy was formerly considered as specially applicable to this class of cases; but the results have not justified the hopes of its originators. To remove an ovary through a small incision in the fornix the operator must work in the dark; he cannot be sure that his pedicle has been properly secured, and the drainage is often defective.

3. *Functional Affections of the Ovary; Ovarian Neuralgia.*—By reason of the inherent difficulties of the subject, this chapter of ovarian pathology is necessarily brief and unsatisfactory. Some authorities deny the existence of a purely functional nervous affection of the ovary, referring all the local and reflex neuralgiae in this region to actual disease of the organ, while others go to the other extreme and make the diagnosis "ovaralgie" an excuse for non-interference in cases in which an operation is clearly indicated. In the lack of positive evidence, a middle course should be adopted. It is to be hoped that the solution of the problem will not be left entirely to gynaecologists, since neurologists might throw much light upon it if they bestowed on it the study which its importance warrants. Whether the neuralgic pains referred to diseased glands and to those which present no morbid appearances are the same in character or not, whether they are to be referred primarily to an irritation of the intra-ovarian nerve-filaments, or to the compression of larger branches by the adhesions resulting from former peri-oöphoritis, it is, of course, impossible to affirm, without indulging in pure speculation. There are unquestionably forms of pelvic nerve-pain which are mistaken for ovaralgie; with greater refinement in diagnosis we shall, doubtless, be able to discriminate between the cases which will be benefited by laparotomy and those in which it is hopeless to expect a cure by extirpation of the appendages. No reference is made to the existence of actual disease in this connection.

Assuming, then, after this long preamble, that ovarian neuralgia is a neuralgia referred to the nerve-plexuses in or near the ovary, we shall regard it here, *not* as symptomatic of oöphoritis or peri-oöphoritis, but as an affection *per se*, and as such deserving special treatment.

Etiology.—Oöphoralgie is a frequent accompaniment of hysteria, when it is often associated with other visceral neuroses—intercostal neuralgia, headache, etc. But it may also be the expression of a general neuralgic condition, as in the case of a patient whose nerve-pains are intimately related to changes in the weather; sometimes these take the form of facial or occipital neuralgia, sometimes of brachial or crural, while occasionally the pain is referred to the ovarian region. Pain in the region of the ovary may be entirely of a reflex character, referable to some affection of the uterus, such as laceration or malignant disease of the cervix. From the preliminary remarks on the anatomical relations of the ovary, it will be inferred that its nerves are liable to be directly

affected by displacement or disease in neighboring organs; this is borne out practically by the fact that the *left* ovary is most frequently the seat of pain. The periodical congestion of the glands at the monthly periods is an important etiological factor, producing, as it does, symptoms which have been described, rightly or wrongly, as constituting "neuralgic dysmenorrhœa." Priestley's "intermenstrual dysmenorrhœa" may be another expression of the same ovarian pain. To summarize—oöphoralgia may be due to local, general, or reflex causes.

Anatomy.—Theoretically, in pure ovarialgia the ovary should be nearly, or quite normal, but until we can define strictly the extent to which the structure of the organ can vary from the type described in the books without being regarded as the seat of disease, we must use this term with caution. Circumscribed indurations of the cortex or stroma, insignificant as they may appear anatomically, may, by reason of pressure on included nerve-filaments, occasion an amount of pain entirely out of proportion to the actual disease.

Clinical History.—It is unnecessary to describe the protean collection of symptoms included under the name hysteria, since we are concerned with only one of them. The patient will complain of a darting or boring pain, generally in the left groin, sometimes in both; it is more apt to be confined to the abdomen; pain in the hip and sacrum being significant rather of prolapsed ovary. The corresponding crural nerve may be affected, and not seldom mastodynia is present also. The suddenness of its onset, its agonizing character and intermittency, as well as the simultaneous occurrence of other neuralgic, will lead the physician to think that he has probably to do with a purely neurotic affection. If, in addition, hysterical manifestations (hemi-anæsthesia or hyperæsthesia of the corresponding side) are present, which are aggravated by deep pressure over the ovarian region, the suspicion will be confirmed—in the absence of positive evidences of disease on local examination.

Diagnosis.—This turns entirely upon the result of the physical examination; hence it is unnecessary to say that this should be *thorough*, since it may involve the performance of a grave operation. Do not be satisfied with a hasty bimanual examination, but look the patient over from head to foot. The most eminent consultant in general medicine would not stake his reputation on a diagnosis in an obscure case until he had interrogated every organ in the body—is the gynecologist less fallible, or is his art so much simpler, that he can decide the most weighty questions without a moment's hesitation and merely by the introduction of his finger? Examine the pelvis carefully and systematically, noting the presence of abnormalities, not only in the genital tract but in the urinary system and rectum, employing anæsthesia if necessary. Note carefully the effect of deep pressure in the inguinal region to which the pain is referred. Olshausen's hint regarding differential diagnosis is a useful one in hysterical cases, viz., that pressure upon a tender, diseased ovary causes a woman to wince and to give a cry of pain, while palpation over an organ which is simply irritable occasions strong contraction of the abdominal muscles, with general symptoms, or even convulsions. In cases of pure oöphoralgia not attendant upon hysteria, deep pressure may be borne without increase of the local pain. The vaginal fornix having been carefully explored with the view of detecting a prolapsed ovary, the attendant may think that his task is at an end. But the importance of the case demands further search. Anæsthetize the patient and repeat the examination, for an ovary may be considerably enlarged and yet it may not be felt through the vagina. In a thin subject, whose abdominal walls are thoroughly relaxed by an anæsthetic, any marked abnormality will be detected. If necessary, the rectal, or even the vesical, touch may be employed, with or without simultaneous traction on the uterus. During this thorough exploration of the pelvis other obscure causes of nerve-pain will be eliminated; among these may be mentioned indurations in the broad or utero-sacral ligaments, small pelvic abscesses, tumors, disease of the pelvic bones, etc. The detection of actual inflammation of

the pelvic nerves or vessels lies, of course, beyond the scope of the bimanual touch.

Comparing the patient's history (especially as to the absence of former ovarian disease or pelvic peritonitis) and subjective symptoms with the negative results of the physical examination, the physician is warranted in assuming that she is the subject of ovarian neuralgia, with the reservation that this may be merely symptomatic of some organic trouble that has escaped his *tactus eruditus*.

Prognosis.—This is doubtful, since there is always a certain amount of uncertainty with regard to the cause of the pain. If not a symptom of organic disease within the pelvis, oöphoralgia may disappear as suddenly as it came, only to return at rare intervals. Sometimes it seems to be subject to the same conditions as other neuralgia—changes of the weather, general impairment of nutrition, etc. If the patient is a subject of neuralgia (hereditary or acquired), the prognosis is less favorable. As a symptom of hysteria, ovarian irritation is not usually permanent, but may come and go like the other phenomena peculiar to the condition. Recurring dysmenorrhœa of an ovarian type, especially if it increases in severity, should awaken the suspicion of organic disease, and render the prognosis less favorable.

Treatment.—The treatment of hysteria would be out of place here. As regards the alleviation of the pain in the ovarian region, it may be said that the internal medication is the same as in ordinary neuralgia, while the local treatment is that suitable to disease of the pelvic organs, the main object of which is to allay or prevent excessive congestion. Hot vaginal douches may give some relief, while blisters, cups, etc., are not to be despised. As the affected ovary (or its environs) is not accessible to treatment from the side of the vagina, the surface of the abdomen immediately over the tender spot must be utilized. The most valuable agent is electricity. Place a large, flat sponge, connected with the negative pole, over the sacrum and a sponge-electrode over the ovarian region, and pass a moderate constant current for from fifteen to thirty minutes, gradually increasing its strength according as the patient can tolerate it. The object is not to *cause* pain but to *relieve* it; hence the necessity of discrimination in the use of this agent. The dosage should be regulated by a galvanometer. The séance should be repeated at intervals of two or three days, and the treatment should be continued for months, if need be, before the attendant ventures to suggest laparotomy.

Removal of the normal or slightly diseased ovaries for the relief of *pain* alone—excluding all other indications for oöphorectomy—is, in most instances, a purely experimental operation, and should be distinctly regarded as such. It will be evident to anyone who takes the trouble to keep under observation for a few years a number of women whose ovaries have been removed for the relief of constant pain, aggravated at the time of the menstrual flow, that a certain proportion of them will not fail to bear sad testimony to the fact that, although they do not menstruate any longer, the old pain persists.

4. **Inflammation of the Ovary.**—Under this head may be included hyperæmia, and acute and chronic oöphoritis.

(a) **Hyperæmia.** It is customary to preface a chapter on the inflammation of an organ with a short description of the pre-inflammatory stage known as hyperæmia—an excess in the normal blood-supply. If the determination of this excess after death in a highly vascular organ, such as the lung or brain, calls for careful discrimination on the part of the pathologist, it may be supposed that the difficulty is still greater in the case of the ovary, which is subject periodically to an engorgement that, in any other organ, would be legitimately regarded as pathological. One of the immediate consequences of excessive congestion is rupture of a blood-vessel and hæmorrhage, either circumscribed (follicular), or more extended (into the stroma).

Etiology.—Pathological hyperæmia of the ovary is doubtless, as a rule, simply an increase of the normal monthly engorgement, consequent upon an obstruction to the venous circulation from local or general causes.

The delicate adjustment between the afflux and efflux of blood may be disturbed by numerous mechanical causes, prominent among which are compression of the vessels by surrounding adhesions, displacements of the pelvic organs, morbid growths, etc. Chronic oöphoritis is at once a cause and a result of hyperæmia. Any causes which determine a frequent and sudden flow of blood to the gland during the intermenstrual period (prolonged sexual excitement, violent or excessive intercourse, etc.) also favor this condition. It may be inferred that masturbation must exert a most pernicious influence in this direction.

Anatomy.—The following is a brief description of an ovary which I regarded as hyperæmic. Immediately after its removal by laparotomy it was slightly above the average size, well-rounded, of an elastic, almost fluctuating feel, and a purple-red color. On median section its cut surfaces presented a moist appearance and a deep pinkish hue, while the blood-vessels stood out with unusual distinctness, like the *stellula Verheyntii* on the surface of a congested kidney. Further examination of the stroma showed that it was in a quasi-œdematous state, similar to that sometimes observed in a soft, fibro-myxoma. A comparison between the organ and a so-called "wet brain" suggested itself, and it seemed as if there might be some similarity in the etiological factors in the two cases. The information afforded by a microscopical examination was rather negative; there were evidences of vascular dilatation, both in the lymphatic and blood-systems, and a few extra-mural collections of corpuscles, such as might have been found in any other vascular organ under similar conditions, but the impression left by the entire examination was that, after all, it was doubtful whether the ovary presented any external or internal evidences of engorgement more marked than would have attended the ordinary menstrual nîsus.

Clinical History.—Mr. Tait, with his accustomed felicity of expression, says: "Ovarian hyperæmia is the result of an over-sufficient, and generally precocious, ovarian activity . . . it is invariably well-marked in its history, the chief detail of which will generally be found to be *menorrhagia*." It is obvious that a young girl, whose ovaries are thus over-active, is liable to have chronic ovaritis, which may render her an invalid for life. It is doubtful if pure ovarian hyperæmia can ever be positively diagnosed, except by inference, as associated with general pelvic engorgement. There are no symptoms sufficiently characteristic to distinguish the temporary condition from actual disease of the gland. When a young girl, especially one of an ardent temperament, who is free from pain in the intermenstrual period, suffers every month with throbbing pain in the ovarian regions, which are tender on deep pressure, accompanied by a profuse flow, it may be inferred that the ovaries are subject to excessive congestion; or a delicate young woman, with no previous history of pelvic trouble, soon after her marriage to a vigorous husband develops the same general symptoms—pain in the region of the ovaries, especially marked during the menstrual flow, which has become excessive, dyspareunia, and even hæmorrhage after each repetition of the sexual act. In the latter case, as in that of young prostitutes, who indulge in frequent and violent intercourse, hyperæmia "passes insensibly into chronic ovaritis."

Diagnosis.—This will be supported by the history of the patient, the principal facts being the ovarian pain at the menstrual epoch and its absence, or remission, during the interval, and the evidence of general pelvic engorgement afforded by the profuse flow. Age, temperament, physical condition, habits, environment, etc., should be duly considered. The result of a local examination is often either negative or doubtful; abnormal conditions of the uterus or its surroundings may be found, sufficient to account for the supposed ovarian trouble. For obvious reasons it is seldom possible to make a thorough examination at the time when the condition of the ovaries is most interesting from a diagnostic point of view, *i. e.*, during menstruation.

Prognosis.—It is especially favorable in the case of

young girls, provided that they are not neglected too long after the menstrual function has become regularly established. In married women the prospect is less encouraging, because of the disturbing influences to which they are exposed and the difficulty of obtaining perfect physiological rest for them. In some instances pregnancy exercises a curative action, but more often the lesions resulting from parturition (laceration of the cervix and consequent subinvolution) tend to aggravate the existing congestion. The history of many cases of chronic oöphoritis shows conclusively that periodical hyperæmia formed the starting-point for the organic changes.

Treatment.—Although this varies with the age and condition of the patient, it is essentially hygienic. The first object to be aimed at is to ascertain the true cause of the ovarian disturbance. If the patient is immature, great care should be exercised that her mind is not cultivated at the expense of her body; during the early months of puberty she should not be confined in school all day, but her hours of study should be shortened, if not abolished entirely, and she should take plenty of out-of-door exercise. While her general health is to be carefully attended to, particular care must be taken to eliminate every source of sexual excitement, such as might be found in improper books, plays, society, late hours, etc. Delicate as the subject may be, the physician should not neglect to inform himself regarding the practice of vicious habits by his little patient. Masturbation is at the bottom of many puzzling manifestations of hyperexcitability in children, male and female, which are vaguely ascribed to "nervousness." Treatment directed to the pelvic organs is mainly expectant. Insist on perfect rest in bed before and during the menstrual flow. Ergot or *hydrastis canadensis*, may be given for the menorrhagia, the bromides to allay ovarian irritation. A fly-blister over the tender ovary will be beneficial. Local treatment at this stage, other than the use of hot injections in exceptional cases, is not to be thought of; it would not only be useless, but harmful. Arsenic and strychnine are more useful than iron as general tonics. Ovarian hyperæmia in an unmarried female who has reached maturity is frequently an expression (though unknown to her) of ungratified sexual instincts; for such women matrimony is a natural relief, and should be recommended, provided that no local disease is present which would be aggravated by that condition. If marriage is impossible, a moral cure must be attempted. The patient should be encouraged to sink the emotional side of her nature in the practical, to go into society, to interest herself in anything and everything outside of herself. Medication is of secondary importance, moral suasion being the main agent to be employed.

For the third class, or married women, the object aimed at is in effect the same—the elimination of all influences which favor pelvic congestion. Such patients are treated most successfully in private institutions, rather than at their own homes, since the suspension of marital relations and entire freedom from domestic care are absolutely necessary. The treatment is essentially that of ovaritis; indeed, in most of these women who apply for relief the pre-inflammatory stage has already been passed.

Hæmorrhage into the ovary is a condition which possesses more of a pathological than a clinical interest, so that we need not consider upon it here.

(b) *Acute Oöphoritis*. Acute inflammation of the ovary presents variations both in its extent and in its intensity. It may be confined to a few of the peripheral ovisacs and their neighborhood, or may involve the entire stroma; it may be represented merely by an excessive hyperæmia, with resulting serous effusion, or may culminate in general necrosis of the tissue.

Peri-oöphoritis, or inflammation of the peritoneum in the immediate vicinity of the ovary, is sometimes described as if it were a separate disease. It is simply a localized peritonitis, sometimes of primary origin, but more often secondary to disease of the appendages, especially of the Fallopian tubes.

Etiology.—"Acute inflammation of the ovary," according to Professor Goodell, "rarely exists *per se*, but

it is by no means an infrequent accompaniment of pelvic peritonitis and pelvic cellulitis, the cause of each being the same." Doubtless many cases of acute primary oöphoritis fail to be recognized, because the symptoms are masked during the height of the disease, which either rapidly subsides or passes into the subacute or chronic form.

The ovary may become inflamed from either external or internal causes; in short, the inflammatory process may be, so to speak, centripetal (secondary to inflammation of the tube or peritoneum) or centrifugal (beginning in the interior of the organ and extending outward). By grouping all of the causes under these two general heads, the question of etiology will be greatly simplified. Thus Tait refers acute oöphoritis to four conditions—direct injury, gonorrhoeal infection, puerperal sepsis, and acute exanthemata (including rheumatism); the first two may be regarded as external, the last two as internal, causes. As Olshausen suggests, gonorrhoeal poison, transmitted through the uterus and tubes, is only indirectly the cause of oöphoritis, since it gives rise to peri-oöphoritis, the ovary being affected secondarily. Inflammation of the follicles is not rare in acute febrile diseases, septicæmia, phosphorus-poisoning, etc., under conditions in which general destruction of the glandular organs is observed. General interstitial inflammation of the ovary is declared by most writers on gynecology to be exceedingly rare outside of the puerperal state. Increased opportunities for studying diseased ovaries during the past few years, afforded by the frequency of laparotomies, have led to some modification of this opinion. In my experience it is not unique to find an abscess of the ovary associated with pyosalpinx.

Strangely enough, cold, sudden suppression of the menses, and other causes of pelvic congestion, are regarded by Olshausen as rarely accountable for acute oöphoritis; considering the uncertain boundary which separates intense hyperæmia from inflammation, we should certainly expect to meet with transitory forms of the disease as the result of such accidents. Sexual excesses must sometimes produce disturbances in the delicate organ more serious than simple congestion.

Gross Anatomy.—An ovary which is the seat of follicular inflammation does not usually show any marked changes macroscopically; in fact, the deviations from the normal may only be detected by the microscope. Enlargement of the organ is often inappreciable. In the lesser forms of the affection the contents of a few of the more peripheral primordial follicles may appear turbid; the older ovisacs may be affected later, and finally, the stroma immediately surrounding them, as shown by the rings of congestion. In interstitial oöphoritis the gross appearances are quite different. The ovary may be enlarged to several times its normal size, and have a soft or fluctuating feel (abscess). On section the picture varies with the intensity of the inflammatory process, from the congested and œdematous appearance described under Hyperæmia to the general disintegration in so-called *putrescentia ovarii*. Yellowish streaks of pus may be seen crossing the field or forming minute collections in the midst of the stroma, while here and there are small extravasations of blood. Finally, in the worst forms of oöphoritis, one or more abscesses, as large as marbles, containing a brownish, acrid fluid, may be present, or the entire organ may be transformed into a foul, sloughing mass which breaks down under the touch. It is hardly necessary to add that in such general inflammations of the stroma the ovisacs do not escape, but undergo changes similar to those in follicular oöphoritis.

Minute Anatomy.—The epithelium of an inflamed vesicle undergoes cloudy swelling and granular degeneration; the turbid, puriform appearance of the *liquor folliculi* is due to the presence in it of numbers of these cast-off epithelial cells. The contents of the ovum undergo a similar change, while the germinal vesicle disappears. Sections of an ovary which is the seat of acute interstitial inflammation show general stasis and vascular dilatation, small extravasations, and an irregular distribution of leucocytes throughout the stroma, with occasional

collections of such cells in the interspaces—in short, the ordinary appearances seen in inflamed connective or fibro-muscular tissue.

Clinical History.—Authorities agree in affirming that acute oöphoritis presents no characteristic symptoms by which it can be distinguished from a localized peritonitis. When we consider the frequent association of tubal and ovarian disease, the subject becomes still further complicated. Acute interstitial inflammation, especially when resulting in abscess-formation, might present such phenomena as the following: A young woman during menstruation is suddenly seized with violent shooting pains in one iliac fossa (usually the left), extending through to the loins, while the flow is suppressed. The pain is of the peculiar agonizing character which has already been described as "ovarian," and although it may seem to be identical with that caused by localized peritonitis, it is apt to be attended with those reflex neuroses (pelvic, mammary, etc.) which so often accompany affections of the ovary. The patient lies on her back, with the knee drawn up on the affected side, the abdomen moderately distended, and the facies expressive of the most acute suffering. The lightest pressure over the seat of pain is resented, as shown by the instant rigidity of the abdominal muscles. Micturition and defecation are impossible, or extremely painful. It is evident that the pressure of the rectal contents against an ovary which is acutely inflamed will give rise to excruciating agony such as would not be observed in simple peritonitis. Note the presence of pain in the corresponding *breast* and *leg*, as a point of importance. The pulse and temperature present the usual characteristics of pelvic peritonitis; in fact, the reader will recognize the symptoms mentioned as fairly typical of the latter condition. The peritonitis may be limited to the region of the ovary (peri-oöphoritis) and may rapidly subside, so that the patient is convalescent within a week; indeed, it is very common to find, on questioning women with evidences of localized peritonitis, that they have had several attacks which were, however, of such short duration that they will deny that they have ever had "inflammation of the bowels," and will only recall certain occasions when they were obliged to remain in bed for a few days at the time of the monthly period and suffered with severe pains in the abdomen, tympanites, etc.

According as the oöphoritis or the peri-oöphoritis is the predominating inflammation, the subsequent history of this hypothetical case will be that of general peritonitis or pelvic abscess; in short, the peri-oöphoritis may lead to a general inflammation of the peritoneum, or the ovary may suppurate and become an abscess, which may discharge its contents into the rectum, bladder, or vagina, or may undergo caseation and gradually disappear.

A peculiar phenomenon, rarely observed, is the alternation of acute oöphoritis with parotitis, analogous to the sympathetic inflammation of the testicle in mumps; as the swelling in one gland subsides, the other becomes affected, so that both may suppurate. The value of this curious complication in connection with the diagnosis of suspected ovarian disease is evident.

The vagueness of the foregoing description is painfully apparent. No attempt has been made to distinguish symptoms referable to tubal disease, since this would only have added to the difficulty of the subject; for this reason no mention has been made of those recurrent attacks of ovarian inflammation which seem to be of gonorrhoeal origin, because the tubes really bear the brunt of the specific poison and are more liable to such recurrences. The reader will infer that it is only in exceptional cases (especially in pyæmia) in which the ovary seems to be primarily affected that the accompanying peritonitis does not obscure the evidences of oöphoritis.

Diagnosis.—One point in the clinical history has been emphasized as affording a clue to the seat of the inflammation—the *pain*. Its location is not absolutely pathognomonic, although it is commonly so regarded; but the character of the pain (sharp and stabbing), its sudden onset, the infra-mammary neuralgiæ which accompany it, the absence of any definite signs of peritonitis at the outset—

these should direct us to the ovary as the probable seat of the trouble. But, if we do not see the patient until either well-marked peritonitis or abscess-formation has obscured the original condition, we can hardly hope to make a positive diagnosis.

The peri-oöphoritis which obscures the subjective symptoms renders the physical examination extremely difficult and unsatisfactory, at least during the height of the inflammation. There is, practically speaking, no necessity for the general practitioner to establish definitely the presence of ovarian inflammation, since the treatment will not be modified by the greater accuracy of the diagnosis. But if the surgeon desires to gain precise information with a view to performing laparotomy, the patient must be examined under ether. The case with which the pelvis can be explored during an attack of acute peritonitis is often described, but is seldom realized at the bedside when we attempt to practise the bimanual method with the abdomen either rigid or tympanitic. In a favorable case, having placed the patient on the side, gently insert the right index-finger into the hot, dry vagina and explore the posterior and lateral pouches. Behind, and generally to the left of, the uterus will be felt a rounded body, apparently as large as an English walnut, extremely tender to the touch, and either fixed or but slightly movable; it may be possible to detect in it an obscure fluctuation. A rectal examination sometimes furnishes valuable information. An ovarian abscess of the ordinary size (not larger than an orange) will present the same sensation to the examining finger as a small cyst, the clinical history and the symptoms of acute suppuration indicating that its contents are purulent. The differential diagnosis between acute oöphoritis and salpingitis is only interesting to the specialist, and even by him it often cannot be made positively. In general, it may be said that the former is an acute, the latter a subacute inflammation; moreover, the latter is apt to be recurrent, while acute oöphoritis tends to terminate by suppuration, or to pass rapidly into the chronic stage; subsequent attacks of inflammation, if they occur, being due rather to the lighting up of a slumbering peri-oöphoritis, than to the renewal of active trouble in the interior of the ovary. The relation between tubal disease and recurrent peritonitis has already been remarked. There are doubtless cases in which we can affirm positively, from the peculiarly elongated, tortuous shape of a retro-uterine tumor, felt *per vaginam*, that it is an enlarged tube; but quite as often it is impossible to determine, from the shape, whether the mass is an enlarged ovary, or tube, or both combined. Again, the question may arise as to whether a fluctuating tumor occupying the site of the ovary is a true ovarian abscess or a suppurating cyst, especially a dermoid cyst. If an enlargement was known to exist *before* the advent of the acute symptoms, the diagnosis is easy; otherwise, it would turn upon the sudden development of the inflammatory process in oöphoritis as compared with the subacute inflammation within a pre-existing cyst. It will at once occur to the reader that it must be very difficult to differentiate between a small pelvic abscess and one confined to the ovary. Here a careful vaginal examination is most important. Both enlargements give a sensation of fluctuation, but the ovarian tumor is rounded, quite sharply defined, and often movable, with more of an elastic feel, while the pelvic abscess is seldom circumscribed, but shades off gradually into the surrounding indurated tissue. It is either perfectly fixed, or moves only as the uterus and vaginal fornix are elevated; the latter, it may be added, bears a close relation to a pelvic abscess. The walls of the latter being thicker than the capsule of a suppurating ovary, it has a doughy, rather than an elastic, feel. Small inflammatory foci in the broad ligaments, however, are not so readily distinguished. After either abscess attains a large size, the most acute diagnostician, unless he had watched its progress from the outset, would hardly pretend to decide whether it originated in a tube, in an ovary, or in the cellular tissue. The aspirator sometimes throws light upon a doubtful diagnosis. When a fluctuating tumor is accessible through the posterior fornix a long *aseptic* needle may be

introduced into it, and a few drops of fluid withdrawn by the hypodermic syringe for microscopical examination.

An *ex post facto* proof, as it were, that an acute attack such as we have described was really oöphoritis, is afforded by the subsequent history of the patient. If she presents the symptoms and physical signs of chronic ovarian disease in the gland formerly affected, it may be assumed that she did have acute oöphoritis, which has terminated, not in suppuration, but in a cirrhotic condition, to be described later.

Prognosis.—This should always be guarded, since, although the patient may recover from the acute attack, her ovary has been permanently crippled and will inevitably give rise to future trouble. Even if the gland itself has only been "scorched," as Dr. Emmet expresses it, by the surrounding peritonitis, the latter inflammation results in the formation of adhesions which fix the organ (often in an abnormal position) and make it eventually the source of misery to its possessor. Acute inflammation of the ovary is always a grave affection, which may speedily reach a fatal termination through general peritonitis—secondary to peri-oöphoritis or to the rupture of an abscess, the former being the principal danger in non-puerperal oöphoritis. In looking over the reports of cases of suppurative inflammation of the ovary, one is struck with the frequency with which the abscess ruptured into the peritoneal cavity; this is probably due to the fact that, unless it is of large size, it does not come into such direct relation with any of the channels through which the contents of a pelvic abscess usually find exit (rectum, bladder, vagina, etc.). The rectum is the most common seat of perforation. Many cases have been reported in which the contents of ovarian abscesses were absorbed, their sites being subsequently marked by caseous masses or cicatrices. Death may result from chronic septic poisoning either before or, more often, after the abscess has ruptured externally.

What future shall we prophesy for a woman who has recovered from an attack of acute ovarian or peri-ovarian inflammation, with or without suppuration? We certainly cannot truthfully promise her freedom from future trouble; on the contrary, she has within her pelvis the smouldering embers of a fire that may at any time be easily fanned into a flame. She will be reminded every month, if not more frequently, that her ovaries are not what they should be. Sterility is the usual result if both ovaries are affected.

Treatment.—This is essentially the same as that employed in pelvic para- and peri-metritis. Absolute rest on the back must be insisted on; the patient will be made most comfortable by bending her knees and placing a pillow beneath them. Blistering the skin over the iliac fossae is the routine treatment, but what possible good this can accomplish it is difficult to discover, while it adds materially to the patient's discomfort. Hot flax-seed poultices, renewed as soon as they become cold, with three or more copious vaginal injections of hot water daily, certainly give relief and possibly reduce, to some extent, the general pelvic congestion. Leeches may be used, also vaginal poultices, consisting of small bags filled with flaxseed meal, poppy-leaves, etc. Morphine should be given hypodermatically in sufficient doses to relieve pain; antipyrine or quinine, with the abdominal ice-coil, are indicated if the temperature runs above 102° F. It has sometimes seemed to the writer as if a peritonitis could be prevented from extending above the pelvis by the early and persistent application of cold to the abdomen. After suppuration has begun this agent is of course useful only as an antipyretic, and the ice-cap may be employed then instead, if preferred. Liquid diet is preferable, especially milk, and stimulants should be given only when the necessity is indicated by the pulse. The bowels may be moved by enemata at intervals of a few days, unless the tympanites is excessive, when we should insure the patency of the canal by the early use of turpentine injections. Evidences of abscess-formation should be anxiously watched for, and when pus is present it should be withdrawn by the aspirator-needle introduced into the sac through the vaginal roof. After the evacuation of its

contents the cavity should be thoroughly irrigated with an antiseptic solution.

It will naturally occur to the reader to ask if this is all. Shall we rest content with simply treating the symptoms, or does not modern surgery offer a bolder method of striking at the root of the trouble? The following quotation from the eminent Birmingham surgeon indicates the tendency of laparotomists: "In the event of the attack appearing to threaten the life of any patient under my care, I would not hesitate to open the abdomen, cleanse out the cavity, and possibly remove the diseased organs. When an ovarian tumor is gangrenous or suppurating, we serve the patient by promptly removing it, and I do not see why this principle should not be extended. The result of the disease is nearly always to destroy the functions of the glands, and, therefore, in prospect of a fatal issue of the disease, the argument against an operation, that it will unsex the patient, need not be considered."

(c) *Chronic Oöphoritis*. It is difficult to define this condition without describing it as at once a cause and an effect—an inflammatory process and an anatomical change in the structure of the gland. It is rather an "end-process" (to use a Germanism), a condition of the ovary resulting from acute or subacute inflammation, characterized anatomically by an overgrowth of fibrous tissue, at the expense of the normal stroma, with or without enlargement of the ovisacs. Either cirrhosis, with resulting atrophy, fibroid enlargement, or cystic degeneration, may be the predominating change.

Etiology.—Dr. Goodell refers to chronic oöphoritis as "a very common form of disease, very rarely coming from an acute attack, but starting subacutely, with all the symptoms of chronicity." Olshausen expresses substantially the same opinion, with the qualification, however, that "perhaps the acute oöphoritis was latent." Fontana in one hundred and forty-five cases traced the chronic changes to a previous acute inflammation in thirteen per cent. While we may seldom succeed in obtaining a clear history of acute ovarian or peri-ovarian inflammation, it does not follow that the sequence is so rare as Dr. Goodell affirms. The fact that Tait regards cirrhosis as a "sequela of exanthemata and rheumatic fever" in early life, indicates that his wide experience has led him to a similar conclusion. Subacute or chronic inflammation of the ovary is essentially the result of persistent hyperæmia, the causes of which have already been mentioned. As regards its frequency, different observers have noted its occurrence in from 1 to 4.75 per cent. of all pelvic affections. Fifty-eight per cent. of the patients are between the ages of twenty and thirty years, the majority being young married women, although the unmarried form no inconsiderable proportion of the sufferers. Among the former it is only necessary to mention the influence of sterility (especially when self-induced), frequent and violent, or imperfect intercourse, specific infection, etc.; the *colica scortorum* of youthful prostitutes is symptomatic of the ovarian disease which results from their unnatural sexual relations. The lesions and displacements referable to parturition produce a condition of lasting, or recurrent, pelvic congestion which naturally exerts a baneful influence upon the susceptible glands. Emotional causes are most active in single women, whether they lead to vicious habits (self-abuse) or to unsound mental conditions. Matthews Duncan refers to suppression of the menstrual flow (from cold, dancing, or sexual excitement) as a frequent etiological factor; he also mentions alcoholic excess as a common cause. The more frequent involvement of the *left* ovary has been noted elsewhere.

Gross Anatomy.—As viewed *in situ* on the post-mortem table, an ovary that is the seat of chronic inflammatory changes may be either movable or buried in a mass of adhesions; it may be found at, or slightly below, its normal plane, or at the level of the pelvic floor, adherent to the base of the broad ligament, the uterus, or the rectum. The corresponding tube may be normal, or may exhibit the enlargement due to salpingitis; its fimbriated extremity may be slightly adherent to the ovary, or the two may

be inextricably glued together in the manner so familiar to the laparotomist.

Three types of ovary are presented, the peculiarities of each being sufficiently evident on gross inspection, although two of these may be readily confounded with normal glands. Interstitial or follicular changes may predominate, the latter leading to more or less marked enlargement of the organ, the former often to diminution of its size. A cirrhotic ovary is smaller than normal, hard and non-elastic, and so nodulated that it reminds one of a "hob-nail" liver. The pinkish, or pearly hue of the healthy gland has given rise to the whitish, cartilaginous appearance of the thickened cortex. Now, comparing a purely cirrhotic ovary with one that has undergone normal senile atrophy, the anatomical identity of the two will appear most striking, and will compare well with their functional condition—one being prematurely, the other actually, senile. The exanthematic atrophy of Mr. Tait is a typical example. However, aside from the difference in the age and sexual history of the two subjects from whom the above-mentioned specimens were removed, there will usually be evidences, even on gross inspection, that the cirrhosis in one instance is due to an actual inflammatory process, which has not resulted in such uniform contraction of the organ as that due to simple atrophy. Moreover, the presence of peripheral cysts, peri-oöphoritis, etc., will point to the true condition. On section a cirrhotic ovary offers the same resistance to the knife as a small fibroma; the cut surface suggests the same analogy. It presents an almost homogeneous fibrous structure, bundles of such tissue interlacing in all directions, with here and there a shrunken ovisac embedded in it. The cortical zone is dense and semi-cartilaginous, while the entire aspect of the surface appears dry and non-vascular, offering a decided contrast to the moist, pinkish stroma of the normal gland. Such an ovary as the one described represents the extreme type of cirrhosis. Every intermediate stage of this condition is observed in specimens removed by laparotomy; localized thickenings of the capsule or stroma, partial atrophy (both interstitial and follicular) of portions of the gland, with functional integrity of the remainder, crippling of one-half by surrounding adhesions, while the other half appears to be discharging its ova in the usual manner—all these pathological appearances are familiar. Moreover, cirrhosis may be only one element, cystic degeneration being present at the same time, so that, while a part of the ovary is atrophied, another is enlarged from hypertrophy of its follicles; this is regarded by some as a separate type. But an increase in the fibrous tissue does not necessarily imply atrophy; fibroid hypertrophy is a well-recognized condition which is particularly interesting from the close relation that it bears to true fibroma of the ovary; indeed, the writer believes that in some instances the latter variety of ovarian tumor is simply the result of excessive development of the fibrous stroma. Instead of appearing as a scarred, shrunken body, less than one-third of its normal size, a gland which has been the seat of so-called hyperplastic oöphoritis looks not unlike a small subperitoneal fibroid; a typical specimen is about the size of a pullet's egg, presents a smooth, often quite regular, surface, and a firm, homogeneous consistence, all traces of the ovisacs having disappeared. Such ovaries are frequently perfectly movable, and show no evidences of any previous surrounding inflammation, such as commonly accompany the atrophic form. Either all vestiges of the Graafian vesicles have disappeared, or those which remain form mere pits in the midst of the dense fibrous tissue.

"Cystic degeneration" of the ovary is an expression that has come to be used very loosely, sometimes, it must be confessed, to excuse the removal of organs that could not fairly be considered as actually diseased. The appearance of a few slightly enlarged vesicles on the exterior of an ovary, otherwise of normal size and appearance, hardly justifies us in applying to it the term "cystic;" it should rather be limited to those specimens in which the gland is enlarged (sometimes to thrice its usual dimensions), and presents on its exte-

rior either several (from twelve to fifteen) cysts, varying in size from a pea to a small marble, or, it may be, two or three larger ones, while on section the deeper ovisacs are seen to have become enlarged at the expense of the stroma. Sometimes a single cyst in the interior of the gland reaches the size of a pigeon's egg, so that the question may well arise, whether we should not regard the condition as true ovarian cyst, rather than simply as cystic degeneration. The term *hydrops folliculi* is sufficiently comprehensive to include all grades of enlargement which are represented by dilatation of a Graafian body, with increase of its clear, watery contents. The main point to be remembered is this—a "cystic" ovary is one in which there is a manifest tendency to general enlargement of the ovisacs, both central and peripheral, at the expense of the stroma, the latter being commonly the seat of cirrhotic changes especially in the neighborhood of the diseased vesicles. In rare cases the entire gland may be transformed into a mass of cysts, like the kidney under similar conditions. In this instance it becomes difficult to characterize the enlargement, which may reach the size of the fist, or even of a man's head. The contents of the cysts is a watery fluid that shows no evidences of an inflammatory origin. Tait has called attention to the frequent occurrence of peri-oöphoritis in connection with this form of chronic ovarian disease. The association of these three varieties of chronic changes is the rule rather than the exception; indeed, it is rare to meet with a pure form of either follicular or interstitial oöphoritis. This fact renders it impossible for one to give a description of a single specimen such as will apply to all. No two ovaries, whether normal or pathological, are exactly similar. In one specimen interstitial changes may predominate; in another, follicular. Because it is described as "cystic," it does not follow that an ovary is not also the seat of both cirrhosis and hypertrophy; indeed, one portion of the gland may be shrunken, while another is enlarged; one region may be rich in cysts, while another presents a homogeneous fibrous tissue without a single vesicle. The possible variations in the size, shape, and external and internal appearance of different ovaries are innumerable; all show the results of the same process, but in different degrees and differently distributed.

Minute Anatomy.—From what has been said, it will be evident to the reader that the microscope often reveals slight pathological changes in the ovary which were not apparent on careful macroscopical inspection, and which, as far as could be ascertained, never gave rise to any recognized symptoms. In order to avoid details uninteresting to the general reader, only the more obvious changes will be briefly mentioned.

Among the various appearances to be noted in a microscopical section of a chronically diseased ovary, the most striking is the transformation of the stroma into a dense fibrous mass, which, from its non-vascularity, often resembles cicatricial tissue; this may exist in spots or throughout the entire field. The arteries sometimes show circumscribed dilatations, but more often they are the seat of endarteritis, with contraction of their lumina. Amyloid degeneration of the middle coat has been described. The cortical zone is particularly fibrous and non-vascular. As regards the Graafian vesicles in aggravated cases, they may have entirely disappeared, being represented either by cysts with thickened walls, by pits or depressions in the midst of the homogeneous tissue, or by small collections of degenerated cells or confused masses of granular débris. If subacute inflammatory processes were present in the ovary, they will be indicated microscopically by dilatation of the vessels, blood-stasis, and interstitial collections of leucocytes. Traces of former hemorrhages are sometimes seen, in the shape of masses of blood-pigment.

It is not proper to judge of the condition of an ovary from the examination of a single section. While one may present evidences of extensive morbid changes, another, cut from a different portion of the same ovary, may vary but little from the normal—the stroma, and even the ovisacs, being intact.

Clinical History.—Patients with this affection do not generally recall any definite time at which it began; it is characteristic of the disease that its onset is gradual. Some women may insist that their troubles commenced with the establishment of menstruation, while others, who have never borne children, refer their ovarian symptoms to the early months after marriage; arrested involution after childbirth is apparently responsible for many cases of chronic oöphoritis, to judge by the frequency with which the beginning of the ailment is referred to that time. Sometimes we succeed in obtaining quite a clear history of a previous attack of subacute inflammation after a sudden suppression of the menses, from which time the patient was never quite as well as before, gradually becoming worse and worse, until she presented all the symptoms of advanced ovarian disease. But when we are consulted with regard to such disease, it is the present symptoms, and not the probable cause, of the trouble that concern us as well as the patient. The symptom from which she desires relief is *pain*, and pain of a peculiar nature. Unlike the dragging, aching pain in the back and abdomen, which is not constant but is increased on exertion, that due to ovarian disease is of a peculiar, sharp, darting character, is clearly localized in one or both groins (especially the left), becomes more severe when the patient stands and walks, and is usually accompanied by certain reflex phenomena that point strongly to its origin. Add to this the well-marked exacerbation which occurs at the menstrual period, and there can be little doubt as to what condition we shall find on making an examination. The special symptoms produced by prolapsed ovaries (especially pain during defecation) have already been described. There exists every shade of difference as regards the intensity of ovarian pain. We not infrequently find, at the examining-table, enlarged and prolapsed ovaries that not only cause little or no discomfort during locomotion, but do not even give rise to marked dysmenorrhœa; the patient may occasionally pass through a period with little discomfort. More commonly the pain is severe and almost unremitting, being relieved only by perfect rest in the recumbent posture; it begins in the ovary and frequently radiates to the back and down the thighs. Reflex neuralgiæ are common, pain in the breast on the corresponding side being especially frequent. The pain is sometimes of a sharp, sickening character, although this peculiarity is more marked when pressure is made upon the diseased organ. Dyspareunia is present in a large proportion of the cases, for obvious reasons. But since the explanation is a purely mechanical one, it follows that, when the vagina is long or the diseased organ has not sunk to the bottom of Douglas's pouch, marital relations may not be attended with discomfort. Stress is laid on this, because the reader must necessarily infer, from reading some of the text-books, that chronic oöphoritis always renders intercourse unendurable. Dysmenorrhœa is the most serious consequence of ovarian disease, and the one which may make the patient's life a burden to her. The pain in the affected gland is most severe a few days before the monthly flow, and reaches its acme just before the latter begins, when it is usually relieved, but does not disappear entirely. It is sometimes of the most agonizing character, suggesting renal colic, so that the most courageous woman becomes frantic, and begs for relief at any price. Patients often describe their sufferings as far exceeding those of labor; with due allowance for the hysterical element in these cases, it cannot be denied that the spectacle presented by a woman writhing in the agony of ovarian dysmenorrhœa is pitiable in the extreme. All theories as to the true cause of this pain must be purely speculative; it is doubtless largely of a neuralgic character, but whether the extra- or intra-ovarian nerves are most affected is, of course, unknown, and doubtless always will be. We may imagine that the terminal filaments are irritated within the stroma, or that the thickened cortex of a cirrhotic ovary prevents it from enlarging under the influence of the monthly congestion, or that, for the same reason, the Graafian bodies have a hard struggle before they can force their way through the cortex and discharge

their contents. Or, reasoning from cases in which the ovaries are only slightly diseased, but are surrounded by adhesions from a former peri-*oöphoritis*, we may ask, "Are not these adhesions responsible for much of the periodical, as well as the persistent pain?" I believe that this thought is a most suggestive one, and that we may yet be able to localize the pain more nearly than we can at present. Disease of the corresponding tube may complicate the ovarian trouble, but it does not mask the characteristic pain.

The character of the menstrual flow deserves some consideration. Sometimes it presents no deviation from the normal, but more often it is either increased or diminished. Menorrhagia is frequently present, and may persist until after the usual time for the climacteric, though it may appear only in the early stage of the affection, the flow becoming subsequently irregular and scanty. Mr. Tait believes that hæmorrhages are more common in connection with the follicular form of *oöphoritis*, although he attributes them mostly to "fundal metritis and inflammation of the tubes." It is fair to assume that the menorrhagia is in many instances simply an expression of the general pelvic congestion, in which the ovary shares, rather than a phenomenon which is directly due to ovarian disease. Scanty and irregular menstruation, and even temporary or permanent amenorrhœa, are not infrequently noted in connection with cirrhosis of the ovaries. The pain is most severe in these cases. In other words, the patient enters upon the change of life prematurely. Sterility is an inevitable consequence of disease of both ovaries, and often exists when apparently only one is affected, but we must be careful how we deliver a prognosis in the latter cases. It is obviously impossible, in a hasty sketch like the present, to enter into a consideration of the complex subject of so-called "reflex neuroses." Attention has already been called to those referable to the bladder, rectum, and breast. Migraine, so-called "spinal irritation," dyspepsia, flatulence, and frequent nausea and vomiting, are lesser evils, while epilepsy and insanity form the final links in the chain. The connection of these symptoms with the ovarian disease is not always clear, and a careful study of the case should be made before we decide positively. The important point to note is, of course, the effect of the menstrual nîsus upon the various symptoms, especially the nervous and psychical. We cannot dwell upon the protean phenomena of hysteria; that their presence necessarily implies ovarian disease is an erroneous idea, although they are frequently associated with it. The important point in such cases is to estimate the symptoms at their proper value, since they are not necessarily all hysterical. A woman may really begin with an actual pain, and exaggerate it until its true character is masked. Charcot's experiment of producing and arresting hysterical attacks by pressure over the affected ovary is classical. Hystero-epilepsy should be carefully differentiated from true epileptic seizures, especially when the advisability of resorting to Batteny's operation is considered. Only by studying carefully the character of the patient and her condition in the intermenstrual period, and by noting the *periodicity* of the phenomena, can their exact relation to the local condition be estimated.

Diagnosis.—From what has been said with regard to the character and periodical exacerbation of ovarian pain, as well as its site and the attending reflex manifestations, it is evident that the diagnosis of chronic *oöphoritis* is often practically made by the expert before resorting to a physical examination. A description of the method of procedure was given under the section on "Prolapse of the Ovary." Pressure in the groin over the affected organ causes sharp, often sickening, pain. By the bimanual method the ovary, if prolapsed, is distinctly felt by the finger within the vagina, or if not, it can generally be mapped out between the finger and the external hand. If necessary the patient should be anesthetized. Although the apparent size of the organ as felt through the vagina is very deceptive, it can be estimated fairly well when the gland lies at the bottom of Douglas's pouch; an ovary that can barely be touched by the finger-tip usually appears

to be about the size of an almond, when it may actually be two or three times as large. General cystic degeneration of the ovary can readily be detected in favorable cases, but it is doubtful if many fingers are sufficiently delicate to appreciate the minor degrees of hydrops folliculi. Fibroid enlargement of the ovary may be recognized by bimanual examination; the diagnosis of cirrhosis is usually made after the abdomen is opened. It is, of course, impossible to estimate the precise character of peri-*oöphoritic* adhesions, although their presence is indicated by fixation of a displaced ovary, as well as by marked tenderness in (or rather around) the organ.

The conditions to be distinguished from chronic *oöphoritis* during the physical examination have already been mentioned under the section on "Prolapse," but they may be briefly recapitulated as follows: Small ovarian tumors, enlargement of the tubes, parametritis, subperitoneal fibroids, and ovarian neuralgia. From what has been said with regard to the limit between cystic degeneration of the ovary and small ovarian cysts, on the one hand, and between chronic fibrous hypertrophy (*oöphoritis hyperplastica*) and fibroma ovarii, on the other, it is evident that it is not always easy for the pathologist to decide when the specimens lie before him, so that it is clearly next to impossible to do so clinically. It may be said, in general, that while a patient with chronic *oöphoritis* invariably gives a history of some menstrual disturbance associated with characteristic ovarian pain, a small tumor frequently occasions no symptoms whatever. Moreover, the tenderness observed on palpation of a diseased ovary is seldom seen in cases of small ovarian cyst or fibroma, unless there has been recent peritonitis. Fluctuation in a small parovarian or ovarian cyst is more clearly marked than it is in the case of simple hydrops folliculi. Small subperitoneal fibroids with long pedicles often simulate fibroid ovaries, but the former give rise to few, if any, symptoms, and are painless on pressure. Their connection with the uterus can sometimes be clearly defined.

Parametritis may be acute or chronic; if the former results in the formation of an abscess, the shape, location, and fluctuation of the tumor, aside from the history, will serve to differentiate it from an enlarged ovary. Localized indurations, the result of peri- or para-metric inflammation, are more diffuse, are less painful on pressure, and have in general a different location from prolapsed and enlarged ovaries. The relation of the induration to a lesion of the cervix can often be established beyond question. Such a condition may co-exist with disease of the ovary, where the diagnosis is often very obscure. This leads to the important question of the possibility of distinguishing ovarian from tubal enlargement at the examining-table; when there has been previous *oöphoritis* (or peritonitis), so that the appendages are buried in a mass of adhesions, it is often entirely a matter of guesswork. Is a rounded, or oblong, or "sausage-shaped" swelling a diseased ovary, or tube, or both? This is a question of great practical importance, and one which some have assumed to be able to answer without difficulty. Doubtless there are characteristic cases in which, from the symptoms, as well as from the physical condition, the exclusive diagnosis of *oöphoritis* or salpingitis can be made, but I have so often found the tube and ovary fused together in cases of pyosalpinx, that I believe it to be rarely possible to separate the two clinically.

Ovarian neuralgia, as has been said, is not only a very obscure affection, but we are not yet in a position to affirm that a large part of the pain in cases of ovarian disease is not of a purely neuralgic character. Certainly the *tactus eruditus* of the gynecologist is not so delicate as to tell him where functional ovarian trouble ceases and organic disease begins. The occult changes within the gland that elude the microscope can hardly be appreciable to the finger-tip through half an inch of interposed tissue. We are only cognizant of gross abnormalities. If there is severe pain in an ovary, and on the most careful examination we find no evidences of enlargement, we content ourselves with the diagnosis "neuralgia;" if there

is enlargement, we attribute all the symptoms to chronic oöphoritis, and seek no further. Perhaps there was disease in the former case and a neuralgic element in the latter, or, perhaps, there were peri-oöphoritic adhesions that gave rise to some of the symptoms, especially to the pain.

The practical lesson is this—we can hardly affirm, positively, the exclusive dependence of a certain set of symptoms on disease of one or both ovaries until the patient has been under observation for some time, and has been examined more than once, under ether, if there is any doubt regarding the diagnosis.

Prognosis.—The prognosis, as regards the life of the individual, is good; death rarely occurs as a direct consequence of the disease of the ovary. In this respect there is a great difference between oöphoritis and salpingitis. That the disturbance of the diseased organ at the time of menstruation, the vascular obstruction, etc., may give rise to fresh attacks of localized peritonitis is quite possible; hæmatocele has resulted from such obstruction, but the actual sequence in these cases is always obscure. All that we can affirm is, that simple, uncomplicated chronic oöphoritis is rarely fatal *per se*. It remains to prognosticate the patient's future. We may, for convenience, consider the question anatomically and clinically. How long will a diseased ovary continue to enlarge, and is there any probability that it will ever form a tumor, cystic or solid? Much confusion has arisen from loose statements to the effect that every cystic ovary may become an ovarian cyst. Careful examination of a number of such ovaries at different stages of enlargement must convince the impartial student that while small unilocular ovarian cysts do arise by excessive distention of one or two central vesicles at the expense of the stroma, general follicular enlargement rarely terminates thus. It follows that our statements with regard to the further increase in size of an enlarged ovary should be marked by great caution, not to say indefiniteness. The small cysts may, and do, rupture, but seldom cause trouble—at the most, slight localized peritonitis. The possible relation of chronic hypertrophy of the ovary to true fibroma will be considered later. The patient naturally asks if her disease is curable. Our reply will be based upon the facts in the individual case, viz., the character and amount of the pain, the dysmenorrhœa, the possible co-existence of tubal disease, and the patient's general condition.

If the pain before the monthly flow is moderate, and disappears almost entirely in the interim, there being few, if any, reflex disturbances, while on physical examination the affected organ is found to be but slightly enlarged and not very tender—the prognosis for ultimate entire relief is good. Under careful regulation of her general and sexual habits, with appropriate treatment, there is no reason why the woman should not be cured, especially if there is a possibility that some uterine trouble may account for the principal symptoms. The prognosis, as regards permanent sterility, is an important one. A large proportion of the sterile women, with prolapsed and diseased ovaries, have also acquired ante flexion (doubtless the two displacements resulted from the same attack of peritonitis), and there is always ample room for doubt as to whether the uterine condition is not partly responsible for the dysmenorrhœa and sterility. In fact, I have recently seen two cases in which women, in whom these conditions existed simultaneously, fortunately declined the proposed laparotomy, and became pregnant after simple dilatation of the cervix.

More often we meet with women who are seriously crippled by their infirmity, seldom enjoying an hour when they are not reminded of it by an occasional twinge of pain, except when they are recumbent. They are unable to walk more than a block or two, tire easily, and look forward to the menstrual period with dread; in fact, one-half of the month is spent in enduring and recovering from it. Sexual intercourse is intolerable. The prognosis in these cases is not encouraging, but it is very far from being hopeless, as long as the patient can be encouraged to struggle against invalidism, and has not become hopelessly addicted to narcotics and stimulants.

When one, or both, ovaries are prolapsed, and are so tender that the slightest pressure gives intense agony, and when, at every menstrual period, there are evidences of recurrent attacks of peritonitis that point to tubal disease, there is little hope of more than temporary relief from treatment. The prognosis in cases of epilepsy, hystero-epilepsy, and various other nervous troubles which appear to be confined to the menstrual period, and are due directly or indirectly to ovarian disease, is always a little uncertain, because of the difficulty of overcoming vicious habits, even after the original cause has been removed. When the menstrual function is hopelessly disturbed or destroyed, as shown by the scanty flow and subsequent amenorrhœa, the probability is that the tissue-changes have become so general that the woman really is "unsexed," in the sense that she is in the same condition sexually as if she had no ovaries at all. The only question, then, to be decided is whether she will finally obtain relief from her distressing symptoms. In all probability she will grow rather worse than better, until she reaches the menopause. The prognosis, as before stated, varies with the patient, and especially with her social condition. While a lady of the upper classes may take to her bed and become an invalid, where her local trouble is really of only moderate severity, her humbler sister may increase her already serious condition by pursuing a mode of life which directly favors the aggravation of existing symptoms. In the former case the diseased ovary often remains *in statu quo* under the influence of rest and the avoidance of exciting influences, while the lady's general nervous condition grows worse and worse, often in consequence of the large amount of attention and sympathy which she receives; in the latter, the patient frequently continues to work until she is unable to bear up any longer, so that when she comes under our observation her local condition is beyond palliative treatment, while she may be far from being an invalid.

He would be a most superficial examiner who recognizes no difference, as regards the prognosis, between the diseased ovary, movable and not especially tender except on deep pressure, and the same organ when fixed by perimetritic adhesions, and so sensitive that the patient cannot bear the slightest touch. Without delaying longer upon this subject, it may be said, in conclusion, that to make a discreet prognosis in cases of ovarian disease requires wide experience, wise discrimination, and a conscientious desire to act for the best interests of the patient.

Treatment.—There is little to add to the local and general treatment of this affection as described in previous sections, the object of which is to secure perfect rest of the diseased organ and to relieve congestion. It is highly important to avoid sexual excitement, for obvious reasons. Doubtless much of the benefit received by patients during a long stay in a private hospital arises from the fact that they are freed entirely from their matrimonial duties, and are obliged to rest at the time of the monthly period. These hygienic measures, in addition to hot vaginal injections, applications of iodine to the vaginal fornix, and glycerin-tampons, often accomplish wonders, especially if combined with the judicious use of electricity, massage, and carefully regulated diet—in short, the system so successfully carried out by Weir Mitchell.

Of course, we should always seek to disabuse the patient's mind of the idea that she is an invalid; she must simply learn to take better care of herself, not necessarily to suspend entirely her pleasures and occupations. Every attendant at a clinic for diseases of women must be impressed with the fact that some patients with ovarian disease come to him month after month without apparently receiving the least benefit. Is it strange, when all the beneficial results of the treatment are more than neutralized by the fact that the patients continue to be exposed to the most unfavorable influences at home?

But even if we cannot cure these women of the lower classes, we can teach them to be more careful of themselves, and can make their lot more tolerable. They can rest a little, can use hot water, regulate their bowels, avoid excesses, and "favor" themselves at the time of

menstruation. Electricity often gives great relief to such patients. If the ovary is prolapsed, a suitable pessary may accomplish much. But it is in this class of cases that the question of operative interference will early present itself.

Of drugs it is hardly necessary to speak, since they will be used as indicated, iron and arsenic in the case of anæmic patients, and the various nervines according to the amount of faith which the reader possesses in the different remedies. We are always warned against resorting indiscriminately to the hypodermatic syringe in cases of ovarian dysmenorrhœa. It is easier to give than to follow this advice. Provided the physician has absolute control over the dosage, as well as over the patient, and withholds the drug when it is not needed (*i.e.*, after the acuteness of the pain has passed away), it is certainly better for him to administer a hypodermatic injection occasionally than to leave a woman to stupefy herself with brandy, as such sufferers frequently do. Let a patient with dysmenorrhœa have opium *when it is absolutely necessary*, but insist on her sending for you to give it to her. As soon as such a woman begins to drug herself, she is in danger.

The removal of the ovaries for the relief of chronic disease is too important a subject to be discussed here, even if the space permitted; the writer even questions the wisdom of touching upon it at all. A few statements may, however, be allowed, since we limit ourselves to the consideration of a single indication for "oöphorectomy"—actual ovarian disease. The glands, when removed for the relief of epilepsy or "ovarian insanity," to bring on the premature menopause in cases of fibroid tumor, or in connection with salpingitis, may of course be diseased, but under these circumstances there is no definite purpose of ablating the ovaries for the primary reason that they are morbidly affected; moreover, they may retain their functional integrity even though associated with the above-mentioned conditions. If we assume, with Olshausen, that pain and dysmenorrhœa are sufficient indications for castration, "even when no anatomical changes are demonstrable," there would be no object in laying any stress upon the presence of oöphoritis; but the more conservative reader will rather believe, with Hegar and Winckel, that the gynecologist should not venture upon such a radical step unless he can demonstrate to his own satisfaction the presence of ovarian disease. But, even then, as Olshausen himself admits, many symptoms, supposed to be due purely to organic changes in the ovary, may be due to extrinsic causes (peri-oöphoritis) or to intrinsic, as neuralgia. This brings us to the vital point of the whole matter—oöphorectomy, performed for the relief of actual, or supposed, ovarian trouble, as indicated by local pain, dysmenorrhœa, and reflex disturbances, is in many cases a *purely empirical measure*.

If we remove a diseased ovary from a young woman, leaving the other because it appears to be perfectly healthy, and one or two years later she informs us that she has precisely the same pain on the affected side, quite as severe before menstruation as it was previous to the operation, while the other ovary has also become the seat of pain, the natural inference is that she has not been greatly benefited by surgical interference. This picture is not a rare one, as every laparotomist who has made any attempt to follow up his patients must admit. Several hypotheses are offered to account for the persistence of the symptoms after the removal of the supposed cause. I incline to the belief that peri-oöphoritis and neuralgia combined are to be regarded as the frequent cause of supposed ovarian pain; the latter may be secondary to the former. How else can we explain, not only its persistence after the removal of diseased ovaries, but its decided amelioration as the result of local (especially electrical) treatment, while the condition of the glands themselves appears to be unaltered? Recovery from the operation is not recovery from the symptoms for which the operation was undertaken, and this is a truth that is beginning to force itself more and more upon the laparotomist. On the other hand, after a patient has been under observation and treatment for several months, and has grown no better, but rather worse,

as shown by both her symptoms and her local condition, and after the risks and uncertainties of the operation have been frankly explained to her, it may properly be performed as a last resort. The surgeon will do well to strengthen his position by reminding the patient that the benefits may not be apparent for at least a year; well-authenticated cases of instantaneous relief after oöphorectomy are not so numerous as the reader would infer from the statements of ultra-enthusiastic operators.

Removal of both the tubes and ovaries is, of course, the operation now practised under the name oöphorectomy (salpingo-oöphorectomy, to use the correct, though ponderous, term), though in cases such as have been described here the tubes are often not only apparently, but actually, healthy. As performed for the express purpose of extirpating diseased tubes, it does not concern us now, except that it may be said that while the ovaries are nearly always more or less affected in cases of salpingitis, the reverse is not true, *i.e.*, chronic oöphoritis exists independently of salpingitis. With Battey's operation, as originally proposed, we are not concerned here, except so far as the nervous and mental phenomena (to relieve which Battey seeks to establish a premature menopause by removing the ovaries) are associated with, or depend upon, actual ovarian disease. Having lifted the ovary into the wound, there is no choice between removing it or letting it alone. If, at the operating-table, it is found to be extensively diseased, it is regarded as unsurgical to be content with puncturing the larger cysts, simply ligating the pedicle, or even excising the diseased portions of the gland and leaving the healthy part (as Schroeder did successfully in several instances, pregnancy ensuing in one case). The separation of peri-oöphoritic adhesions without removal of the ovary is of doubtful value. On the other hand, if an ovary is merely "suspicious," and shows only apparent evidences of disease, the corresponding tube being healthy, there is still time to give the patient the benefit of the doubt. It is extremely difficult to choose the right path, especially if the decision is left entirely with the surgeon; while the subsequent occurrence of pregnancy may cause him to be devoutly thankful that he spared the suspicious organ, on the other hand, the development of a large cyst may occasion feelings that are directly the reverse. A word should be added regarding some phenomena occasionally observed after the removal of the uterine appendages. In quite a respectable proportion of the cases the monthly flow does not cease for several months, or even for years, although no morbid condition of the uterus is present to account for the hæmorrhage. It is not necessary to resort to the theory of a possible third ovary, or of imperfect removal of one of the glands. As has been shown by careful observers, persistent metrostaxis is most common in patients in whom extensive adhesions were found at the time of the operation; it is not difficult, in view of our present knowledge regarding the separate identity of ovulation and menstruation, to explain the monthly flow as due to the pelvic congestion induced by the perimetritis. Nor is this all. Even after the lapse of two or three years the patient still suffers every month from cerebral congestion, profuse perspiration, pelvic and reflex neuralgic pains, and even psychical disturbances such as formerly attended the menstrual nîsus. Vicarious hæmorrhages, especially epistaxis, are not uncommon. It is hardly necessary to remind the reader that no intelligent observer now entertains the idea that a woman is "unsexed" by the removal of her diseased tubes and ovaries, since, as Dr. Goodell aptly says, "her instincts and affections remain the same, her sexual organs continue to be excitable, her breasts do not wither up, and she is no less a mother or a wife." The question that is still *sub judice* is this: *Can we offer the sufferer from ovarian disease a prospect of relief by laparotomy sufficiently certain and permanent to compensate her for the risks which she must take?*

II. TUMORS OF THE OVARY.—These are divided into solid and cystic, the latter being by far the more common.

1. *Solid Tumors of the Ovary*.—These growths are characterized anatomically as benign or malignant, although

clinically it is not always possible to insist upon this distinction. Under the former are included pure fibromata, under the latter carcinoma and sarcoma. Fibro-adenoma, pure myxoma, enchondroma, and tuberculous disease of the ovary are so rare that we need only make a passing allusion to them.

A. *Fibroma*.—I cannot agree with most writers on ovarian pathology that fibroid tumors are so exceedingly rare as they represent, since I have an opportunity to examine two or three undoubted specimens every year, and see reports of many more in current literature. There are now a large number of cases on record. Moreover, I differ from Olshausen and others, who affirm that such growths are always the results of hyperplasia of the stroma, resulting from former inflammatory processes, and are never independent morbid growths. There are doubtless many specimens of ovaries, enlarged to the size of a hen's egg or an orange, which, from their gross and microscopic appearance, may fairly be regarded as examples of excessive fibroid hypertrophy in consequence of preceding oöphoritis, but these are to be distinguished from the tumors under consideration, just as a hyperplastic is to be differentiated from a fibroid uterus. Some careful observers deny the existence of true ovarian fibromata, alleging that the tumors thus described are either detached subperitoneal uterine fibroids, or fibrous growths of the tube or broad ligament. Others affirm that all supposed fibroids of the ovary are really spindle-celled sarcomata.

Etiology.—While the smaller tumors show evidences of growth by simple hyperplasia of the stroma, the larger ones closely resemble uterine fibroids, in the obscurity of their etiology as well as in their structure. There is, as a rule, absolutely nothing to account for their presence. They have been found as separate nodules growing from the stroma or outer surface of the ovary, the gland itself being normal. A few cases are on record in which they developed from the *corpus luteum*.

Gross Anatomy.—An ovarian fibroid is usually of small size (weighing in the neighborhood of two pounds), although I have seen a specimen weighing upwards of twenty pounds. It closely resembles a subperitoneal fibroid, having a smooth, shining exterior, and is often nodular or divided into several lobes. It may be of almost stony hardness, or may undergo every variety of degeneration common to fibroids, until it becomes a true fibro-cyst, the latter condition being the result of geodic softening (*fibroma lymphangiectodes*). Ovarian fibro-cysts may attain such a size as to fill the abdomen. Spiegelberg removed one that weighed sixty pounds.

Interstitial hæmorrhage, fatty and calcareous degeneration, etc., are not uncommon; a transition to spindle-celled sarcoma is possible, but never to carcinoma. These tumors are generally unilateral, especially when of large size, and have precisely the same relations to the tube and broad ligament as cystomata—an indisputable proof of their ovarian origin. Contrary to Goodell's experience, I have found that the pedicle is usually long and slender, so that the tumor floats freely in the abdominal cavity; adhesions are rare, unless the growth has reached a large size, when it may become attached to the anterior parietal peritoneum. In consequence of the mobility of these tumors and the length of the pedicle, torsion of the latter not infrequently occurs.

Ascites is a common complication of ovarian fibroids, and may awaken suspicions regarding the possible malignancy of the growth. The ascites is sometimes explicable by the venous obstruction due to the direct pressure of the mass, or possibly to long-continued irritation of the peritoneum; more often the cause is unknown.

Minute Anatomy.—The smaller tumors appear to consist wholly of dense fibrous tissue; in the larger ones occasional smooth muscle-fibres are found, justifying the name myo-fibroma. "Geodes" are numerous in the larger growths, where their development can be traced from the commencing dilatation of a lymph-space, in consequence of local stasis, up to cavities containing half a pint of clear serous fluid, coagulating spontaneously on

exposure to the air. The various microscopical appearances are identical with those observed in studying sections of uterine fibroids and fibro-cysts, except that a tendency to sarcomatous degeneration is more frequently noted.

Clinical History.—The presence of the tumor may be entirely unsuspected during life; in fact, small fibroids possess no clinical significance, unless they result from chronic oöphoritis, the symptoms of which have been detailed. They are found most frequently in young women (below the age of forty), and rarely attract attention, except by their mechanical pressure, until they have risen out of the pelvis. They cause no pain or deterioration of the general health, and when small are as innocuous as sub-peritoneal fibroids. Cases are on record, however, in which they have given rise to serious dystocia. Being of slow growth, the patient can rarely recall the precise time when her attention was first directed to the tumor by dragging sensations in the lower part of the abdomen, enlargement of the same, and a feeling as if there was some foreign body in her belly which shifted its position as she turned over in bed. Ascites may be the only symptom for the relief of which she consults a physician. The large tumors, especially the fibro-cystic variety, give rise to the usual disturbances of such growths, but not to any severe pain. These will be mentioned in describing the complications of cystomata. The tendency of these tumors to become fibro-sarcomatous always causes apprehension.

Diagnosis.—If the tumor has been under observation for some time and is of small size, its ovarian origin may generally be determined. It is often impossible to distinguish it from a sub-peritoneal uterine fibroid with a long pedicle. Small semi-solid dermoid or multilocular cysts may be mistaken for fibromata. The very slow growth and peculiar, hard, nodular feel of the latter is quite characteristic. If the tumor can be felt distinctly through the vaginal vault (as in a case of probable double ovarian fibroid which I have now under observation) the differential diagnosis is not so difficult. If it is so large that its unilateral situation is no longer apparent, to make a diagnosis between it and a uterine-fibroid or fibro-cyst is clearly impossible. The question of malignancy always arises in these cases, especially if ascites is present. The slow development of the tumor, its mobility, smooth surface, and the fact that it is unilateral, the absence of pain, and the general condition of the patient, should point to its true character.

Prognosis.—This is invariably good, since these tumors grow slowly, often undergo atrophy after the menopause, and rarely cause peritonitis or become the seat of suppuration. The ascites which sometimes complicates them is entirely cured by the removal of the tumor, an operation which is rendered quite easy by the almost invariable absence of adhesions.

Treatment.—Ovariectomy is the only resort, the results of the operation in this class of cases being excellent. As in the case of all solid tumors, the abdominal incision must be longer than that made in removing ordinary cysts. The possibility that a solid tumor may be, or may become, sarcomatous, always renders an operation advisable.

B. *Sarcoma*.—This develops primarily in the ovary. Olshausen says that the spindle-celled variety is most common. The few specimens which I have examined have been of the transitional round-celled type (*sarcoma carcinomatodes*). Between the two there exists a wide difference as regards malignancy, since the former (fifty termed fibro-sarcoma) is closely allied to fibroma, while the latter approaches closely in its structure and dangerous character to medullary carcinoma.

(a) *Spindle-celled Sarcoma*. Etiology.—Fibro-sarcoma develops, like fibroma, from the stroma, the original change in both instances suggesting simple hyperplasia; but, while the benign growth is comparatively poor in vessels, the vascular supply of the former is excessive. The ultimate cause of the malignant formation is of course unknown, but it seems to be related to the period of development, because sarcoma of the ovary is most often found

in early life, not infrequently in childhood. A form of adeno-sarcoma described by Leopold develops from the Graafian vesicles. The origin of the rapidly growing sarcomata of the mixed type is not clear; it is doubtless epithelial as well as stromal.

Gross Anatomy.—Malignant tumors of the ovary are frequently bilateral. The fibro-sarcomata are usually of moderate size (one or two pounds), of a smooth exterior, reddish-white in color, and of firm consistence. They may reach the size of a child's head, while sarcomatous nodules are seen on their outer surface. Small cysts sometimes project above their surface. They closely resemble fibromata, but are usually of less firm consistence. On section their cut surfaces appear softer and much more vascular, often resembling raw meat, especially when the tumor is of the mixed spindle- and round-celled variety. Rapid growth, inflammation, and degeneration are characteristics of these formations, as shown by the hyperemic and oedematous appearance of their cut surfaces, the fatty and necrotic foci, and the numerous cysts containing a reddish, gelatinous fluid.

Minute Anatomy.—It is not necessary to dwell upon the well-known microscopical anatomy of these tumors, except to reiterate that they are characterized by their vascularity and tendency to retrograde metamorphosis, the latter being readily explained by reference to the venous thrombosis observed under the microscope. The occurrence of metastatic deposits in distant organs depends upon the involvement of the blood-vessels in the morbid process. Retrograde changes are, of course, less marked in fibro-sarcoma. It should be noted that myxo-sarcoma often occurs in the ovary.

Clinical History.—It may be said, in general, that fibro-sarcoma of the ovary may be attended by few, if any, graver symptoms than those produced by benign solid growths. These growths have little tendency to form metastatic deposits, and may increase very slowly for years (ten years in one case) until they reach an immense size (sixty or eighty pounds), the general health not being affected, after which they undergo cystic degeneration or assume a more malignant character. Pain is often absent or insignificant, and moderate ascites is frequently the only symptom that attracts attention, aside from the irregular menstruation or amenorrhoea, which would naturally attend disease of both ovaries. In short, the natural history of fibro-sarcoma is essentially that of fibroma, and the diagnosis is commonly uncertain until the specimen is in the hands of the pathologist.

As the cellular element predominates in the growth, the condition becomes more grave; still, as Olshausen says, "on the whole, sarcomata of the ovary are relatively of slight malignancy, seldom form metastases, and are not so very often double. Their malignant character is shown more by their striking influence upon the general health." I have found the most malignant type of sarcoma of the ovaries and peritoneum in a young woman who appeared to be in robust health, and was entirely unconscious of her condition. I have also discovered in the dead-house unsuspected metastases in the intestinal canal. The soft, round-celled variety grows rapidly, is usually bilateral, and terminates fatally in a few months, the patient generally dying from exhaustion. Ascites, peritonitis, and pulmonary complications hasten the end. The pain may be of the characteristic sharp, lancinating variety, especially if subacute peritonitis is present, while disturbances of the pelvic organs are indicated by uterine hæmorrhage; rectal and vesical troubles are not uncommon.

Diagnosis.—As before stated, a differential diagnosis between fibroma and spindle-celled sarcoma is practically impossible; a solid ovarian tumor of slow growth is more apt to be of the latter character. Between round-celled sarcoma and medullary carcinoma it is often impossible to distinguish, nor is the distinction of any importance clinically. The youth of the patient, the more gradual development of cachexia, and the moderate ascites, as well as the less rapid extension of the disease to the abdominal viscera, speak in favor of sarcoma. Peritonitis is more common in cases of cancer, and on exam-

ination the pelvic organs are found to be fused into a solid, immovable mass; the pain is also apt to be more severe. A large cysto-sarcoma may be mistaken for a thick-walled cystoma, for a cyst that has undergone secondary malignant degeneration, or for an ovarian or uterine fibro-cyst. Similar symptoms (pain, cachexia, ascites, etc.) may be present in each case. An explorative puncture may throw light on the diagnosis, the contents of a cysto-sarcoma being a peculiar bloody, gelatinous fluid (often containing characteristic cell-masses) which contains mucin and paralbumin and coagulates spontaneously.

Prognosis.—In fibro-sarcoma the prognosis is good, removal of the tumor being nearly always followed by complete recovery. In growths of the round-celled variety it is not encouraging, on account of their influence on the general health, the tendency to metastasis and other complications, and the danger from operative interference—death from shock, hæmorrhage, or peritonitis, being a frequent result of attempts at removal.

Treatment.—If the tumor is freely movable, and the patient's general condition allows it, ovariectomy is clearly indicated; since, if the growth is thoroughly removed before secondary deposits are formed, there is comparatively little danger of recurrence, and a radical cure may be expected. The question of the expediency of laparotomy in cases of extensive malignant disease, with well-marked cachexia, will be discussed in the following section.

C. Carcinoma.—This may be primary or secondary, and may be of the medullary, scirrhus, or colloid variety, the medullary being by far the most frequent. Carcinomatous degeneration of cystomata will be more properly considered elsewhere. Unnecessary confusion has arisen from the loose use of the term "papilloma," some writers regarding all proliferating papillomatous cysts as malignant. For this reason I prefer to omit them from the present section, although many of these are really solid tumors of the adeno-carcinomatous and adeno-sarcomatous type. Colloid cancer of the ovary is a transitional form, which will be described under colloid cysts. Scirrhus cancer of the ovary is too rare to call for separate mention in a brief *résumé* like the present.

Etiology.—Medullary carcinoma of the ovary may be secondary to cancer of the pelvic organs or peritoneum, although it is sometimes extremely difficult to trace the sequence. These cases possess a pathological, rather than a surgical, interest, and will not be considered. Primary cancer of the ovary should be clearly distinguished from secondary cancerous degeneration of a pre-existing cyst, since the prognosis, as well as the treatment, in the two cases is essentially different. The ultimate cause of primary malignant disease is unknown. The patients are frequently under thirty years of age, a peculiarity as regards cancer of the ovary, in comparison with cancer of other organs, which seems to point to the period of the greatest sexual activity as the one most favorable to the development of the disease. Frequent pregnancies do not appear to exert any special influence. Sexual excess has been noted as a possible etiological factor. The growth takes its origin from the epithelial elements of the ovary, principally those of the ovisacs, malignancy being, as Tait has expressed it, "a reversion to the foetal type." That the process is at first confined to a few vesicles is shown clinically, as well as anatomically, by the fact that patients with cancer of both ovaries have ovulated and become pregnant.

Gross Anatomy.—In the early stage a cancerous ovary appears somewhat enlarged, of an irregular, nodular shape, a dead-white color, and of softer consistence than normal. At this time the tumor may be perfectly movable, and may resemble closely an ordinary hypertrophied ovary. I have seen a carcinoma as large as a man's head that closely resembled a uterine fibroid, even on section. It was removed from a young woman, aged twenty-two, who had complained of few symptoms except occasional dragging sensations in the stomach. When the disease is advanced, we observe, on looking into the pelvis from above, a diffuse, irregular mass involving both ovaries, often the rectum and uterus, and frequently also coils of

small intestine, and distributed over the peritoneum in the shape of smooth nodules or papillary excrescences. The consistence of the growths varies from that of a soft fibroid to the cheesy, diffident condition which characterizes malignant diseases of the liver.

Minute Anatomy.—The structure of medullary carcinoma is well known, and does not require a separate description as it is found in the ovary. These growths are prone to become the seat of inflammatory and degenerative processes which obscure their original appearance. We seldom have an opportunity to observe the disease in its inception before the stroma and ovisacs have been entirely destroyed, and when the alveolar structure of the growth is clearly marked, by reason of the scattered collections of epithelioid cells. The frequent occurrence in the ovary of the mixed type, "alveolar sarcoma," or sarcoma carcinomatodes, has been mentioned. It is worth noting that, aside from rapid growth and tendency to degeneration and extension as clinical evidences of malignancy, the finding of the "budding" or "sprouting" cells at the periphery of a cancerous ovary testifies to its dangerous character. Some of the circumscribed tumors appear to be almost encapsulated, as contrasted with the soft, diffuse growths. Microscopically the difference between a cysto-carcinoma and a carcinomatous cystoma is, broadly speaking, this: In the former we find an irregular cavity, plainly the result of degenerative changes (fatty, necrotic, etc.), and situated in the midst of a homogeneous cancerous tissue; while careful examination of sections of the wall of an ovarian cyst that has undergone secondary carcinomatous degeneration will nearly always reveal evidences of the original cyst-wall, with its usual layers.

Clinical History.—The symptoms of cancer of the ovary may be entirely negative, or, on the other hand, while there is no doubt regarding the existence of malignant disease, it may involve the pelvic and abdominal viscera so extensively that its connection with the ovaries is obscured. Pain of a peculiar, sharp, darting character is generally regarded as characteristic of cancerous growths. But it is a singular fact that this symptom is often wanting in extensive malignant disease of the pelvic organs, which, from their rich nerve-supply, we might suppose would be most profoundly affected. I have repeatedly seen cancer of the ovary revealed by laparotomy in cases where the pain had not been any more severe than that which attends chronic cellulitis. Again, pain of an apparently suspicious character may be produced by so many morbid conditions within the pelvis that it is not to be regarded as a trustworthy indication of malignancy. The pain, when it is present, makes its appearance gradually, the patient having an occasional twinge or stab in the groin, which sometimes extends down the thigh. As the growth becomes more diffuse and begins to break down and extend to the peritoneum, that membrane becomes the seat of a subacute inflammation, in consequence of which the pelvic organs are fixed just as if they had been embedded in liquid plaster which had subsequently hardened. The patient may then suffer acutely, locomotion being impossible. Menstrual disturbances appear—first, menorrhagia, then irregularity of the flow, and eventually, as the ovaries are completely destroyed, complete amenorrhœa. The effect of the condition upon the uterus is the same as that produced by ordinary pelvic peritonitis—*i.e.*, it causes congestion and a tendency to hæmorrhages. Vesical irritation is a distressing symptom, and constipation and painful defecation result from mechanical obstruction. In aggravated cases coils of small intestine are imprisoned at the bottom of Douglas's pouch, giving rise to frequent violent, colicky pains by reason of the resistance offered to the peristaltic movements. Ascites is justly regarded as an important symptom in connection with malignant disease. The important point to note is that the dropsy develops *early* and *rapidly*, its time of appearance not being governed by the size of the tumor, since it is due rather to irritation of the peritoneum than to direct pressure on the vena cava inferior. If the fluid is removed by tapping, it quickly returns. Sometimes œdema of one or both legs is ob-

served, in consequence of direct pressure of the growth on the iliac vessel.

The "cancerous cachexia" is often alluded to as pathognomonic. This is quite as often absent as present, some of the women being young and blooming. On the other hand, the face of a patient with extensive secondary deposits on the peritoneum and intestines does sometimes present a peculiar hue and a drawn expression which are certainly striking. This is best marked in women above forty, and is accompanied by emaciation and rapid decline of the vital powers.

Diagnosis.—In the case of young patients who complain of only moderate pain, appear in good health, and have little, if any, ascites, the physician may naturally fail to discover the true condition. When the tumor is small, and is buried in a mass of adhesions, it may be mistaken for a benign growth, for an enlargement of the tube or ovary, or for chronic peritonitis. The diagnosis may be equally uncertain after the tumor has risen out of the pelvis, provided that it is painless, movable, and not associated with ascites and constitutional disturbance. Age, as has been stated, is not a reliable criterion; but, negatively, a rapidly growing tumor in a woman over forty should awaken grave suspicion.

Ascites (with or without œdema of the legs) developing rapidly in a patient, who is found by careful examination to be free from cardiac, renal, or hepatic disease, is a significant symptom, especially if it is associated with severe lancinating pains in the groins and a general cachexia or decline of the health for which no reason can be assigned. Evidences of subacute peritonitis, as presented by great tenderness over the lower part of the abdomen and elevation of the pulse and temperature, possess no little significance in connection with the other symptoms.

Since the pain is located in the pelvis, we naturally make a vaginal examination. The uterus is found high up—so that the cervix appears as if it were drawn into the fornix—and is immovable, while the entire vaginal vault presents a peculiar, hard, board-like feel. There is usually so much tenderness, on account of the general inflammation, that no definite information can be gained; in very favorable cases an irregular nodular growth, perfectly immovable, can be obscurely felt through each lateral fornix. If there is no ascitic fluid, and the patient is not too sensitive (or is under ether), the tumors can be mapped out by the bimanual examination, while their peculiar, knobbed exterior is recognizable. If the ascites prevents a thorough examination the fluid should be removed by an aspirator, when a flood of light is often thrown upon an obscure diagnosis. It is so important for the physician to obtain all the information possible, regarding the nature of the disease and its precise extent, that he should employ every diagnostic aid at his command. I have on several occasions seen extensive malignant disease of the abdominal viscera completely masked by ascitic fluid, the removal of a few ounces of which cleared up the diagnosis, and saved the patient from a proposed laparotomy which would have been worse than useless. In this connection I cannot refrain from expressing my disapproval of a hasty resort to explorative laparotomy in cases of ascites where the presence of malignant disease is strongly suspected, and all the symptoms point to the existence of extensive infiltration and subacute peritonitis such as would render a radical operation impossible. I have seen this exploration undertaken on the person of a woman whose abdominal, and even, thoracic, viscera were riddled with secondary growths; she, of course, did not survive. It seems much more rational to tap a woman in whom we suspect malignant disease, to make repeated examinations, and to keep her under observation for some time, than to open her abdomen at once in order to satisfy our curiosity. The result of explorative incision in these cases is fatal in a large proportion of cases, the patient dying of shock or exhaustion. This opinion, it should be stated, is opposed to that of weighty authorities, yet it is supported by the facts. Foulis and Thornton have called attention to the diagnostic value of the so-called "sprout-

ing cell-groups" found in cancerous ascitic fluid. These are clusters of large epithelial cells, containing vacuoles of different sizes; in my experience, when found in large numbers, they point strongly to the existence of a proliferating malignant growth (carcinoma, sarcoma, or papilloma) which has extended to the peritoneum. The rapid re-accumulation of ascitic fluid after aspiration points to a probable cancerous origin.

Prognosis.—This is invariably bad. While some patients may live for years, exhibiting alternate remissions and exacerbations, others succumb in a few months from pure exhaustion, peritonitis, or secondary complications induced by metastatic deposits in the thorax or abdomen. The retro-peritoneal glands and peritoneum are early involved, next in order the intestines, omentum, stomach, and liver; but, strange to say, the other pelvic organs (uterus and bladder) frequently escape. Even when the tumors are movable, so that they can be completely extirpated, we can never be sure either that metastatic deposits do not already exist or that there will not be a recurrence. Olshausen has called attention to the difference between ovarian sarcoma and carcinoma in this respect: spindle-celled sarcoma rarely recurs after complete removal.

Treatment.—Many malignant tumors are not recognized as such until after their removal. When the growth is not too firmly adherent it is justifiable to extirpate it, if no secondary nodules are discovered on the peritoneum, since the patient's life is prolonged and there is always a possibility that the disease may not recur. To tear out by main force a soft, vascular, cancerous tumor, firmly adherent to the pelvic and abdominal viscera, with imminent risk of having the patient die on the table from shock or hæmorrhage, is unsurgical, not to say inhumane. The resection of the intestines, bladder, etc., with the tumor is a procedure which we may leave to our German *confrères*.

We may briefly summarize the treatment of carcinoma ovarii by saying that when we are reasonably sure of the presence of advanced malignant disease we should be content with trying to make the patient as comfortable as possible by administering opium freely, withdrawing the ascitic fluid when necessary, and building up the general strength. Ovariectomy in cases of adherent solid malignant tumors is always dangerous and the result is questionable; nevertheless it is now generally held that the patient should be given the benefit of the doubt. A considerable number of patients do not survive the operation.

2. *Cystic Tumors of the Ovary*.—A. *Dermoid Cysts*. They form between three and four per cent. of ovarian cysts. These curious growths are congenital unilocular cysts, the walls of which present a more or less perfect epidermal structure, while their interior is filled with caseous material, in which are often found hair, teeth, bone, etc. These cysts are always simple, are usually single, and seldom reach a size larger than a man's head. I have examined specimens of multilocular colloid cystomata, a few loculi of which presented a well-marked dermoid structure, and contained hair and teeth; as a rule these tumors are homogeneous.

Etiology.—Dermoid cysts are not peculiar to the ovary, being found in the mouth and pharynx, in the testicle, and in other localities, but their origin in each organ is equally obscure. It is impossible to enter into a minute discussion of the different theories; suffice it to say that there are two principal ones, some authorities believing that there is an inclusion of abnormal structures in the foetal ovary, while others affirm that these curious tumors are caused by excessive growth of the ovarian elements. Others, drawing upon their scientific imagination, advance the theory of "fœtus in fœtu," or inclusion of an imperfect within a perfect one, or of "hypererchesis"—an inherent power possessed by the ovum of forming certain rudimentary tissues without the assistance of the male germ. In the absence of any better explanation the reader may accept Elsner's statement, that "dermoids occur externally and internally in places where the epiblast dips down to meet the hypoblast, and where, by

processes of grooved involution, new bodies are formed, such being, first in order, the testicle and ovary, and that they are therefore all, without exception, embryonal in their first structure." Dermoid cysts are frequently found in young children, and their development seems to belong to the period of puberty and greatest sexual activity, about two-thirds of the growths occurring in women under thirty. It is probable that a large proportion of them exist at birth and grow very slowly until puberty, when they share in the development of the pelvic organs and enlarge rapidly. It has been shown that the presence of dermoids seems to retard the time of puberty.

Gross Anatomy.—A typical dermoid cyst is commonly intra-pelvic, being about the size of a large orange or of a foetal head at term, and is lodged in Douglas's pouch. It has a smooth exterior, a wall of variable thickness, and a consistence differing according to the degree of fluidity of its contents. The relations of the tumor to the tube and broad ligament are not always clear, on account of the frequent occurrence of inflammatory adhesions, which these cysts are extremely liable to contract. On section it will be found that the wall is thick, almost cartilaginous in some places, and quite thin in others. It has not the smooth, epithelial lining of a simple cystoma, but presents in many places a rugose appearance, resembling that of the hands after being dipped for some time in hot water. A cyst which has become the seat of suppuration and necrosis may lose its original appearance, so as to resemble the sac of a pelvic abscess, while its contents are transformed into fetid pus. Long, coarse hairs are frequently seen growing from this epidermal lining. The cyst-contents vary from a thick, oily fluid in which float cheesy lumps, to a solid mass similar to that found in an ordinary wen. This is partly fluid at the temperature of the body, but rapidly hardens. Large masses, or coils, of blond (rarely dark) hair are often found in these cysts; the hairs are sometimes several inches long, and may form regular locks. Bone and teeth, when present, are usually partly embedded in the epidermal layer, or they may be contained in diverticula; the bits of bone are mostly of irregular shape, and contain but little cancellous tissue. The teeth are separate, or attached to an alveolar process; they are usually rudimentary, although they may closely resemble normal teeth. They may be present in enormous numbers (three hundred were found in a single cyst), and are found in about one-fifth of the cases. Smooth muscle-fibres, and even nervous substance, have been found in dermoid cysts. Mixed dermoid and colloid, and dermoid and sarcomatous tumors have been described. Dermoids rarely show a tendency to form metastatic deposits.

Minute Anatomy.—Sections through the thicker portions of the wall show the ordinary structure of epidermis, including the epithelial layer and corium, the latter sometimes including papillæ. Hairs (with the arrectores pili), sebaceous- and sometimes sweat-glands, are present as in sections of the skin. The cyst-contents under the microscope are seen to consist of cholesterin, oil-globules, fatty, degenerated epithelial cells, and amorphous matter.

Clinical History.—Since the tumors are of slow growth and remain latent until after puberty, they may give rise to no symptoms whatever. On the other hand, from their tendency to become inflamed and to suppurate, dermoids are the most dangerous of the non-malignant ovarian cysts. As they are commonly intra-pelvic and become adherent to neighboring organs, especially to the posterior surface of the uterus, they may cause displacements and pressure-symptoms. Rectal and vesical troubles are common. Pain, out of proportion to the size of the growth, is frequently present, due probably to sub-acute peritonitis. Evidences of local inflammation, elevation of temperature, hectic, and other signs of suppuration in a patient with a small pelvic tumor of slow growth should always awaken suspicion of threatening perforation from a dermoid cyst; the diagnosis will be verified if there is a sudden discharge of the characteristic caseous matter (containing tufts of hair) from the rec-

tum, vagina, or rarely from the bladder. Symptoms of peritonitis quickly follow rupture into the peritoneal cavity, death being the almost inevitable ending.

Diagnosis.—A small, thick-walled tumor, of very slow growth, situated in Douglas's pouch and fixed there by adhesions, occurring in a young woman, is likely to be a dermoid cyst, although the diagnosis is never certain until the abdomen is opened, and the contents of the cyst are removed by puncture or are evacuated spontaneously. The conditions most likely to be mistaken for dermoid cyst are small ovarian and parovarian cystomata, solid tumors of the ovary (also subperitoneal fibroid of the uterus), pelvic abscess, enlargement of the tube, and possibly tubal pregnancy. Unless the case has been under observation for some time, a positive differential diagnosis can seldom be made, unless we resort to explorative puncture with a fine hypodermic needle (through the vaginal vault), or suppuration occurs and the contents of the cyst are discharged. Puncture is not entirely devoid of danger, and the fluid is usually too thick to flow through a small cannula; the surgeon should be prepared to operate if this procedure is followed by signs of suppuration or peritonitis. All the signs described as characteristic of dermoid growths—location, slow growth, size, absence of distinct fluctuation, etc.—are present in most of the conditions above mentioned. Rarely bones or teeth may be felt on vaginal examination.

Prognosis.—These cysts being intra-pelvic, and generally adherent, may cause dystocia during labor; moreover, they are apt to suppurate in consequence of the injury to which they are exposed at this time. They rarely attain a sufficient size either to cause disturbance of the abdominal or thoracic viscera, or to exhaust the general health. Localized peritonitis is a common complication, and the inflammation may become general and fatal. Suppuration and perforation of the cyst may result fatally from the drain upon the vital powers, or from peritonitis. Fistulous openings in the abdominal wall sometimes result and are slow to heal; if the cyst communicates with the rectum or bladder (especially with the latter), the subsequent history of the case is similar to that of a pelvic abscess under the same conditions. Septicæmia is a real danger in these cases. The prognosis of laparotomy is somewhat doubtful, because of the frequent presence of firm adhesions.

Treatment.—The knife alone offers any prospect of cure, aspiration being contra-indicated. It may be stated briefly, that a dermoid cyst should be either incised freely and drained, or removed, or let alone. Aspiration of a portion of the contents is certain to be followed by suppuration, necessitating a subsequent incision—provided that the sac does not rupture spontaneously. Moreover, the fluid is seldom or never sufficiently thin to escape through even the largest-sized needle. The needle may, of course, be introduced as a guide, and a narrow-bladed knife may be passed in by the side of it—in short, the *modus operandi* is that followed in opening pelvic abscesses, viz., a free incision, followed by the introduction of a good-sized drainage-tube, through which antiseptic irrigation can be practised. This method of treatment is, of course, only suitable to cases in which the cyst is of moderate size, is firmly adherent, and is situated so low in the pelvis that it is directly accessible through the posterior fornix. Symptoms of suppuration indicate the necessity of immediate interference. The complete removal of the cyst is the desideratum, and this is often effected before its true character is recognized. The management of complications will be described elsewhere.

The operation is generally rendered difficult by the existence of general adhesions, out of which the tumor should be shelled entire, since it is desirable to avoid puncturing it if possible. It will usually be necessary to make a longer abdominal incision than is necessary for simple ovarian cysts. If the trocar is introduced and the characteristic oily fluid begins to flow, the surgeon should exercise more than usual care to prevent it from entering the peritoneal cavity; some operators withdraw the cannula as soon as they recognize the character of the cyst, close

the puncture with the finger or with a stitch, and enlarge the abdominal wound, so as to lift out the entire mass. If the cyst is firmly adherent, we are advised by most writers to follow the usual course in such cases, viz., to open, empty, and wash out the sac, to introduce a drainage-tube into it, and, finally, to stitch it into the abdominal wound. Much judgment is required in deciding upon the proper management of this complication. If the cyst is of moderate size and is accessible through the vagina, I should prefer to close the abdominal wound and to incise and drain the sac in the manner previously described, rather than to draw it up forcibly out of the pelvis and secure it as recommended.

The treatment of dermoid cysts with fistulous openings into one of the hollow viscera is unsatisfactory; the ordinary surgical rule should be followed of making a free incision, and endeavoring to promote the collapse of the sac by granulation and adhesion of its walls. Extirpation is sometimes possible, especially if the tumor is abdominal.

B. *Ovarian Cysts Proper.* Under the general term "ovarian cysts" are included a number of growths which, anatomically, cannot properly be grouped together. Clinically, surgeons have fallen into the habit of regarding as cysts tumors which are nearly, or entirely, of a solid character, while pathologically these may exhibit all degrees of malignancy. But in a practical article like the present it would be pedantic to insist upon a strict anatomical classification. We shall divide cystomata broadly into the simple and proliferating varieties, considering subsequently variations from the common type, both benign and malignant.

Etiology.—The causes are obscure, yet statistical researches have led to the establishment of certain general facts which may be stated briefly as follows: Although no age is exempt (ovarian cysts have been found in the fetus, and cases of ovariectomy in girls under puberty are recorded), they are most common during the period of greatest sexual activity, being infrequent after fifty. The unmarried and sterile are far more liable to be affected than are those in whom the reproductive organs fulfil their proper functions; the inference is that uninterrupted menstrual congestion favors the development of morbid growths, as well as diseases, of the ovary. It has been affirmed that pregnancy is a direct etiological factor in the development of ovarian cysts; it is probably more correct to say that pre-existing cysts grow rapidly under the influence of this condition, as we shall see later.

Heredity has been urged as a possible cause, but if this influence exists at all, it is probably confined to cases of malignant growth. The reason for the greater frequency of cysts of the left ovary cannot be established, as in oöphoritis. Scanzoni has sought to trace a direct causal relation between amenorrhœa and chlorosis and cystic growths, but his statistics are scanty and imperfect. There is no evidence that a woman's general condition has anything to do with the development of these tumors. It is interesting to note that while cystic degeneration of both ovaries is quite common, double cysts occur in only eight or ten per cent. of the whole number of cases, and the majority of these are either clinically or anatomically malignant.

Mode of Formation.—The ingenious illustration employed by a writer on diseases of the ovaries, of a number of soap-bubbles coalescing through the bursting of their thin walls, so as to form a single sphere, expresses graphically a simple and attractive theory of the formation of ovarian cysts—by the general dilatation and fusion of contiguous Graafian vesicles. By this theory doubtless not a few laparotomists justify the removal of slightly diseased ovaries, on the ground that the patient is thus saved from the inevitable danger of developing one or more large cysts. Attention has already been called to the infrequency of double cystomata as compared with the existence of cystic degeneration of both ovaries. Shall we accept the statement that "ovarian cystoma is the result of follicular dropsy only," or seek for some additional explanation of the histogenesis of

these protean growths? It will certainly be more sensible to examine all the evidence before coming to a definite conclusion. It must occur to the most superficial observer that, since there are so many variations in their appearance, structure, and mode of growth, it may be possible that the origin of all cannot be explained in the same simple manner. Moreover, it is not to be supposed that the subject has yet been exhausted; indeed, careful pathologists affirm that we have only touched upon it as yet, so that dogmatic statements are hardly warranted. Waiving the question as to whether a purely unilocular ovarian cyst can exist, let us consider first the probable origin of simple cysts, or those which evidently result from hydrops ovarii. Although these seldom attain a large size (they form only one per cent. of the tumors removed by laparotomy, according to Olshausen), they have been carefully studied, and there is no doubt as to their origin. Finding in a given specimen, in addition to a large cyst which shows in its interior traces of having been formed by the coalescence of several smaller ones, smaller cysts of different sizes, the smallest being dilated vesicles still containing ova, the above inference is legitimate. This is supported by further anatomical evidence, as the structure of the wall is the same in the largest cyst as in the dilated ovisac. But some writers go still further, and affirm that cystic adenomata and papillomata result from proliferation of the single layer of epithelium lining these simple cysts.

It is also true that the degeneration of undeveloped ovisacs and even of corpora lutea forms the starting-point of simple cysts. Several theories have been suggested to account for the formation of proliferous cysts, the principal one being that of Pflüger, who advanced the idea (supported by Waldeyer) that they take their origin from the germinal epithelium which penetrates into the stroma of the foetal ovary in the form of tubular ingrowths from the peripheral layer of cells; these ingrowths are subsequently separated from the surface epithelium and form isolated cell-collections in the stroma, which later develop into Graafian vesicles. Cysts are then formed, according to this theory, by the degeneration of foetal, rather than of mature, ovisacs, or in other words, germinal epithelial masses that would normally form Graafian vesicles, develop abnormally to form cysts. De Sinéty and Malassez have modified this theory by substituting for "Pflüger's ducts" certain "epithelial tubes," regarded by them as undeveloped Pflüger's ducts. Nöggerath has further demonstrated the probable origin of cysts from diseased blood-vessels, which, he holds, are the structures which others have mistaken for the ducts. All agree that the stroma takes little, if any, part in these changes, which are essentially of epithelial origin. The well-known tendency of foetal epithelium to proliferate explains the luxuriant growth of the adenomatous masses, which sometimes fill the interior of the cyst. Some have affirmed that the epithelial tubes may form and develop into cysts in the adult, as well as in the foetal ovary. On the other hand, those who assert that the mature ovisac is the origin of the cyst, explain this most plausibly by saying that after the destruction of its ovum, the epithelium of the vesicle reverts to the foetal type and thus acquires the same proliferating tendency as the foetal tube. Space does not allow a further discussion of this interesting question, but, until we possess more evidence in favor of the common origin of all varieties of cyst from the dilated vesicle, on account of the dissimilarity that exists between the epithelium of the latter and that of a proliferous cyst, it seems wiser to accept provisionally the idea of foetal formation. The investigations of Marchand and Flaishchen are in accord with this view, since they show (as I have noted in one beautiful specimen) that papillomata instead of being growths *sui generis*, also originate in the germinal epithelium, which in this case has assumed an unusual proliferating, or malignant, tendency. Recent investigations point also to the probable origin of these growths from that portion of the parovarium which enters the hilum of the ovary, thus proving that parovarian cysts are not always as innocent as has been supposed. The fluid within the cysts, vari-

able as it is in character and appearance, is formed by degeneration of the epithelial cells. Papillomata secrete this fluid very rapidly, especially when they are not confined within the interior of a cyst, but spring from their exterior; hence the occurrence of ascites with papilloma, especially when it has invaded the peritoneum. Combinations of adenoma and papilloma are not uncommon, and the tendency of such cysts to become malignant will readily be understood by reference to the peculiar character of the epithelium.

Gross Anatomy.—Simple cysts arising from dilated ovisacs seldom reach the size of a man's head; indeed, they are not often seen larger than an orange. As far as such a cyst itself is concerned, it may be regarded as unilocular, although in most instances traces of multilocularity will be found in its interior; but in connection with the main cyst there will be found smaller ones of a similar character, some of which contain ova. Or, two, or three cysts may develop simultaneously in the same ovary, and may remain separate, one being larger than the rest (so-called "oligo-cysts"); they seldom coalesce to form a single cyst-cavity. The fluid within these cysts is of a thin, serous character, having rather a low specific gravity (1.012 to 1.015), and containing albumin and sodium chloride; under the microscope only a few epithelial cells are seen. The anatomical relations of the tumor are the same as that of the ovary; its pedicle is similar to that of other ovarian cysts.

Tubo-ovarian cysts deserve a brief mention. They are formed, as their name implies, by simultaneous dilatation of a Graafian vesicle and of the corresponding Fallopian tube; the fimbriated end of the latter becomes adherent to the surface of the ovary opposite to a ripe ovisac, which ruptures and discharges its contents, when circumscribed peritonitis causes permanent adhesion, and a catarrhal process results in dilatation of the common cavity. The tumor has been compared in shape to a retort, the resemblance being more or less perfect according to the extent to which the tube is dilated. There is usually a furrow indicating the line of fusion between the tube and the cyst; moreover, traces of the fimbriae can often be seen on the inner wall.

Proliferous cysts of the glandular variety (multilocular colloid) may reach an enormous size (seventy-five or one hundred pounds), and are usually of irregular shape and variable consistence, portions of the tumor being nearly solid, while others are fluid. There may be one large cyst, containing in its interior several smaller ones, or two or three cavities of nearly equal size may exist, separated from one another by thick partitions. The smaller secondary or "daughter-cysts" are outgrowths from the wall of the primary cyst, and they may grow so rapidly as to entirely fill the cavity of the latter, so that its original character is obscured. More frequently the partitions between contiguous secondary cysts are destroyed, and several cavities are thrown into one; the traces of this fusion are long preserved in the shape of trabeculae on the inner lining of the central sac. Three distinct layers are easily distinguished in the cyst-wall, although one or more of these may be wanting—an outer serous, a middle fibrous, and an inner cellular. The wall of the principal cyst varies greatly in thickness, being rendered thick in some localities by the coalescence of the walls of several secondary cysts. Various secondary changes are evident to the naked eye, the most common being calcification (in the form of thin scales, scattered over the interior of the cyst), fatty and atheromatous degeneration, infarction, etc. The contents are exceedingly variable; indeed, from the different loculi of the same cyst four or five fluids, with totally different physical characteristics, may be obtained. It is usually of lower specific gravity in the principal cyst than in the secondary ones, which often contain a clear, semi-solid, colloid material, while the fluid in the central sac is turbid, and may be green, gray, red, or chocolate-colored, according to the presence of hæmorrhage, suppuration, fatty degeneration, etc. The specific gravity varies from 1.010 to 1.030. Spontaneous coagulation of pure cyst-fluid never occurs. Chemically, the reaction is usually neutral; albumin is present in large

amount, also paralbumin, cholesterin, fats, sodium chloride, etc. Eichwald has divided the substances found in such fluids into the "mucin-group" and "albumin-group," the former being most abundant in colloid material. The microscopical appearances will be described in the following section.

Papillomatous cysts (*cystoma proliferum papillare*) are distinguished from those of the multilocular colloid type by the tendency of the lining epithelium to proliferate and form cauliflower-excrecences instead of secondary cysts. It is, of course, impossible to draw a sharp line of distinction between the two forms, since they are sometimes combined in the same growth. Their distinguishing characteristic is the presence upon their inner wall of masses closely resembling papilloma of the bladder; these may be scattered sparsely over the interior of the cyst, or may grow so luxuriantly as to completely fill it and to burst through the wall and spread over its exterior, forming secondary deposits in the peritoneum. Such cysts do not reach a very large size, and have but few secondary loculi. The fluid is wanting in that peculiar colloid character which marks the contents of the *cystoma proliferum glandulare*. These tumors are often bilateral (in seventy-five per cent. of the cases), and differ from other cysts in being outside of the peritoneum; they sometimes grow between the two layers of the broad ligament (intra-ligamentous cysts), in which they are enveloped as in a capsule. They are frequently accompanied by ascites, especially if the papillary growths have become extra-cystic, and tend to become anatomically (as they are regarded clinically) malignant, especially after tapping.

In connection with this variety of cyst may be mentioned true papillomata ovarii, which should really be classed among the solid growths, since their only relation to papillomatous cysts lies in the fact that they spring directly from the outer surface of the ovary (from the germinal epithelium?). In a specimen in my possession, while one-half of the ovary is apparently normal, the other half is transformed into a cauliflower-mass as large as an English walnut. The tendency of these masses to proliferate and extend to the adjacent peritoneum shows that they approach closely to malignant growths. Anatomically they are identical with the similar masses found in proliferous cysts. This peculiar metastasis, it should be noted, is not confined to papillomata, since it has been observed in cases of multilocular colloid cysts, the secondary growths of which have been described as myxoma (or pseudo-myxoma) peritonei.

So-called "papillary cancer" of the ovary is nothing more or less than papillary growths in the interior of an ovarian cyst that have become malignant. These may coexist with the ordinary cauliflower-masses, and their presence may be unsuspected until they are examined microscopically; in fact, the possibility that malignant disease may be present should render us suspicious of every cyst the lining epithelium of which shows a tendency to rapid proliferation.

The vascular supply of an ovarian cyst is quite rich—the arteries run in the middle lamella of the fibrous coat, their capillaries in the sub-epithelial layer, while the veins lie in the outer lamella. These increase in size as we near the pedicle, and are accompanied by large lymph-vessels provided with valves. Nerves of considerable size have also been traced into the cyst, though their ultimate terminations are unknown.

The pedicle of the cyst deserves some mention, as it is of such great surgical importance. It is subject to every possible variation as regards its length, breadth, thickness, and the number and size of the contained vessels. It may be a slender stalk not larger than the little finger, or a thick, fleshy mass as broad as the wrist. These variations in size depend upon the changes in the thickness of the tube and broad ligament. The pedicle is described as consisting of the tube, the broad ligament, and the utero-ovarian and round ligaments, though the latter is not properly included, since it is not connected with the cyst and is seldom or never ligated. The arrangement of the venous plexuses will be understood by refer-

ence to the normal anatomy of the broad ligament; the vessels are often immensely dilated, especially the veins. The danger of torsion is greater when the pedicle is long and slender. Sessile, or non-pedunculated, cysts are often intra-ligamentous and firmly adherent.

Minute Anatomy.—A section through the wall of a simple cyst shows that it consists essentially of a layer of fibrous tissue lined by a single row of columnar, or rather, cuboidal epithelia. The fibrous layer is of variable thickness, and may be subdivided into two strata—an outer, in which the tissue is loose and interlacing, and an inner, in which the fibres are denser and more nearly longitudinal in direction. These layers correspond to the tunica fibrosa and tunica propria of the original ovisac; in some cases a localized thickening in the wall of the cyst seems to represent the remains of the cortical zone of the ovarian stroma. Secondary changes are sometimes observed, especially fatty degeneration of the lining epithelium; inflammatory processes lead to considerable thickening of the cyst-wall, which, however, may be due to external causes, such as peri-ovarian adhesions. Evidences of proliferation of the epithelium (either the glandular or papillomatous forms) are absent. The fluid presents few objects of microscopical interest, usually containing scattered epithelial cells, normal or fatty; blood-corpuscles and masses of pigment indicate hæmorrhage into the cyst. We should look for ova in the accompanying smaller cysts, as their presence serves to confirm our opinion with regard to the origin of the larger ones.

Sections through the wall of a compound cyst present different appearances according as the glandular or papillomatous element predominates. The wall of the principal sac consists of firm fibrous tissue, of variable thickness, sometimes separable into two, less often into three, lamellæ, in which will be found, from within outward, the capillaries, arteries, and veins. Smooth muscle-fibres may be found, especially along the larger vessels and near the pedicle (Sinéty). Resting upon the loose sub-epithelial layer of fibrous tissue is a single layer of cuboidal epithelium, which, in consequence of long pressure, may be flattened; some writers affirm that there are several layers, the lower ones being flattened and polyhedral. Ciliated cells are occasionally found, as well as the so-called "beaker-cells," which are simply ordinary epithelia distended by thin, mucoid contents. Large multinucleated cells, cells with serrated edges, and other transition-forms are sometimes seen. Tubular, sometimes acinous, follicles, similar to the gastric glands, are scattered throughout the field, some of them plugged with mucus; these represent the initial process in the formation of secondary cysts.

Commencing cysts may also be represented in the section by small, thin-walled cavities lined by cylindrical epithelium. In the same cyst may be found papillomatous masses, which on section are found to consist of outgrowths from the fibrous layer, covered by a single layer of columnar (sometimes ciliated) epithelium; in the midst of the delicate fibrous tissue are round and spindle cells. Secondary and tertiary projections extend from the primary one. Adjacent villi coalesce and form cyst-cavities. The dendritic masses are quite vascular. In short, the microscopical appearances are those of simple adenoma. Degeneration of the cyst-wall (fatty or calcareous) will be recognized by the characteristic changes in the cells; such changes are nearly always localized. In many spots where degeneration has occurred the epithelial lining may be entirely wanting. Suppuration, or even necrosis, is sometimes observed. The papillomatous masses may grow so rapidly as to cause atrophy and, finally, perforation of the wall; the growths should be carefully examined in these cases, as they will often show a transition to carcinoma. Inflammatory thickening of the cyst-wall is not uncommon, so that the differentiation of a fibrous tumor from a fibro-cyst is not always easy. The microscope will reveal, not only the epithelial lining of the ovarian cyst, but the cicatricial or indurated character of the tissue in the thickened portion of the wall.

Under the microscope the fluids from different cysts vary not a little as regards the character of their cellular elements. Aside from the cast-off epithelial cells, there are often found blood- and pus-corpuses, pigment-granules, fat-globules, Glüge's corpuscles, and cholesterol-crystals—all of which indicate the presence of retrograde changes, the extent of which can be estimated to some degree by the number of such elements. The cells present different degrees of fatty and granular degeneration. The so-called "ovarian cell," on the pathognomonic character of which Drysdale has laid so much stress, is merely a swollen and degenerated epithelial cell that contains a number of highly refracting granules, which are more clearly defined after treatment with acetic acid, and are thus distinguished from the smaller pus-corpusele in which two or more nuclei appear after exposure to the same reagent. Since they are found in the fluid of other cysts the lining of which is undergoing fatty degeneration, they possess no positive diagnostic value; but their absence from a cyst-fluid is a sign of some negative importance, as pointing to the fact that the cyst is probably not ovarian. Large flakes of epithelium and sprouting cell-masses possess some significance, the former pointing to extensive exfoliation of the lining, the latter to possible malignant degeneration.

Clinical History.—It is difficult to condense the varied symptomatology of ovarian cysts within the narrow limits of this paper, since a separate monograph might be written on this branch of the subject alone. A woman may have a tumor that extends to the umbilicus without suffering any inconvenience except from its weight, or, on the other hand, she may have an intra-pelvic cyst not larger than an orange that causes her great distress and affects her general health. The following is a brief sketch of the clinical features in a typical case: A patient who may have had no previous pelvic trouble begins to have some disturbance of her menstruation, amenorrhœa being more common than menorrhagia. Dysmenorrhœa may or may not be present. If one ovary remains intact there may be no menstrual trouble, and pregnancy may occur. Vesical irritability early appears, due to pressure on the neck of the bladder, while the presence of irritation of the rectum, constipation, and hemorrhoids also gives evidence of mechanical obstruction; backache, and pains following the course of the pelvic nerves, and extending down the thighs, point to the presence of some local morbid condition. An attack of peritonitis at this stage may fix the tumor and further aggravate the pelvic troubles.

After the cyst rises out of the pelvis the before-mentioned pressure-symptoms are relieved; it now occupies the inguinal region, and is often noted by the patient as distinctly unilateral. If the pedicle is long, it may move about as she changes her position in bed. As it grows it approaches the median line at the umbilicus, rises above the latter point, and begins to cause uniform distention of the abdomen, with a new set of pressure-symptoms referable to the thoracic and abdominal viscera, which may later be exchanged for evidences of actual organic disease of the affected organs. The weight of the tumor causes an unpleasant feeling of distention and weariness on making slight exertion, and the aching pains in the back and legs reappear. The diaphragm is pushed upward, and there is dyspnoea on exertion, finally becoming constant. The stomach, constantly compressed by the growing tumor, becomes extremely irritable, so that the patient can take but little food at a time and vomits easily. The intestines are crowded into a small compass behind the mass and share in the general disturbance, as evidenced by alternate constipation and diarrhœa, and sometimes by complete obstruction. Signs of venous obstruction, such as enlargement and varicosities of the superficial veins, especially those in the abdominal wall, œdema of the lower extremities and of the vulva, and sometimes ascites, develop. The patient already begins to show the drain upon her vital powers; she is restless and anxious, cannot find a comfortable position, and her sleep is disturbed.

As the cyst increases still more, the lungs are com-

pressed, the heart dislocated, and extreme dyspnoea and palpitation are noted; sudden death from heart-failure, from pulmonary congestion, or from an intercurrent attack of bronchitis, is imminent. The patient cannot sleep unless her head is elevated. The gastric irritation is now excessive, and obstinate vomiting may ensue, threatening death from inanition. Congestion of the kidneys results from pressure on the renal vessels, and albumin may appear in the urine, though without evidences of organic changes in the kidneys. Emaciation has been all the time steadily progressing and is now marked, especially in the face, which assumes the "facies ovariana" so graphically described by Sir Spencer Wells, as marked by "the expression of anxiety and suffering, the furrowed forehead, the sunken eyes, the open, sharply defined nostrils, the long, compressed lips, the depressed angles of the mouth, and the deep wrinkles curving around these angles." Death finally occurs from pure exhaustion. But the complete train of symptoms thus described is rarely observed at the present day, since, thanks to the general intelligence of the profession and the spirit of modern abdominal surgery, few patients are allowed to perish thus without some attempt being made to relieve them. Physicians of the present generation are more familiar with the earlier than with the later symptoms of an ovarian cyst.

It is highly important that every practitioner should be able to recognize promptly the symptoms denoting the occurrence of certain complications and accidents which demand instant and radical treatment. These are hæmorrhage into the cyst, suppuration of its contents, twisting of the pedicle, and rupture. If the attendant believes, or only suspects, that one of these conditions is present, it is his duty to open the abdomen without delay, even if he has shrunk from doing so before. In order to economize space, the first two complications will be described as consequences of torsion of the pedicle, since they commonly follow that accident.

A cyst of moderate size, perfectly movable, and having a long pedicle, may undergo gradual axial rotation until the pedicle becomes strangulated. The fact that most tumors thus affected are situated on the right side, and that the twist is from left to right, substantiates Mr. Tait's idea that the accident is due to the passage of fœces through the adjacent rectum; the chief symptom, to use his words, is "the sudden accession of severe abdominal pain and tenderness, followed immediately by vomiting, which soon becomes green." A rapid, feeble pulse, and evidences of internal hæmorrhage and collapse may speedily follow. The large vessels that supply the cyst are strained to their utmost, and often rupture into the abdominal cavity. The sac rapidly increases in size, and is extremely sensitive on palpation; in a case in the Woman's Hospital, which terminated fatally in a few hours from acute peritonitis, the cyst was perfectly black, its contents being transformed into a mass of tarry, coagulated blood. If the patient survive the shock and loss of blood (the shock itself is frequently out of proportion to the size of the cyst), she will probably succumb from acute peritonitis or subsequent suppuration and gangrene of the sac, the symptoms of which will be a succession of chills, characteristic elevation of temperature, hectic, rapid emaciation, sweats, and finally general peritonitis, if death does not ensue beforehand from septicæmia. Suppuration may also result from inflammation of the lining membrane in consequence of tapping or other injury (less often spontaneously). The symptoms and result will be the same in either case.

Rupture of the cyst sometimes occurs spontaneously, but more often in consequence of violence. If the fluid is unirritating, little, if any, reaction may follow. I recall two cases of colloid cystoma in which but slight disturbance followed the accident; in fact, in one patient it was unsuspected before the abdomen was opened. Although the mortality is estimated by Aronson at forty-one per cent., cases are on record in which simple cysts (parovarian?) have apparently been radically cured in this way. The rupture of a large cyst is indicated by the sudden acute pain, evidences of collapse, and marked

change in the form of the enlargement. The mass becomes much more diffuse, and if a large quantity of colloid material is loose in the cavity it may give a peculiar, jelly-like sensation on palpation. If the patient does not succumb to shock, fatal peritonitis is apt to supervene. Nature's attempt to dispose of the escaped fluid is shown by an excessive flow of urine. In the case of papillomatous and myxomatous cysts, secondary disease of the peritoneum may be a direct consequence of the prolonged contact of their contents with the peritoneum.

A common complication of ovarian cyst is peritonitis and the subsequent formation of adhesions. The presence of the latter is indicated by recurrent attacks of peritonitis and general tenderness over the area of the tumor; it may become adherent to any or all of the pelvic organs, and to most of the abdominal viscera, thus adding further symptoms to those already due to compression. The entire extent and character of these adhesions can never be accurately estimated until the abdomen is opened. Occasionally the cyst-wall may ulcerate at the point where it is attached to a hollow viscus, and may discharge its contents in the manner described in the section on dermoids.

Diagnosis.—There are no characteristic subjective symptoms of simple ovarian cyst, other than the disturbance produced by any large abdominal tumor which displaces or compresses the viscera and impairs the general health. It is not uncommon to find cysts that are universally adherent, and are even surrounded by evidences of recent peritonitis, when the patient has given no history of inflammation within the abdomen. On the other hand, the complications which have been mentioned may be attended by most serious local and general symptoms, such as shooting pains, elevation of temperature, collapse, and even sudden death. Intra-pelvic cysts are sometimes discovered by accident in patients who are entirely unaware that they had any local trouble. Most of the points that have been noted with regard to the recognition of dermoids will apply here. Cystomata cause no characteristic symptoms, and are seldom associated with menorrhagia. On practising the bimanual a non-adherent intra-pelvic cyst will be recognized as a tense, globular, fluctuating body, usually situated behind the uterus and moving independently of that organ, which is often displaced forward. Simple cysts do not, as a rule, contract firm adhesions at this stage of their growth, and may be lifted up on the finger and mapped out between the two hands, especially if the patient is anesthetized. A suggestion of Hegar's is of value in this connection, although the procedure recommended by him should not be employed indiscriminately. It is intended to aid the examiner in determining the presence and exact origin of the pedicle of a movable tumor, situated above the pelvic brim, and is therefore not applicable to sessile growths. The cervix uteri is seized with a volsella and the entire organ is drawn steadily downward in the axis of the pelvis, while its posterior and lateral surfaces are thoroughly explored by the rectal or recto-abdominal touch. If a pedicle is felt extending outward from the fundus to the tumor, it is highly probable that the latter is ovarian. By placing the patient in the genu-pectoral posture the tumor often falls forward by its own weight. Schultze recommends the following manipulation under similar conditions: An assistant grasps the abdominal wall with both hands and pushes it toward the symphysis, then "gathers in the slack," as it were, and draws it upward, at the same time raising the tumor out of the pelvis and making its pedicle "taut." The examiner then practises the bimanual, sinking the upper hand into the abdominal wall below the tumor so as to grasp and explore the lateral borders of the fundus uteri. The relations of the pedicle will then be made out as before. This method is best applied when the muscles are relaxed by an anæsthetic. A rectal examination may throw light upon a doubtful case. Withdrawal of a small quantity of fluid for microscopical examination is legitimate when the cyst is easily accessible through the posterior fornix.

A retro-uterine ovarian cyst may be mistaken for either

of the conditions mentioned in the section on dermoids; a careful history of the case will usually serve to exclude sanguineous or purulent collections (hæmatocele, pelvic abscess), while the shape of the tumor and its distinct fluctuation will render it probable that it is not a solid growth, either of the uterus or ovary. It would seem unnecessary to caution the reader against the possibility of mistaking early pregnancy (especially in a retroverted uterus) for a small cyst, had not this error in diagnosis been made by the most accomplished gynecologists. In women well advanced in life, whose menstruation has been irregular, who have not had any children for a number of years, and who show none of the usual signs of pregnancy, the diagnosis of this condition is often extremely difficult. The patient may be very stout, her cervix may be lacerated and the lips everted and softened, and the uterus may closely resemble the organ in the common condition known as subinvolution. If there is any doubt, the patient should be examined under ether, when Hegar's sign of pregnancy (triangular shape of the corpus uteri, with marked projection of the anterior aspect) will be found valuable. It is a far less serious matter to produce abortion by the diagnostic use of the sound than to perform explorative laparotomy and find a gravid uterus instead of a cyst. Such a uterus has even been tapped before the error was discovered. Pregnancy may, of course, coexist with a small cyst. In these cases, as well as in those of suspected extra-uterine foetation, much depends upon the menstrual history; but here, as under all circumstances, it is often necessary to keep the patient under careful observation for some time before coming to a definite conclusion.

It may be impossible to distinguish a small adherent cyst, lateral to the uterus, from an encysted peritonitic effusion; such laterally situated cysts are usually intraligamentous. Here an examination of the fluid will be of service; the same applies to small parovarian cysts. Distended tubes of large enough size to be mistaken for ovarian cysts are not so very frequent. They are often double, are continuous with the uterus, of a tortuous shape, and do not give such distinct fluctuation. The history (sterility, menstrual irregularities, dysmenorrhœa, and recurrent peritonitis) will point to the true condition. But a hydrops tubæ may be of large size, so as to exactly resemble an ovarian or tubo-ovarian cyst, even after the abdomen is opened. From an examination of many specimens of fluids from hydro- and pyo-salpinx, I have been led to attach considerable importance to the discovery of numbers of ciliated columnar cells as diagnostic of tubal contents. When the tumor is accessible through the fornix, a drop of fluid may be withdrawn with a hypodermic syringe for microscopical inspection. The procedure is not entirely devoid of danger in the case of very acrid pus from a pyo-salpinx. The differential diagnosis between ovarian and parovarian cysts will be considered subsequently. It should not be forgotten that the spleen or a kidney may be found in the pelvis, while malignant disease of the pelvic organs or bones, and the rare condition, echinococcus-cyst, are possible contingencies.

The differential diagnosis between abdominal tumors is described at length in every text-book and monograph, yet no descriptions can supply that intuitive appreciation of the "feel" of a tumor which is only gained by years of experience. As Mr. Tait says, the "sense of resistance" given by different growths, "it is quite impossible to teach." While a few diagnosticians have attained to such a degree of skill that they can, by simple palpation of the abdomen, obtain an amount of information which, to the uninitiated, seems perfectly marvellous, most men can only avoid gross errors by exhausting every means of diagnosis. The true way to arrive at the probable nature of an abdominal tumor is to consider every possible condition that could cause enlargement, and then to exclude them one by one. To do this we must first obtain an exhaustive history. The possible existence of extra-pelvic disease must never be lost sight of; many unpardonable errors in the diagnosis of tumors have been made by specialists who have allowed themselves to

ignore everything but the pelvis and its contents. A general practitioner would not be so likely to open the abdomen for dropsy of cardiac, renal, or hepatic origin, as has been done by laparotomists under the idea that they had to do with an ovarian cyst. A general history, then, is highly important. The patient's attention is, of course, directed to her abdomen; she has noticed that it is growing larger; and that may be all the information that she can offer, except that she has various pulmonary, gastric, vesical, and other disturbances, due to pressure, with perhaps venous obstructions, œdema of the lower extremities, etc. Or, if she is in the advanced stage, emaciation and the "facies ovariana" may be significant. The most important fact that she can state is that the tumor was distinctly unilateral at first, and gradually approached the median line.

Having placed the patient on the back and exposed the abdomen, we first make an inspection of it, noting its general contour, the condition of the superficial veins, the appearance of the umbilicus, etc. Palpation is next practised, by placing the palm of the hand on one side of the abdomen and tapping lightly with one or two fingers of the other hand at a point directly opposite; one hand should be kept stationary, while the percussing finger moves about over the tumor. An inexperienced examiner will readily mistake the "superficial subcutaneous wave" in a stout subject for the deeper wave in a cyst. "To muffle this fat-thrill," says Goodell, "the ulnar edge of the hand of an assistant is laid along the linea alba while the surgeon percusses the abdomen. The pressure thus exerted acts precisely like the damper-wedge of the piano-tuner, which muffles the sound of one string while its fellow is being tuned." Palpation not only gives definite information regarding the tension of the cyst and the fluidity of its contents, but we can by its aid determine with some exactness, by the manner in which the impulse is transmitted, whether the cyst is simple or multilocular, or contains portions that are solid. It is sometimes possible to detect adhesions to the anterior abdominal wall by the peculiar rubbing sensation which we get on moving the skin over the tumor. Careful examination of a cyst (unless it is so large, or is so complicated by ascites, that its relations are obscured) will usually show that, while its upper and lateral boundaries are well defined, its lower limit shades off into the pelvis and cannot be determined showing that the growth originated in the latter cavity. As regards the detection of fluctuation by external palpation, the reader should remember that until a cyst has reached the umbilicus, the sensation communicated when it is grasped between the hands is rather that of an elastic body (Olshausen). A multilocular cyst of large size may give the same elastic feel, but usually careful palpation will develop a peculiar, jelly-like vibration, or, if it is composed of numerous loculi, there may be absolutely no fluctuation. In a thin-walled ovarian or parovarian cyst, containing watery fluid, exquisite fluctuation may be obtained, so that it is difficult to believe that the fluid is not free in the abdominal cavity.

Percussion gives some additional information. With the patient lying on her back, a dull percussion-note is obtained over the entire surface of the tumor, shading off above and at the sides into the tympanic resonance of the stomach and intestines. There is no line of difference between the umbilicus and the pubes. If the tumor is so large as to fill the entire abdomen (it is assumed that in the case of smaller unilateral growths no special difficulties are presented), no difference will be observed in the percussion-note whether the patient is standing, or is reclining on either side.

Auscultation rarely adds much to the information already gained by the preceding manipulations; the negative results may be important (absence of the fetal heart-beat, of intestinal gurgling, etc.). Rarely a murmur is heard in the vessels of the tumor, especially when these are of unusual size, or when there is obstruction to the blood-flow. A peculiar rubbing or creaking sound has been described as indicating the presence of adhesions between the anterior surface of the cyst and the

abdominal wall. As Tait properly observes, it merely shows that the opposed peritoneal surfaces are dry, so that we should expect to find adhesions absent, rather than present, over this area. A kind of rubbing sensation is sometimes imparted to the finger and ear in cases in which a quantity of colloid material has escaped from a cyst and forms a layer between it and the anterior abdominal wall; but it may also be caused by the moving about of the colloid contents within an unruptured cyst. It is of slight importance as a diagnostic sign.

The vaginal examination of a patient with a large intra-abdominal cyst reveals but little that was not already discovered by external palpitation. As the tumor causes a general bulging of the fornix, or frequently none at all, no idea of its relations can be gained by the examining-finger alone, although the bimanual may furnish important information regarding its relations, mobility, etc. The cervix uteri is often so high up in the posterior fornix that it is difficult to reach it, the uterus being displaced forward and often pushed over to one side of the pelvis; retroversion is not common. The organ is not usually enlarged, unless from causes independent of the tumor (pregnancy, subinvolution, fibroid); hence the sound enters to the depth of three or three and one-half inches, with a decided anterior curve. The bladder is generally of normal size, but cases are on record in which it has been drawn up above the pubes and has covered the anterior surface of the cyst.

Having satisfied himself that he has to do with a cystic tumor that originated within the pelvis and is probably ovarian (or parovarian), the expert seeks to obtain some more exact information regarding the site and character of the pedicle, the presence of adhesions, and the probable nature of the cyst itself, whether simple, multilocular, proliferous, malignant, etc.; it is hardly necessary to add that it is a matter of daily experience for the most accomplished diagnosticians to find, on opening the abdomen, a condition of affairs exactly the reverse of what they had predicted. With our present imperfect methods, this is not surprising. How shall we decide upon the probable structure of a given cyst? The history gives some clew, although it may be misleading. For special symptoms pointing to malignant degeneration, suppuration, hæmorrhage, etc., the reader is referred to the section on Clinical History. When the abdominal wall is very thick it may be impossible to discover anything save that a tumor exists; if it is thin and relaxed we may both see the irregular, nodulated shape of the growth, which proves that it is multilocular, and may further demonstrate that it is of this character by practising palpation with the fingers of both hands over circumscribed areas, when the difference in the fluctuation at different points will indicate the presence of several loculi, containing fluids of varying density. It is of course impossible to say positively whether a sac does or does not contain papillomatous growths, although this may be suspected when a cystoma gives the impression of being solid, or semi-solid. The presence of a parovarian cyst may be suspected when the tumor is of slow growth, causes little, if any, general disturbance, has thin walls, and gives with the lightest tap a perfect wave of fluctuation which is quite superficial, and only differs from that observed in ascitic fluid (in patients with thin abdominal walls) in being completely arrested at the opposite border of the cyst, *i.e.*, in being confined strictly to the area of dulness. It is not always possible to tell which ovary is diseased, as a cyst with a long pedicle may lie in the side of the abdomen opposite to that from which it arose. Double cysts can be distinguished when both are small and either are intra-pelvic, or have just risen above the brim; even when they are in contact a groove may sometimes be felt between them. If adhesive peritonitis occurs, the two growths may be so fused together that it is difficult, even at the autopsy, to determine the original condition. If the presence of two tumors is demonstrated, the chances are in favor of their being malignant (anatomically or clinically), since seventy-five per cent. of all double ovarian cysts are of the papillomatous variety.

Adhesions are regarded as far less significant now than

they were in former years, when abdominal surgery was hampered by a spirit of timidity that is scarcely comprehensible to modern operators; moreover, intra-pelvic and intestinal adhesions, which are most dreaded by surgeons, are extremely difficult of recognition before the abdomen is opened. As the prognosis is modified by their known existence, the method of detecting them may be described briefly. Under favorable circumstances (thin and relaxed abdominal walls), with the patient in the dorsal posture, a non-adherent cyst which does not distend the abdomen to its utmost extent will be seen to move downward at each deep inspiration; this is only a negative sign, and the reverse (an absence of movement with parietal adhesions) is not always true. Sensitiveness on moderate pressure over the tumor, with a history of a recent attack of peritonitis, will render the diagnosis of adhesions extremely probable. Collections of ascitic fluid in front of the growth (encysted peritonitis), are, in the opinion of Olshausen, indicative of parietal adhesion. Adhesions deep within the pelvis, to its floor or walls, can only be suspected on general principles, by the sensitiveness to pressure made through the vaginal roof, and by the fixation of the tumor; the determination of the mobility of intra-pelvic cysts has been described elsewhere. If the cyst has been tapped several times the existence of adhesions may safely be assumed.

Adhesions to the abdominal viscera are of great significance during ovariectomy and have an important bearing upon the prognosis, but it is possible to infer their probable presence only by marked disturbances in the adherent organ. I have noted on several occasions that patients, in whom a loop of intestine was firmly adherent to the cyst suffered from severe localized, colicky pains, especially during the process of digestion, which I attribute to the tugging of the imprisoned gut in its attempt to share in the peristaltic movement; this phenomenon is especially marked in cases in which the intestine becomes adherent to the abdominal wall after laparotomy. Adhesions to the stomach or liver may be suspected in cases in which the cyst is so large as to be in contact with those viscera, and when it is depressed simultaneously with them during deep inspiration. Adherence of the tumor to the uterus or bladder is determined by lifting it upward and noting whether the organ in question moves with it; pelvic adhesions undoubtedly exist when the intra-pelvic portion of a cyst remains fixed as the abdominal portion is pushed upward or moved from side to side. A sound passed into the bladder at once gives the relation of that viscus to the tumor; if, after emptying the bladder with a catheter, it is still drawn up over the anterior aspect of the cyst, it is doubtless adherent to the latter.

The manipulations practised for the purpose of determining whether the pedicle is long or short have already been mentioned. Sometimes the cyst has no pedicle at all, being situated beneath the peritoneum, either in the broad ligament or on the pelvic floor. An intra-ligamentous cyst is recognized by its lateral situation with regard to the uterus, to the side of which it is frequently adherent while the two move in common. If the tube can be felt, it will be found to run outward across the upper surface of the cyst.

Differential Diagnosis.—An ovarian cyst occupying the abdomen must be distinguished from every variety of abdominal enlargement, however produced. Such enlargements can be grouped most readily by reference to the organ in which they originate. First in order of frequency is ascites, whether general or encysted; then come enlargements of the uterus, bladder, omentum, and intestines, kidney, spleen, and liver; and lastly, tumors and adipose hypertrophy of the abdominal wall. Abdominal aneurism, retro-peritoneal tumors or hæmorrhages, and circumscribed abscesses, situated in various localities within the pelvis and abdomen, need not detain us, because it is only exceptionally that they have been mistaken for ovarian cysts.

Ascites.—The more obvious causes of effusion (renal, cardiac, hepatic) ought not to be overlooked, especially if œdema of the lower limbs and anasarca are present; the latter rarely occur as complications of ovarian cyst. But

there are obscure forms of ascites, due to chronic peritonitis, enlarged glands, malignant disease, etc., conditions which often elude the most astute observer. I have on two occasions seen fatal cases of laparotomy, in which the operation was performed by distinguished surgeons, where the condition was simple ascites, due to causes which could not be definitely ascertained at the autopsy. In simple ascites the differential diagnosis must be based principally upon the physical examination.

On inspection (the patient lying upon the back) the abdomen appears flatter and broader than in ovarian cyst, while there is a marked projection of the lateral abdominal parietes. Turning the patient on her side, the shape of the belly is not changed in the case of ovarian disease, while in ascites there is evident bulging of the lower side, due to the gravitation of the fluid. On measuring the circumference of the abdomen it will be found to be largest at, or just above, the level of the umbilicus in ascites, but the greatest circumference will be below that point in ovarian cyst; in consequence, the distance between the symphysis and the umbilicus in the latter condition considerably exceeds that between the umbilicus and the ensiform cartilage—a difference which does not exist in ascites. On palpating an abdomen which is distended by ascitic fluid, a visible superficial wave of fluctuation will follow the lightest tap of the finger, and will be transmitted from one flank to the other, without reference to the area of dulness; in a large ovarian cyst, on the contrary, the wave, no matter how distinct it may be, will be confined to the dull area, and will be sharply limited by the opposite edge of the tumor. Complications, such as might obscure this sign, will be considered subsequently.

Percussion over an extensive ascitic accumulation gives a tympanitic note around the umbilicus, with dulness elsewhere; as the patient is turned alternately upon either side, tympanitic resonance is noted over the flank that is uppermost, while a similar variation in the limit of dulness will be observed when she assumes a sitting posture. The explanation is, of course, purely mechanical, the variation being due to the changes in the position of the fluid, which allow the intestines to float upward. Over an ovarian cyst there is a universal area of dulness, while in the flanks and just below the ribs the tympanitic note of the colon is present, unless the tumor is so large as to completely obscure it. No difference is noted with change of position. On making a vaginal examination in a case of ascites, the uterus will be found to be perfectly movable, while there will be a general depression of the fornix, giving the impression that the cervix is retracted.

The omentum may be so thickened (cancer, tuberculosis, excessive deposit of fat) that there is dulness over the umbilical region, or peritonitic adhesions may prevent the intestines from floating upward; unusual thickness or œdema of the abdominal wall, fecal impactions, etc., may also interpose obstacles. So-called "encysted dropsy," in which a circumscribed collection of fluid is confined by peritonitic adhesions, is readily mistaken for ovarian cyst. The history of the case, the situation and immobility of the tumor, and the entire absence of any relation between it and the pelvic organs, will give a clew to its true character.

In every case of doubt explorative puncture may settle the diagnosis. Ascitic fluid is clear, yellowish or greenish, sometimes turbid or sanious; it has a specific gravity, rarely above 1.015, and frequently coagulates on standing, especially if it be mixed with blood. The diagnostic importance of the "sprouting-cells" has been alluded to elsewhere. Pus and fatty-degenerated epithelial cells may be present (though the latter are rare except in malignant dropsy), and few, if any, elements resembling the "ovarian cell." Puncture of a cyst may be without results, as the fluid is too thick to flow; this negative evidence is against ascites. If cyst-fluid is withdrawn, its specific gravity will seldom be as low as in the former condition, and spontaneous coagulation almost never occurs, while the microscope shows large numbers of the peculiar cells already described. Waldeyer goes so far as to regard the absence of cylindrical epithelial cells as proof positive that a given fluid is ascitic. It must not

be forgotten that an ovarian cyst may co-exist with ascites, when the former may easily escape detection, especially if the abdomen is greatly distended; the diagnosis is often cleared up by withdrawing a portion of the ascitic fluid. Not infrequently malignant nodules in the peritoneum are plainly felt after a few ounces of fluid have been removed, and the patient is spared an explorative incision. Some surgeons prefer to resort to the latter measure in all cases of doubt, claiming that in this way a removable tumor is often discovered, and the patient is thus radically cured, whereas, after tapping alone there always remains some doubt regarding the exact pathological condition. Perhaps a combination of the two methods of diagnosis might be recommended, the surgeon being prepared to operate if the information obtained by the puncture is not sufficiently definite.

Pregnancy.—The general practitioner can afford to bear in mind the possibility of error in this direction, when he remembers that the most famous laparotomists have opened the abdomen to find that the tumor which they mistook for a cyst was the gravid uterus. The history may be entirely negative or misleading, especially if menstruation has been irregular, if the patient's age is somewhat advanced, and her general condition is such as to warrant the impression that she is suffering from some chronic disease. Hydramnios and death of the fetus may render the condition still more obscure. Certain cardinal facts should be borne in mind, chief among which are the existence of contractions in the gravid uterus, of fetal movements and heart-beats, the characteristic alterations of the portio vaginalis (especially in primiparæ), and the fact that the latter is continuous with the tumor—assuming that it is impossible to recognize a fetal part. But every characteristic sign may be wanting, when the only proper course is to *wait*, keeping the patient under constant observation. The possibility of pregnancy and ovarian cyst co-existing should not be forgotten, but under these circumstances the history of the case has usually shown the pre-existence of a tumor, although sometimes it is not discovered until during or after labor.

Fibroids and Fibro-cysts of the Uterus.—A. Fibroids. The history of the patient will show that the tumor was of comparatively slow growth, that when first noticed it was near the median line, and that menorrhagia was a prominent symptom—unless the tumor is sub-peritoneal and is attached by a long pedicle. A semi-solid colloid cyst may convey to the palpating finger the impression that it is quite solid, but it will rarely feel so firm and unyielding as a large fibroid; on examining per vaginam a dense mass is felt which often fills the pelvis and is immovable. If the entire growth is seized by an assistant and is moved in different directions, the uterus will be felt to move with it; the depth of the uterine cavity, as measured by the sound, will probably be found to be upward of four inches. The patient's general health, it may be stated, is usually very fair in the case of fibroid disease; her facies is anæmic rather than "ovarian."

B. Fibro-cysts. I am sure that these tumors are not so rare as they were formerly represented, before laparotomy began to be performed so generally. They are very often mistaken for ovarian cysts, for unfortunately there is no sure means of distinguishing the two except by a resort to abdominal section. The history is an uncertain guide; they grow slowly and often remain solid for a long period—an important point if the patient has remained under observation for some time. The general health often remains surprisingly good, and menorrhagia is frequently absent, if the tumor is pedunculated. The growth is median, is continuous and moves with the uterus, and the cavity of the latter is usually elongated. On palpation the uterine tumor gives in some places a firm feel, in others an elastic, and in others an obscure sense of fluctuation, or the fluctuation may be general, but always deep-seated and indistinct. The indescribable sensation conveyed by a colloid cyst is absent, being replaced by the elastic resistance given by the thick wall of the fibro-cyst. On tapping, the fluid from the latter source is thin and serous, containing comparatively little albumin, un-

less it is mixed with blood; its peculiar characteristic is its tendency to coagulate rapidly and firmly. The microscope reveals few elements except blood- and lymph-corpuscles, epithelial cells being absent. The existence of the "fibre-cell" of Atlee is questionable. The non-coagulability of ovarian cyst-fluid has already been mentioned.

If, as happens in the majority of cases, the abdominal cavity is opened, the exterior of a fibro-cyst appears of a dark, bluish hue, showing a firm fasciculated structure, and its vascular supply is seen to be unusually rich; an ovarian cyst, on the contrary, presents a pearly, glistening appearance, and is not particularly vascular. Palpation of the former cyst shows that it has a thick elastic wall, while the wall of the latter appears to be thin and membranous.

Distention of the Bladder.—A hyper-distended bladder has been tapped under the impression that it was an ovarian cyst. The subjective symptoms, the dribbling of urine which frequently attends this condition, the position of the tumor, and its rapid growth ought to render the diagnosis clear; the passage of a soft catheter will soon dispose of the tumor.

Tumors of the Omentum, etc.—Tumors in and behind the peritoneum, tumors of the omentum, etc., may be mistaken for ovarian cysts. Malignant disease is the most frequent condition. Reference has already been made to the symptoms. The rapid decline of the patient, the shooting pains, the rapidity with which ascitic fluid appears and re-accumulates after tapping—all point to the probable condition. Before, or after, tapping, the cancerous nodules in the omentum or peritoneum may often be plainly felt. Omental cysts are extremely liable to be taken for those of ovarian origin; indeed, in fluid removed from an undoubted cyst of the omentum I found numerous cells identical in appearance with those described by Drysdale. Encysted dropsy and abscess of the abdominal peritoneum are rare conditions, which have invariably an inflammatory history, while they do not cause general enlargement of the abdomen; fluctuation is obscure and circumscribed, and but a small quantity of fluid is obtained on tapping. There are no pelvic symptoms, and a vaginal examination gives negative results. I have known an adherent knuckle of intestine low down in the groin to be mistaken for an ovarian cyst; in fact, the true condition was not recognized at the abdominal section, but after death. Hydatid disease of the peritoneum is rare and is nearly always secondary to echinococcus of the liver. The differentiation from ovarian cysts is extremely difficult, as the so-called "hydatid thrill" is seldom well-marked. Under these circumstances, removal of a small quantity of the fluid for microscopical examination, will throw light on the diagnosis.

Tumors of the Intestine.—A. Fæcal Impaction. A large mass of feces in the colon may simulate an ovarian tumor, since it may remain of undiminished size for months, although the patient affirms that her bowels are regular. There will be a history of colicky pains, gastric and intestinal disturbances, etc. The location of the tumor (in the colon, usually the transverse), its nodular and peculiar doughy feel, and its mobility, should awaken a suspicion of its true character. A vigorous course of treatment with cathartics and copious enemata will cause its disappearance.

B. Tympanites, Phantom Tumor, Pseudo-cystis. This phenomenon is purely hysterical, as the history of the patient will usually show. The abdomen is generally distended and resonant, and the spine is arched forward in a peculiar manner, the recti muscles being kept extremely tense. No fluctuation can be obtained, no solid mass is to be felt, and on changing the patient's position no change will be noted in the percussion note. Her own statements regarding her symptoms are utterly unreliable. Obesity may be present as a complication, when the tympanitic resonance is obscured. Palpation in the latter case will give a general soft, doughy sensation, no deep-seated, globular tumor being felt. A valuable method is to seize the abdominal wall firmly and make a large "plait" in it, when its thickness can be accurately

estimated. The patient should always be anesthetized, if possible, when the tumor will disappear, or the signs will change to such an extent that the true condition will be recognized. Spurious pregnancy (pseudo-cyesis) is described in all text-books on obstetrics, and need not detain us here; the age, condition, and character of the patient (especially if she is sterile), and the state of the uterus and mammae, will point to the true character of the affection.

Tumors of the Kidney. Solid tumors of the kidney, or the displaced organ itself, are occasionally mistaken for malignant or semi-solid ovarian growths of moderate size, but the same rule applies here as in every case of enlargement of one of the abdominal viscera, *i.e.*, the history shows that it began in the abdomen and grew downward, whereas the enlargement of the ovary proceeded from the pelvis upward. And moreover, the latter never becomes independent of the pelvic organs. A floating kidney, even after it has become enlarged or cystic, usually preserves its characteristic form, and can often be pushed back under the ribs. Cystic enlargement of the kidney (hydro- and pyo-nephrosis, cystic degeneration, and hydronephrosis) is often difficult to distinguish from ovarian cyst. The points of difference in the history are important, especially the existence of calculus, hæmaturia, lumbar pain, etc. A renal cyst begins in the lumbar region and grows out from below the ribs, behind the intestines, the transverse colon intervening between it and the liver. An ovarian tumor lies in front of the intestines, except in those rare cases in which the gut has become adherent to its anterior surface. Examination of the fluid withdrawn from a renal cyst may, or may not, give positive results; we frequently find in addition to the albumin a quantity of urea and urates, which could only exist in a kidney-cyst, while the microscope shows pus, blood, pelvic and renal epithelium—evidence which, united to the history and the other facts, suffices to confirm the diagnosis. But in a large hydro-nephrotic tumor the smell, appearance, specific gravity, and chemical and microscopical character of the fluid may be quite misleading. The absence of ovarian cells and the comparatively small amount of albumin furnish negative evidence in favor of the cyst being of extra-pelvic origin. The urine in the case of the renal enlargement sometimes contains albumin and pus or blood, but it may be quite normal.

Enlargements of the spleen and liver hardly require more than brief mention. They both begin at the margin of the lower rib, the former on the left, the latter on the right side, their areas of dullness being continuous with those of the normal splenic and hepatic dullness, and separated from the pelvis by a resonant area, so that their independence of the latter is evident. They are depressed on deep inspiration. The edges of both tumors and the characteristic notch in the spleen can usually be felt. A careful history of the case, and an examination of the blood will aid, or serve to confirm, the diagnosis.

The reader must not infer from this brief *résumé* of the diagnosis of abdominal tumors that the character of an enlargement can be unerringly defined by applying the rules usually given. On the contrary, a large proportion of them are of a very obscure nature, and even explorative laparotomy does not always throw light upon doubtful points. The general tendency among laparotomists, at the present day, is to treat lightly the making of an exact diagnosis in these cases; explorative incision is, in their opinion, such a certain, and, at the same time, safe means of ascertaining the character of an abdominal tumor, that there is no reason why it should not be resorted to at once. It remains for the general practitioner to show the specialist that careful observation and the proper application of the rules of physical diagnosis may render the experimental use of the knife unnecessary, and (in cases of malignant disease, at least) may save the patient from incurring risks which are, in spite of our vaunted antiseptics, still considerable. Moreover, at the present day few operators like to report "incomplete" operations, and hence many explorative incisions culminate in rash attempts to remove tumors that ought never to have been touched, since a fatal termination in consequence of

shock or hæmorrhage was practically a foregone conclusion.

Prognosis.—This varies with the character and rapidity of growth of the cyst and the occurrence of complications. A simple cyst gradually increases in size for two or three years without affecting the patient's health or causing any disturbance by reason of its size; it may then cease to enlarge, or it may suddenly begin to grow more rapidly. Rarely cysts exist for years without causing much disturbance or sapping the vital powers. The patient usually dies from exhaustion, aggravated by dyspnoea and venous obstruction, as well as gastric irritation. Or, being already enfeebled, she may be carried off by some intercurrent pulmonary or intestinal trouble. Death from cardiac paralysis is not unheard of; obstinate and uncontrollable vomiting may cause the fatal ending. Complete intestinal obstruction has been occasioned. Proliferous cysts grow rapidly, and terminate within a few months; malignant cysts tend to form secondary deposits, lead to ascites, and run a rapid course. Small intra-pelvic growths may become impacted, and cause inflammation and sloughing of the pelvic organs, while the serious consequences which follow labor under these circumstances are well known. It is a well-recognized fact that a certain class of ovarian cysts rapidly tend to become malignant, and since we have no means of determining positively before operation whether any given tumor is assuming, or may assume, this character, it follows that the prognosis is always doubtful; recent investigations have shown that parovarian cysts, that were formerly regarded as entirely innocent, are no exception to this rule, since they proliferate like the rest. Any one of the various complications previously described may result fatally. Localized peritonitis, due simply to friction, may become general, while rupture or suppuration of the cyst may cause death from peritonitis or septicæmia. Twisting of the pedicle, if it does not speedily lead to a fatal termination from hæmorrhage into the cyst and shock, is usually followed by sloughing of the sac and fatal peritonitis.

Does an ovarian cyst ever undergo spontaneous cure? The fluid is never absorbed so long as it is contained within the sac, and it is irrational to believe that the sac can ever undergo the retrograde changes which take place in an abscess-cavity, whereby the pus is absorbed and the cavity obliterated. As long as the cyst is freely supplied with blood through the pedicle, it tends to grow and to secrete fresh fluid from its walls. Should rupture take place and the fluid escape into the peritoneal cavity, in those rare cases in which the woman survives shock and peritonitis, the opening in the sac closes and the contents re-accumulate. Cases have been reported in which patients survived partial torsion or compression of the pedicle, and the circulation through the cyst was so far interrupted that it atrophied and even became completely detached. To summarize, there is no prospect of relief from an ovarian cyst except by surgical aid; ninety per cent. of the patients die within two years after first coming under observation, if not thus relieved.

Treatment.—This part of the subject may be dismissed in a few words. In the present condition of abdominal surgery an ovarian or parovarian cyst admits of but one form of treatment—ovariotomy. Tapping is now recognized as an unscientific procedure, which not only exposes a patient to the danger of peritonitis from the escape of fluid into the peritoneal cavity, or of hæmorrhage from the wounding of vessels in the cyst-wall, but also leads to no small risk of suppuration of the sac. A polycyst can never be completely emptied by tapping, and it rapidly refills, each operation proving a serious tax upon the patient's vital powers; in fact, the procedure, at first simple and without unpleasant after-effects, may, if frequently repeated, be followed by a serious reaction, so that it hardly seems as if the patient would survive it. But the most serious objection in the mind of the surgeon is that the effect of repeated tapplings is to cause the formation of adhesions, that seriously complicate the radical operation, which sooner or later must be resorted to. There is good evidence that a proliferous cyst, if frequently

emptied, tends to assume a malignant character. In this connection it is well to caution the reader against accepting the general belief that a parovarian cyst, if once tapped, will disappear; on the contrary, such cysts often refill and undergo papillomatous degeneration. Probably a large ovarian cyst ought never to be tapped, unless the surgeon is prepared to open the abdomen, except during labor, when it is necessary to relieve the pressure at once (in cases of great dyspnoea, vascular obstruction, etc.), and when the patient is too weak to survive the radical operation, or where the sufferer herself desires to try the effect of tapping before submitting to ovariectomy. It is unnecessary to describe the operation, in which the aspirator is to be preferred to the trocar. A firmly adherent intra-pelvic cyst sometimes causes such pressure-symptoms that it is necessary to aspirate it through the vagina; to follow a strictly expectant plan would be to expose the patient to the danger of spontaneous rupture, with the usual fatal consequences. The cyst being so small that it could not be drained through the abdominal wall, there remains no other course but to remove its contents and to wash it out with an antiseptic solution, incising freely, and draining it if suppuration ensue. Noeggerath's plan of stitching the edges of the cyst in the vaginal wound has given good results. The sac closes by granulation.

The injection of iodine into cysts after tapping has been abandoned, not only on account of the doubtful results, but of the positive danger which attends this practice; moreover, many of the radical cures reported from this treatment were probably, as Dr. Goodell observes, obtained in cases of simple parovarian cysts where tapping alone might have been equally efficacious.

Electrolysis was at one time supposed to offer a simple and sure means of curing ovarian cysts, without risk to the patient. It is safe to say that it will never be regarded with favor except by a few enthusiasts. Ovariectomy is the only rational way of dealing with the disease, which was formerly regarded as incurable, but is now recognized as the most legitimate and hopeful subject for surgical interference.

Parovarian Cysts.—A brief allusion to these growths cannot well be omitted. They result from distention of one or more of the parovarian tubules, which are situated in the folds of the meso-salpinx; they are nearly always monocular, are of slow growth, and frequently rupture spontaneously and do not refill. They are distinguished from ovarian cysts, first of all, by their situation between the folds of the broad ligament below the Fallopian tube, which passes over their upper surface, while the ovary is found attached to the cyst at a lower level. As Doran has shown, they sometimes contain papillary growths. They have a thin wall, lined with a single layer of columnar epithelium, often ciliated. The fluid is thin, colorless or opalescent, with a very low specific gravity (1.002 to 1.008), containing a trace of albumin and no paralbumin. Few cell-elements are found in it, except columnar epithelia. These cysts seldom cause either local or general disturbance, unless they develop papillary growths, a complication which has been observed after tapping. They seldom attain a large size, and are not subject to the accidents described as occurring in the case of ovarian cystomata, with the exception of rupture, which not infrequently takes place; the fluid being absolutely bland, no reaction follows. The cyst may refill, though slowly. Sweeping statements have been made to the effect that they never refill after having been emptied spontaneously or artificially, but Olshausen is, perhaps, not wrong in saying that, "on the whole, the number of radical cures without extirpation or excision of the cyst is certainly small."

The anatomical and clinical differences between these growths and cysts of the ovary are sufficiently evident. Their lateral position with regard to the uterus, their slow growth, the thinness of their walls, and the distinct wave of fluctuation obtained on palpation, point to their true character, while diagnostic puncture reveals their peculiar watery fluid.

Puncture has been universally recommended, but, in view of the possibility of an error in diagnosis, of the dan-

ger of recurrence of the cyst in a less benign form, and of the ease and safety with which it can be extirpated, the radical operation is to be preferred. However, the tumor is sometimes firmly adherent, and no pedicle can be found, so that it is necessary to enucleate it from the broad ligament. If this is impossible, I should feel safer to stitch the edges of the non-removable portion of the cyst into the wound and to drain it, rather than to leave the adherent part in the cavity without introducing a tube; the latter practice has often been adopted, however, with good results. *H. C. Coe.*

OVARIOTOMY. The method of performing ovariectomy has undergone many changes in the past twenty years, and is now much simpler and more uniform than it used to be. While it cannot be said that there is any standard or universally accepted operation, the differences are chiefly in details, many of them comparatively unimportant. No attempt will be made in these pages to describe all the methods of operating adopted by even the more eminent surgeons, but the operation will be treated of according to the writer's own experience, or that which has come under his observation, in a large number and variety of cases. Success in ovariectomy, whatever method be chosen, depends largely upon attention to details apparently insignificant in themselves, but in the aggregate often capable of determining the issue. This may be said of all operations, but it is especially true of those which involve the peritoneal cavity. The preparation of the patient, her surroundings, the operation itself, and the after-treatment, will be dealt with separately, and as concisely as the nature of the subject will admit.

THE ROOMS.—The room in which the operation is to be performed is to be selected with care, and likewise the room to be occupied by the patient afterward. Special attention should be given to the operating-room. In hospitals there is usually little difficulty in securing perfect cleanliness. In private practice personal attention must be given by the operator or his assistants to the thorough preparation of the room. It should be large, well lighted, well ventilated, as free as possible of furniture, having an open fireplace, and not having bath- or water-closets adjoining. Where all these conditions cannot be obtained, the lack may be somewhat counterbalanced by additional care and vigilance. In any case, the room is to be made perfectly clean and aseptic by every means available. If the walls and ceilings are painted they can easily be thoroughly washed, first with hot water, and afterward with warm water to which pure carbolic acid has been added in the proportion of two ounces to the gallon; or bichloride of mercury, one drachm to the gallon. The wood-work and all recesses and corners are to be cleaned in the same way. If the walls are papered they can be made tolerably free from dust by using a damp cloth and the antiseptics. The floor, if not very old, is better without a carpet, and should be thoroughly scrubbed; but if the carpet is new and clean it will suffice to have it entirely covered with new, clean, cotton cloth, which is tacked over it in every part of the room. After the final cleansing the windows should be closed, and the room is not to be disturbed until two or three hours before the operation. The use of carbolic spray, for at least one hour immediately before operating, is recommended as a means of precipitating the finer particles of dust; a five per cent. solution of carbolic acid may be used. The temperature of the room during the operation must not be allowed to fall below 75° F. Only such furniture as is necessary is to be put in the room, and it is better if not upholstered. In guarding against any possible danger from unwholesome surroundings, no detail, however small, is unimportant. All curtains are to be removed, and the blinds must be made perfectly clean. All sheets, towels, and gowns to be used during the operation should be soaked in the hot carbolic solution, dried rapidly, and put away until needed. The room to be occupied by the patient need not have the same care bestowed on it as the operating-room, but, of course, should be well purified. It should, if possible,

