

TUBERCULOSIS OF THE FEMALE GENERATIVE ORGANS.

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For the past few years it has been our custom to examine systematically all pathological specimens pertaining to the diseases of women which have come within our reach, our material being derived from the operating as well as the autopsy table. During the past two years we have accurately described all specimens in the fresh state and then hardened them for microscopic study, whether they appeared to be of interest or not. This systematic method of examination has resulted in considerable information both of a practical and scientific character. Among other things it has served to demonstrate that tuberculosis of the female generative organs is of far more frequent occurrence than is generally supposed, and that, instead of being merely a pathological curiosity, it should be regarded as a disease of practical interest and importance.

In the present article we will endeavor to present our own observations on the subject, and at the same time will combine with them what other work has been done in this field, so that we may be able to present the subject in its entirety.

HISTORY.

Genital tuberculosis has been known to exist for a great length of time, but it is only within the last few years, since the adoption of laparotomy for the cure of tubercular peritonitis, that it has assumed an important position as the possible mode of origin for that affection. Previous to that period it was only of interest as an occasional find at autopsies on phthisical women, who might or might not have a tubercular peritonitis.

The first undoubted case of this character was described by Morgagni²³ in 1744, who, at the autopsy on a girl of twenty years, dead of tubercular peritonitis, found both the tubes and uterus filled with caseous material, and the ovaries and tubes so matted together by

adhesions that it was impossible to separate them, and did not hesitate to consider the genital tuberculosis as the starting-point for the entire trouble. The case is so clearly described that there can be no doubt as to its authenticity.

In the early part of the present century, cases were described by Louis¹³³ and Senn,¹⁰² but the affection appeared to be lost sight of to a great extent, for no mention was made of it in the classical works of Bayle, Laennec, or Andral. It was first brought prominently to the attention of the profession by Reynaud,⁹⁴ in an article entitled "*De l'affection tuberculeuse de l'utérus*," in which he accurately described two cases of great interest, occurring in phthisical patients, and stated that it was no doubt of frequent occurrence and that he was certain, now that he had directed attention to it, others would soon describe similar cases. His predictions were soon fulfilled and within a year or so several additional cases were reported, and since then they have become too numerous to be readily counted.

Of course, at that period the general uncertainty as to the significance of tuberculosis and its pathological entity applied as well to the genitalia as the other organs of the body, and we find all varieties of growths described as tuberculosis or tubercle of the uterus. Thus, for example, we find Waller¹²² (1842), in a learned article on "*Tuberculosis uteri*," describing ordinary cases of uterine myomata and saying that they were identical with the "fleshy tubercle of the womb" as described by William Hunter.

With somewhat more excuse, we find Osiander⁸⁸ (1840) describing a case of myoma uteri with multiple areas of necrosis as a case of "softened tubercles in the substance of the uterus acting as an obstacle to labor," and Düntzer⁸¹ the same year describing some form of degenerated polypi or submucous myomata as "steatomatous and tuberculous degeneration of the walls of the uterus."

Nabothian follicles also were frequently confounded with tuberculosis, and we find Lisfranc⁸⁸ (1842) falling into this error and stating that tuberculosis of the cervix represented the most readily curable form of tuberculosis; for it was only necessary to puncture the individual tubercles with a bistoury for them to discharge their contents and heal permanently.

The same mistake was made by Thiry¹¹³ in 1842, who stated that tuberculosis of the cervix was the most frequent form of genital

tuberculosis, as well as the least dangerous. Indeed, he rather considered it a good thing to have, for he stated that the women who had tuberculosis of the cervix, rarely had tuberculosis of the lungs; but if they had the latter and were fortunate enough to develop tuberculosis of the cervix, their general condition would be greatly improved, as in this event there would be a determination of the process to the uterus. With all this error he managed to combine some truth and gave a very good description of several undoubted cases of tuberculosis of the uterus itself.

Amid all this confusion and error, some good work was done, and in 1834 Boivin et Dugés,¹⁰ in their atlas, described and gave an excellent drawing of an undoubted case, in which there was tuberculosis of the uterus, tubes and one ovary.

Gradually the ideas concerning genital tuberculosis became more definite and the articles of Kiwisch,⁵⁶ Geil⁵⁹ and Paulsen⁵⁶ on tuberculosis of the uterus were so complete that we can add but little to them at the present day.

One of the interesting features of the history of this affection is the fact that the majority of the writers on the subject stated that tuberculosis of the ovary was of such rare occurrence, even if it ever occurred, that its consideration was perfectly useless. This statement was made by Virchow,¹²¹ Rokitansky⁹⁸ and others, in spite of the fact that several of the earliest cases to be reported were of this variety. Even as late as 1880 this fallacy had not entirely disappeared, and Brissaud¹³ made the statement that there was not a single specimen of tuberculosis of the ovary in the Museum of the College of France. As progress was made in the study of the affection, it was found that it was not always secondary to tuberculosis elsewhere in the body, but that in rare instances it was primary in the genitals. This naturally gave it a more important place in the nosology, but until very recently its importance has been more of a scientific than practical character.

The suggestions of Cohnheim¹⁸ and Verneuil¹¹⁹ that in some instances the disease might be the result of infection by sexual intercourse between persons, one of whom has a genital tuberculosis, was readily seized upon and a considerable number of articles written in its support. This of course attracted more attention to the subject and soon made it eminently practical.

The removal by Mandach⁷⁰ in 1881 of tuberculous tubes and ovaries by laparotomy, and the discovery of tubercle bacilli in the vaginal secretion by Babes,³ soon greatly increased the interest in the affection, both from a diagnostic and operative standpoint. Owing to this interest, which has not yet subsided, a considerable number of articles have been written upon the subject during the last few years.

PATHOLOGICAL ANATOMY.

Tuberculosis of the female generative organs presents in a general way many points of similarity to the same affection in the male, and in the course of this article we shall have frequent occasion to direct attention to this fact.

While the pathological anatomy of tuberculosis affecting the genital tract is essentially the same for each organ connected with it—for the histological character of tuberculosis is essentially the same, no matter what organ it may affect—still there are minor differences, according as one or other portion of the generative tract is the seat of disease, which make it appear practical for us to consider the pathological anatomy of each organ separately.

a. Vulva.—That many cases of tuberculosis of the vulva have been described under other names is certain, for there can be no doubt that some of the cases which Huguier and others described as *esthiomene* and *lupus* of the vulva were really of tuberculous origin; while, on the other hand, it is equally certain that a considerable number of the cases described as *lupus* and tuberculosis had nothing to do with that affection, but were due to elephantiasis, carcinoma, and even syphilis.

Owing to the great uncertainty prevailing in this direction, and to the fact that most of the observations were made before the discovery of the tubercle bacillus, and as we have not met with a case of this variety, we have thought it best to consider as tuberculosis only those cases in which tubercle bacilli were found or inoculation experiments yielded positive results. Measured by this standard, we are only able to point to three undoubted cases of this variety, namely, those of Deschamps,²⁸ Chiari,¹⁶ and Zweigbaum.¹³²

In Deschamps'²⁸ case the patient, 25 years old, in the last stage of phthisis, had fallen down stairs some four months previously and had wounded herself about the vulva; since then she had leucor-

rhœa and constant itching about the vulva, and coitus became so painful that she was obliged to separate from her lover. On examination a large ulceration was seen involving the left labium minus and the fourchette and extending about 4 cm. up the vagina. Death three months later; at the autopsy, third stage of phthisis, fatty liver and kidneys, with peritoneum and internal genitals normal. Histologically the ulcer was tuberculous, and portions of it inoculated into rabbits produced tuberculosis.

Chiari's¹⁶ case also occurred in a phthisical woman, aged 30, who had most extensive tuberculous ulcers in the rectum. The vulval ulceration was similar to that in Deschamps'²⁸ case, except that it was more extensive and had involved the vagina to a greater degree; the internal genitals likewise being intact. It was thought to have resulted from infection by bacilli from the rectal ulcers, the vagina having been wounded two years previously during a very painful coitus.

Zweigbaum's¹³² case was similar to the other two, except that the process started in the vagina and only affected the vulva secondarily. In this instance also the woman died of phthisis and presented no involvement of the internal genitals.

In the last two cases, the histological and bacteriological examinations demonstrated the tuberculous nature of the ulcerations. It is worthy of mention that all three cases occurred in phthisical patients, and that the vulva and vagina were the only portions of the genital tract involved in the disease. In each case the microscopic appearance of the ulcerations was identical, and so characteristic that a probable diagnosis was made in each case. Accordingly, we may say that tubercular ulcers of the vulva may attain a considerable size and that they are usually shallow; their margins are irregular, sharply cut, slightly raised above the general surface, and of a more or less granular appearance; when the secretion is removed from the surface of the ulcer, its base is seen to be studded by a greater or less quantity of granulations, some of which are grayish and semi-transparent, while others are bright yellow in color, usually not exceeding a millet-seed in size.

b. Vagina.—Tuberculosis of the vagina is of much more frequent occurrence than tuberculosis of the vulva, and is usually secondary to tuberculosis affecting the higher portions of the genital tract,

though it may occasionally occur independently of any affection of the rest of the genitalia. It occurs either in the form of miliary tubercles or tubercular ulcers arising from their caseation and breaking down, or a combination of both forms. The miliary tubercles may be of various sizes, the largest not exceeding a millet-seed, and may vary in color from grayish to opaque yellow. The larger tubercles occasionally present a minute ulceration at their apex, indicating that they are undergoing more or less caseation and softening. By the caseation and breaking down of the miliary tubercles, typical tubercular ulcerations are produced, which vary in size, according as one or an aggregation of tubercles have taken part in their formation.

Tubercular ulcerations of the vagina present several characteristics, which in most instances serve to distinguish them from ulcerations of other origin. Their outlines are irregular and frequently present a serpiginous appearance, and their margins are sharply cut and perpendicular; the base of the ulceration is shallow, studded with granulations of varying size and color, and covered by a more or less thick layer of caseous material; and about their circumference is a reddish areola, in which many miliary tubercles may be found.

Tubercular ulcers in their extension may perforate the wall of the vagina, on which they are situated, and, according to their location, lead to the formation of vesico-vaginal and recto-vaginal fistulæ, or in some instances may extend to the vulva, as in Zweigbaum's ¹³² case.

The manifestations of tuberculosis in the vagina are in the vast majority of cases limited to its posterior wall or cul-de-sac, and in most instances do not extend below its upper third. This is due to the mode of origin in most cases; for the great majority of cases are merely secondary to tuberculosis of the uterus, and are produced by the secretions from the tubercular uterus trickling down the posterior vaginal wall. It would appear that it is only because of the resistant structure of the vaginal mucous membrane, with its many layers of stratified epithelium and its total lack of glandular structures, that it does not more often become the seat of tuberculosis; but the bacilli cannot be expected to penetrate it and reach the subjacent tissues, except in rare instances.

This explanation of its production was first given by Reynaud,⁸⁴ who described the first case of the kind on record. In his case there was phthisis and tuberculosis of the uterus and tubes, with the formation of tubercular ulcers limited to the posterior wall of the vagina.

Gusserow,⁴¹ Kiwisch⁸⁶ and others soon described other cases of tuberculosis of the vagina, and for a time it was thought that it only occurred as secondary to tuberculosis of the uterus. This view was held as late as 1873, when Klebs⁵⁹ stated that he had seen three or four cases, and that they were always secondary to tuberculosis of the uterus.

Tuberculosis of the vagina usually occurs during the period of greatest sexual activity, that is from the twentieth to the fortieth years, but may occur at any age, the extremes being represented by cases at 7 (Parrot⁸⁵) and 79 years (Kiwisch⁸⁷).

It has been found that the statement that tuberculosis of the vagina is always secondary to tuberculosis of the uterus is not based upon facts; for numerous cases have been observed which conclusively demonstrate that it may follow other forms of tuberculosis and possibly (?) be the primary seat of the disease. Thus Oppenheim,⁸¹ whose material was furnished by Orth, states that in three out of seven cases of tuberculosis of the vagina, a normal uterus intervened between the disease in the vagina and the tuberculous tubes, thus showing that secretions from tuberculous tubes may set up tuberculosis of the vagina without affecting the uterus.

It is possible that the source of infection may be removed one step further and be situated in the peritoneal cavity; for Weigert¹²⁴ has reported a case of advanced tuberculosis of the peritoneum, with slight involvement of the lungs and intestines, in which there were both miliary tubercles and ulcers in the vagina.

The urinary organs may also be the primary seat of the disease; for, years ago, Virchow¹²¹ described a case of miliary tuberculosis of the vagina, limited to its anterior wall, which occurred along with marked tuberculosis of the kidneys and bladder. A more or less similar case has also been described by Menetrier.⁷⁴ In other instances, tubercular ulcers of the bladder may extend so deeply as to lead to the formation of a vesico-vaginal fistula, with subsequent infection of the vagina, as has been recorded by Catuffe.¹⁵

The perforation of tuberculous ulcers of the rectum, resulting in the formation of recto-vaginal fistules, should also be mentioned, for cases of this variety have been reported by Babes³ and Jones⁵⁰—the case of Babes being of particular interest, for it was the first instance in which tubercle bacilli were demonstrated in the secretions of a case of genital tuberculosis in women. In this connection, a case of DeFontaine's (mentioned by Deschamps²⁸) should be mentioned, in which a tuberculous perineal abscess perforated both into the vagina and rectum, with subsequent infection of the vagina.

The cases of Chiari,¹⁵ Deschamps²⁸ and Zweigbaum,¹³² mentioned when considering tuberculosis of the vulva, serve to show that tuberculosis of the vagina may be secondary to tubercular disease other than that affecting the genital and urinary systems.

Lancereaux⁶⁶ stated that he had seen in four instances in women dead of phthisis, miliary tubercles in the vagina without any further affection of the genital tract. More or less similar cases have been described by Cornil and Rigal,²¹ Mayor⁷³ and Bierfreund.⁹ If we can only rely upon an observation of Friedländer⁸⁶ in his article on local tuberculosis—as is well known, he was an accomplished pathological histologist of wide experience—we have an instance in which a tuberculous ulcer on the vaginal portion of the cervix represented the only localization of the disease in the entire body. Be that as it may, it is readily seen, in view of the facts here brought forward, that tuberculosis of the vagina deserves more careful consideration than if it only occurred as secondary to tuberculosis of the uterus. Cases of tuberculosis of the vagina have also been described by Homolle,⁴⁷ Klob,⁶⁰ Kascherowna Rudnewa,⁵³ Mosler,⁷⁶ Späth,¹⁰⁶ Suchard and Krause,¹⁰⁹ Thiercelin,¹¹² Winter¹³⁰ and Zweifel.¹³¹

c. Uterus.—Tuberculosis of the uterus is not at all a rare affection and is met with frequently enough at autopsies on phthisical women for its general characteristics to be familiar to us all. It is nearly always secondary to tuberculosis elsewhere in the body, and is usually associated with tuberculosis of the tubes, from which the process extends to the uterus; it is frequently secondary to phthisis or occurs as part of a general infection, and in very rare instances may be the only focus of tuberculosis in the body.

A most interesting feature of the affection is that it is almost always limited to the body of the uterus, rarely extending beyond the

os internum to involve the cervix; and of the few cases of tuberculosis of the cervix on record, a considerable portion occur without any involvement of the rest of the uterus. For this reason we will consider separately tuberculosis of the cervix and of the body of the uterus.

Tuberculosis of the uterus is at first limited to the endometrium, and it is only at a later period of the disease that the muscular tissue of the uterus becomes involved; accordingly the consideration of the early stages of tuberculosis of the uterus resolves itself simply into the study of tubercular endometritis, which may occur in three forms: 1. Miliary tuberculosis, with or without the formation of ulcerations; 2. Chronic diffuse tuberculosis (caseous endometritis); 3. Chronic fibroid tuberculosis.

The first variety, miliary tuberculosis of the endometrium, when it occurs simply as a part of general acute miliary tuberculosis, is without clinical importance. Miliary tubercles are no doubt the initial lesion in nearly all cases of tuberculosis of the uterus, but as most cases in this stage are only recognized at autopsy, after death from some other cause, the disease, except in rare instances, has progressed beyond this point, and presents itself either in the form of ulcerations involving a larger or smaller portion of the endometrium or as the typical caseous endometritis. In this form of tubercular endometritis, one sees typical miliary tubercles, of varying size and color, scattered through the endometrium and usually situated just beneath the epithelium. According as the process is combined with an ordinary endometritis or not, so will the intervening portions of the mucosa be reddened or present their normal appearance; and according as the miliary tubercles have gone on to caseation and softening or not, so the surface of the endometrium will or will not present irregular, shallow ulcerations scattered over it. The examination of sections through the endometrium shows that it is studded with typical giant-epithelioid cell tubercles, some of which present more or less caseation, above which the epithelium is preserved intact. According as inflammatory changes have occurred in the endometrium or not, so we find the usual signs of inflammation in the tissue surrounding the tubercles. If the process has gone on to the formation of ulcerations we find that the epithelium over it has disappeared, and at the base of the ulcer numerous areas of caseation and isolated miliary tubercles may be seen, with more or less infiltration with leucocytes.

The second form, chronic diffuse tuberculosis, is the most frequent, and is the variety which is usually met with at autopsies, and is what one usually understands by tuberculosis of the uterus. In this variety the entire cavity of the body of the uterus is filled with caseous material, which forms a thicker or thinner coating over its inner surface, as the case may be. On scraping it off with the back of a knife, one sees that the subjacent tissue is very jagged and irregular and studded with tubercles in all stages of development, from the typical grayish, semi-transparent nodule to the irregularly shaped ulcer (case 8). In most cases this process is sharply limited by the internal os, and the cervical canal is perfectly normal. As the process extends, the formation of tubercles gradually takes place in the muscularis, which then undergoes hypertrophy and causes considerable enlargement of the uterus. Of course the caseation and softening of tubercles in the muscular wall of the uterus weakens it according to the extent of the process, which may even lead to rupture, as in a case recorded by H. Cooper.¹⁹

A microscopic section through such a specimen shows the mucous membrane almost if not entirely destroyed, and its place taken by a new formation of diffuse tubercular tissue, which contains numerous well-marked tubercles, and here and there areas of caseation, which increase in amount as the cavity of the uterus is approached, the most superficial layers consisting only of caseous material (case 8).

The third variety, chronic fibroid tuberculosis of the endometrium, has not as yet been described as occurring in the uterus, but, as it occurs in the tubes (case 6), it is quite natural to suppose that it may also occur in the uterus.

Except for a possible fibroid variety of tuberculosis of the uterus, our classification is hardly different from those of Paulsen⁸⁸ and Kiwisch⁸⁷ forty years ago.

If in any way the cervical canal becomes clogged or obliterated, as frequently occurs in old women, the caseous material and other secretions cannot escape into the vagina, and the uterus in consequence enlarges to accommodate them, and this leads to the formation of a pyometra. Numerous cases of this condition have been reported, several of them attaining a considerable size, that of an orange or larger. In a case of Silcock's¹⁰⁸ this condition was noted in a child aged five, and Krzywicki⁶⁴ mentions two cases, aged 71 and 83 years, in which it occurred.

Kiwisch⁵⁷ considered that in some instances the puerperium appeared to act as a predisposing cause for tuberculosis of the uterus; and there can be no doubt that numerous cases of miliary tuberculosis of the uterus have occurred as the result of a general miliary tuberculosis occurring after the puerperium or an abortion. Cases of this variety have been described by Rokitansky,⁸⁵ Breuss,¹² and Heimbs,⁴⁵ in all of which the formation of miliary tubercles was most marked at the placental site.

While tuberculosis of the body of the uterus is of quite frequent occurrence, tuberculosis of the cervix is but rarely met with; both Rokitansky⁸⁶ and Lebert⁶⁷ stating that it does not occur. As far as we can learn, the first undoubted case of tuberculosis of the cervix was described by Virchow,¹²¹ in which there were miliary tubercles scattered over the vagina and vaginal portion of the cervix, secondary to tuberculosis of the urinary tract. Since then isolated cases have been described by various observers, until at present a considerable number can be culled from the literature. But even so late as 1888, Cornil²² stated that only two cases had ever been described, namely, one by himself and the other by Virchow,¹²¹ but this, like so many of his statements on this subject, is based upon imperfect information; for Späth¹⁰⁵ in 1885 was able to find 6 cases in 119 cases of genital tuberculosis which he collected from the literature, and since then a considerable number of undoubted cases have been recorded.

Like tuberculosis of the vagina, it may occur either as an eruption of miliary tubercles or in the form of tubercular ulcerations, or as a combination of both forms. As we stated above, tuberculosis of the uterus which also involves the cervix is rarely met with, and as far as we can ascertain from a careful survey of the literature has only been noted in seven cases, namely, those of Homolle,⁴⁷ Lukasiewicz,⁶⁸ Mayor,⁷³ Späth,¹⁰⁵ Steven,¹⁰⁸ Thiercelin,¹¹² and Winter.¹³⁰ Of course, this does not begin to represent the entire number of cases, for Kiwisch,⁵⁷ in 1854, described tuberculosis of the cervix with the greatest possible accuracy and without doubt had seen several cases coming under this category. In most of the cases on record there was no trace of tuberculosis of the rest of the uterus, and the disease of the cervix was associated with tuberculosis of the vagina, as in the cases of Virchow,¹²¹ Weigert,¹²¹ and Zweig-

baum; and in still other cases the cervix was the sole localisation of tuberculosis in the genitals of phthisical women, as noted by Klebs,⁵⁵ Laboulbène,⁵⁶ Lancereaux,⁵⁶ and Derville,⁵⁷ and lastly it may occasionally constitute the sole manifestation of tuberculosis in the entire body; as in the case of Péan,⁵⁷ recorded by Cornil, in which a tubercular ulcer of the cervix was mistaken for carcinoma, for which the uterus was removed per vaginam; and also the case of Friedländer,⁵⁸ to which we have already referred, in which a tubercular ulcer (?) of the cervix was the only trace of the disease in a woman dead of apoplexy.

The ulcerated variety of tuberculosis of the cervix, in view of the possibility of mistaking it for carcinoma, deserves to be constantly borne in mind by operators; and we have no doubt that tubercular ulcerations of the cervix have not infrequently been operated upon on the supposition that they were of carcinomatous origin.

d. Tubes.—The Fallopian tubes are by far the most frequent seat of tuberculosis of the genitals, which, in the vast majority of cases, is associated with tuberculosis of the uterus or ovaries, or both; and in rare instances every portion of the genital tract may be affected at once. In a very considerable number of cases the peritoneum is likewise involved, but whether this involvement is primary or secondary to the disease of the tubes will be discussed under the head of etiology.

Most cases of tuberculosis of the tubes are secondary to tuberculosis elsewhere, and all the early cases of the affection were discovered accidentally at autopsies on women dead of phthisis. In nearly all cases, however, the tubes are the primary seat of the disease as far as the genital tract is concerned. The affection is not, however, always secondary to tuberculosis in other portions of the body, but may in a considerable number of cases be the primary seat of the disease. This was known to Kiwisch,⁵⁸ Rokitansky⁵⁶ and the earlier writers on the subject, but it is only in the last few years that its frequency has been appreciated; and in this article we intend to demonstrate that it is of far more frequent occurrence than was ever suspected.

The gross appearance of tubal tuberculosis varies considerably according to the character, stage and severity of the disease and

whether or not the peritoneum is affected. The macroscopic appearance of tubes which are the seat of marked tuberculosis (caseous pus tubes) is almost too familiar to need description. In these cases the tube is greatly enlarged, and according as the peritoneum is involved or not, the external surface is studded with tubercles in various stages of development, and occasionally covered by a thicker or thinner layer of caseous material; in many instances the tube is densely adherent to the surrounding structures, and it is only with great difficulty that it is possible to separate them. In most instances the fimbriated extremity has become occluded; but when it is still patulous, a mass of caseous material may be seen protruding from it into the abdominal cavity. On cutting open the tube, its lumen is found more or less dilated and filled with typical yellowish caseous material, which varies greatly in consistency, sometimes being perfectly fluid, sometimes forming a soft mass, and in still other cases being dry and almost solid, and occasionally even partially calcified.

In advanced cases the normal appearance of the mucosa has disappeared, and on removing the caseous material we come upon a ragged, ulcerated surface, over which are strewn tubercles in all stages of development. This process is usually limited to the mucosa, and it is only in relatively rare instances that the muscularis is affected; in most cases, however, there is marked hypertrophy of the tube walls. This is the picture of advanced tuberculosis of the tubes as found at autopsies and frequently at operations (cases 1, 2, 8).

In most instances the tubes have fallen down behind the uterus and form large sausage-shaped tumors, which frequently possess an almost stony hardness (case 1).

In some instances, instead of forming the typical caseous pus tubes, the tubes may form pus sacs, which occasionally attain immense proportions, Aran² mentioning a case in which the pus sac reached as high as the umbilicus, and Werth¹²⁷ recording a case upon which he operated successfully, which contained two litres of pus.

This description applies to the most advanced cases of tuberculosis of the tubes; and between these and the simplest cases, in which the tubes are not enlarged at all and have only a few isolated

miliary tubercles scattered through their mucosa, all possible gradations may be observed.

In many instances the tube is considerably enlarged and its mucous membrane studded with innumerable miliary tubercles; the greatest profusion being noted at the lateral end of the tube, particularly in the cases associated with phthisis or tuberculosis of the peritoneum, while the uterine end may be almost or quite intact (case 9).

In some rare instances the deposit of tubercles may be limited to a very circumscribed area, and give rise to a single nodular enlargement of the tube, as in case 7, in which a hard nodule about 1 cm. in diameter is situated in the median part of the tube, which on section is seen to be studded with tubercles and to be the only point of disease in the tube. This variety of tubercular disease of the tubes bears a certain gross resemblance to the nodular enlargements described by Chiari¹⁷ and Schauta¹⁸ as resulting from catarrhal salpingitis.

There is another variety of tuberculosis of the tubes to which we desire to direct special attention; these are cases in which the tubercular nature of the disease of the tubes and ovaries is either so slight or so disguised that it is not recognized on careful macroscopic examination, and which are considered by the operator to be simply ordinary cases of catarrhal or purulent salpingitis or even pyosalpinx, but which on careful microscopic examination are found to be of tuberculous origin. To this class of cases, in contradistinction to the typical and readily recognized forms of tuberculosis of the tubes and ovaries, we have ventured to apply the term "unsuspected genital tuberculosis" (cases 3 to 7).

We have met with this condition in five instances, the specimens in all cases having been removed by laparotomy for the relief of disease, without the least suspicion of their tuberculous nature, and it was only after careful microscopic examination that the diagnosis of tuberculosis was made. In two of these cases the fresh specimens appeared to be examples only of the usual "adherent tubes and ovaries" (peri-salpingo-oöphoritis), associated with hydrops folliculi in each case (cases 5 and 6). In one case the nodular condition of the tube referred to above was noted, and on section the nodule was found to be studded with tubercles, some of which were caseous case (7).

In one instance (case 4) there was a tubo-ovarian abscess on one side and simple "adherent tube and ovary" on the other; under the microscope, however, both sides were found to be tuberculous; and in the last case (case 3) there was a double-sided ovarian abscess and pyosalpinx, which in the fresh state gave no evidence of being tuberculous.

In all these cases the adhesions surrounding the tubes and ovaries were of the densest character, but in none of them was there the slightest trace of tubercular peritonitis or tubercular peri-salpingo-oöphoritis. In all the fimbriated extremity of the Fallopian tube was occluded, and, as far as a careful physical examination of the patient would permit the statement, they appear to be cases of primary genital tuberculosis.

This discovery is of the greatest possible importance and makes the entire subject of genital tuberculosis of far more importance than was formerly supposed, and will be referred to frequently in the course of the article. It also demonstrates that the disease is far more frequent than was ever supposed, and shows that the careful macroscopic descriptions of the disease which have been handed down to us from the time of Morgagni⁷⁵ are no longer sufficient to enable us to recognize it in all its forms.

This brings us to the consideration of the microscopic anatomy of tuberculosis of the tubes, and from this standpoint we may divide all forms of tubercular salpingitis into three classes :

1. Miliary tuberculosis.
2. Chronic diffuse tuberculosis.
3. Chronic fibroid tuberculosis.

These correspond to the three forms described when considering the pathological anatomy of tuberculosis of the uterus.

Except in some cases occurring in a general miliary tuberculosis, miliary tuberculosis of the tubes has not been frequently described and, according to Daurios⁷⁶ (1889), does not occur at all. Our own observations, however, afford abundant proof that his statement is without foundation.

The microscopic examination of a section from a case of miliary tuberculosis of the tube shows that the process is limited to the mucous membrane and is therefore simply a tubercular salpingitis. Scattered through the mucosa are varying numbers of typical giant-

epithelioid cell tubercles, only a few of which are undergoing caseation, and the majority of them are situated directly under the epithelium, which is intact. In cases uncomplicated by inflammatory changes the tubercles are situated in the normally arranged folds of the mucosa, which present a perfectly normal structure, save for the presence of the tubercles (case 5).

On the other hand, beside the presence of the miliary tubercles, the mucosa may be the seat of a marked inflammatory process; in which event the lumen may be considerably distorted and the folds of the mucous membrane infiltrated with leucocytes and round cells and present the typical appearance of a purulent salpingitis in addition to the miliary tubercles (cases 2, 4, 5, 7). In these cases considerable portions of the epithelium may be destroyed and areas of small cell infiltration found in the tube-wall.

This is apparently the first stage in tuberculosis of the tubes; and in some instances the process ends here, while in others it goes on to the production of diffuse tubercular tissue along with the miliary tubercles. In some instances both forms may be found in the same tube, as in case 3, in which there is typical miliary tuberculosis with inflammatory changes in the median portion of the tube, while its lateral end is the seat of a diffuse tuberculosis.

In chronic diffuse tuberculosis the mucous membrane is infiltrated with a new formation of epithelioid cells, in which are numerous miliary tubercles and areas of caseation. As the lumen of the tube is approached the caseation becomes more marked and the mucous membrane more completely destroyed, so that at last nothing is left to indicate its original position save a mass of caseous material. This may or may not be combined with ordinary inflammatory changes. In a few instances, where the disease is very advanced, the process may extend a varying depth into the muscularis. This is the form of tuberculosis which leads to the production of the typical caseous pus-tubes, and was seen in various degrees of development in cases 1, 2, 3, 4 and 7.

Chronic fibroid tuberculosis of the tube, as far as we can learn, has not yet been described. It differs from the other forms of tuberculosis in the excessive formation of fibrous tissue in and between the tubercles. Sections show the lumen greatly distorted and a few miliary tubercles scattered through the mucosa. There may or may

be accompanying inflammatory changes, the main change consisting in the excessive development of fibrous tissue both within and about the tubercles, and the relative absence of caseation (case 6). The marked feature of this form of tuberculosis appears to be its chronicity.

A point of considerable interest in all the cases with which we have met, is that the fimbriated extremity of the tubes is occluded and the tubes and ovaries are covered by very dense adhesions which present no trace of being tuberculous. This would seem to point to some inflammatory process which had existed either prior to or simultaneously with or even after the deposit of tubercles in the tube. This of course can be readily accounted for in those cases in which the microscopic examination shows existing inflammation, but its explanation is less apparent in the cases in which the tube presents no trace of inflammatory changes, as in cases 5 and 6. The condition of the lumen of the tube in case 6 would, however, indicate that it had previously been the seat of a marked salpingitis which had healed and left the tube in a deformed condition, and that the deposit of tubercles had taken place in the healed tube. Whether or not this indicates that a previously diseased condition of the tubes predisposes to the deposit of tubercles is a question which we are unable to answer with certainty. The discovery of gonococci in the pus of case 4 does not settle the question, and the only conclusion, which we feel justified in drawing from the condition, is that a mixed infection of the tube does occur, but whether the processes are coincident or secondary to one another we are unable to decide. If the occlusion of the fimbriated extremity and the formation of adhesions occur as the result of a preceding inflammation, its connection with the tuberculous condition would be purely accidental; but if it occur as the result of the tuberculosis it must be regarded as a highly conservative process, in that it shuts off the diseased parts from communication with the peritoneal cavity.

The case of fibroid tuberculosis may likewise be considered as representing a conservative process which possibly in some instances indicates a mode of healing. The extinction of the tuberculous affection by calcification, as mentioned by Rokitansky,⁶⁶ Kiwisch,⁶⁸ Klob⁶⁹ and Geil,⁷⁰ may, and, reasoning by analogy with the lungs, does no doubt occur; but we have not as yet met with an instance of this occurrence.

We have not been able to substantiate the statement of Stemann¹⁰⁶ (1888), who states that a marked difference exists between the appearance of primary and that of secondary tuberculosis of the tubes. He adopts Baumgarten's⁶ view as to the significance of giant cells, and states that in primary tuberculosis many giant cells and few bacilli are found, and that the opposite condition prevails in those due to general infection.

In all save one of our cases (case 6) we demonstrated bacilli in the tissues, and were unable to distinguish any difference in the quantity of the giant cells, whether the cases were due to primary or to general infection.

e. Ovary.—While tuberculosis of the ovary is not of such frequent occurrence as that of the tubes and uterus, still it does occur frequently enough not to be reckoned among the rare localizations of tuberculosis.

Relying on the statements of Klob,⁶⁰ Rokitansky⁹⁵ and Virchow¹²⁰ that tuberculosis of the ovary rarely if ever occurred, it was for a long time the general belief that it was one of the rarest affections and, until the last few years, nearly every observer in recording a case stated that he was the first to do so (Geil and others). But the fact is that undoubted cases were described at an early period by Senn,¹⁰² Reynaud⁹⁴ and Boivin et Dugés,¹⁰ after which other cases were published every few years until gradually it was established that it was not so rare, and in 1887 Terrillon¹¹¹ stated that in six cases of genital tuberculosis the ovaries were affected in three. The old ideas were not, however, completely extinguished, for as late as 1889 we find Heiberg⁴⁴ stating that tuberculosis of the ovary is not frequent.

Tuberculosis of the ovary usually occurs in connection with other forms of genital tuberculosis, either of the tubes or uterus or both; sometimes in connection with tubercular peritonitis, without any other involvement of the genital organs (case 9), and in rare instances in phthisical women they are the only seat of tuberculosis in the genital tract. In a case reported by Oppenheim⁸¹ only the ovaries and suprarenal capsules were affected; but as yet primary tuberculosis of the ovary has not been described. In 1876 Klebs⁵⁹ made the remarkable statement that he had seen three or four cases of tuberculosis of the ovary, but in all of them, the ovaries were the only portion of the genital tract to be affected. Corresponding cases have been described by Pillaud⁵⁸ and Späth.¹⁰⁵

From our own observations on the subject, we would say that tuberculosis of the ovary may be limited to its surface alone or may invade the entire organ. Macroscopically it occurs either in the form of miliary tubercles, caseous masses or tubercular abscesses. We have met with four cases:—in one (case 9), from a case of tubercular peritonitis, the process was limited to the surface of the ovary, which was covered by miliary tubercles and small ulcers. In another (case 1), on section, the entire ovary was studded with miliary tubercles; and in the other two (cases 3 and 4) the ovaries were converted into abscess cavities. In case 4 the process was limited to the right ovary, which with the tube took part in the formation of a tubo-ovarian abscess. Under the microscope the miliary tubercles present a typical appearance, and the walls of the abscesses are composed of diffuse tubercular tissue, the epithelioid cells of which bear a striking resemblance to the large cells of a corpus luteum. In all these cases numerous tubercle bacilli were found in the tissues, and in the pus of the tubo-ovarian abscess gonococci were also found (case 4).

Cornil²² has seen tuberculosis limited to the surface of the ovary only, and believes that most of the cases described as occurring in its interior are due to confusion with the various forms of the corpus luteum and small ovarian myomata. Our observations, however, cannot be placed in this category, for in them we not only observed the typical histological structure of tuberculosis, but also demonstrated tubercle bacilli in the tissues.

Besides affecting the ovary in its usual state, tuberculosis may also invade the walls of ovarian cystomata. This condition has been observed in five cases, namely, those of Spencer Wells,¹²⁸ Baumgarten,⁵ Dohrn (quoted by Olshausen⁷⁹), Krzywicki⁶¹ and Kelly.⁵⁵ In all of these cases there was also a tubercular peritonitis, which was the starting-point for the involvement of the ovary. Olshausen⁷⁹ also mentions a specimen in the museum at Prag, in which there were tubercles on the internal wall of an ovarian cyst. The case was examined by Klebs, who considered that it was due to infection from a tubercular uterus.

Other cases of tuberculosis of the ovaries have been described by Ahrt,¹ Coote,²⁰ Courty,²⁴ Gusserow,⁴¹ Hennig,⁴⁶ Lukaszewicz,⁶⁰ Griffith,⁴⁰ Kötschau,⁸² Marchand and Schücking,⁷¹ Mayor,⁷³ Mosler,⁷⁶ Nimias and de Christoforis,⁷⁸ Scanzoni,⁸⁸ Siredey¹⁰⁴ and Talamon.¹¹⁰

f. Placenta.—The only reference to tuberculosis of the placenta which we have met is a case reported by Hardy⁴² in 1834—"Note sur des tubercules dans le placenta et dans l'utérus chez une femme phthisique." From the description it is impossible to decide as to the nature of the affection; but in view of the fact that it is the sole reference to such an affection, the probabilities are greatly against it being tuberculosis.

As undoubted instances of congenital tuberculosis have occurred in a few instances, a particularly positive case having been reported in an unborn calf by Jöhne,⁴⁹ the possibility of the existence of placental tuberculosis becomes a question of very great scientific interest.

FREQUENCY.

The statements as to the frequency of genital tuberculosis vary to such a degree that we have thought it best to give the results of a number of observers, taken both from the autopsy and operating tables, and then to compare them with our own figures.

According to Pollok⁵¹ (1852), Schramm¹⁰¹ (1882), and Winckel¹²⁹ (1888), tuberculosis of the female genitals occurs about once in every 100 autopsies; but it is when we come to consider the results at autopsies on phthisical women that we notice the greatest discrepancy between the various observers, as will be seen from the following table:

Courty²⁴ found 1 case in every 100 autopsies on phthisical women.

Louis ¹³³	"	66	"
Cornil ²²	"	50-60	"
Kiwisch ⁵¹	"	40	"
Mosler ⁷⁸	"	40	"
Schramm ¹⁰¹	"	24	"
Nimias and Christoforis ⁷⁸	"	12	"

In other words, genital tuberculosis has been observed in from 1 to 8½ per cent of all autopsies on phthisical women; with the exception of the figures of Nimias and Christoforis,⁷⁸ these correspond more or less with the figures of Reclus³³ for the same affection in the male; he found it occurring in from 2 to 3 per cent of all autopsies on phthisical men.

The statements of operators of experience as to its frequency also vary considerably. Thus Geo. M. Edebohl, of New York, in a

personal letter states that he has met with 6 cases in 157 laparotomies for all causes, or 4 per cent; Martin, 9 cases in 287 operations, or 3 per cent; and in 137 laparotomies performed at the Johns Hopkins Hospital a tubercular condition of the genitals was noted in 2 cases at the time of the operation, or $1\frac{1}{2}$ per cent.

These results apply only to the well-known and readily recognized forms of the disease, and do not begin to include the cases which we have designated as "unsuspected tuberculosis."

Beside the two cases just mentioned, in which the condition was recognized at the time of operation, on careful microscopic examination of the tubes and ovaries removed for all causes in 137 laparotomies, we find five cases of "unsuspected tuberculosis," to which we have already referred. If to the two cases in which a macroscopic diagnosis was made, we add these five, we will have found genital tuberculosis in 7 instances in the specimens from 137 laparotomies, or in 5.2 per cent.

These figures do not, however, represent the startling frequency of the affection; for among the 137 cases are included 46 cases in which the ovaries and tubes were either perfectly normal, having been removed for various causes, or were converted into cystomata and presented no other pathological lesion. Deducting these 46 cases from the 137, we have left 91 cases in which the tubes and ovaries were removed for purulent processes or for adhesions (perisalpingo-oöphoritis). As in all our cases the tuberculous condition was only noted in tubes and ovaries the seat of past or present inflammatory disease, it is therefore only in that condition that we would expect to find the disease. Accordingly, in 91 cases coming within this category, genital tuberculosis was noted in 7, or 7.7 per cent. In other words, in our material, genital tuberculosis is found in about one out of every twelve operations for the removal of tubes and ovaries which are the seat of past or present inflammatory disease.

As only 2 of the 7 cases (30 per cent) were recognized at the time of operation, it is evident that 70 per cent of our cases would have escaped observation were it not for the routine microscopic examination of all specimens removed.*

* Since writing we have met with another case of unsuspected tuberculosis of the tubes, making in all six cases; thus making 75 per cent instead of 70 per cent of our cases belong in this category.

If this proportion should obtain in all cases, it becomes evident that most of the statements as to the frequency of genital tuberculosis represent in reality only about one quarter of the actual number of cases, the other three quarters having previously escaped observation.

Edobohls, in his letter to us, states that his six cases occurred in 62 cases which were operated upon for inflammatory disease, thus making every tenth case tuberculous. All of his cases were, I believe, associated with tubercular peritonitis, and consequently were readily recognized on macroscopic examination. If in his material the "unsuspected cases" were nearly so numerous as in our observations, the frequency of genital tuberculosis would become absolutely startling.

Whatever the proportion of "unsuspected tuberculosis" in his material may be, his figures and ours at once raise the disease to a very important position from a pathological standpoint and prove that it is of far more frequent occurrence than was ever suspected, and that it is deserving of practical attention on the part of gynecologists.

In our seven operative cases the tubes were affected in each case, and in three the ovaries (cases 1, 3, 4). In a case of tubercular peritonitis, the surface of the ovary was studded with tubercles, while only the lateral end of the tube was affected (case 9). Altogether in nine cases of genital tuberculosis, seven from operations and two from autopsies, we found the ovary affected in four, or 44 per cent of all our cases. This certainly proves that Rokitansky,⁹⁵ Virchow,¹²⁰ Cornil,² and others were in error when they stated that tuberculosis of the ovaries was extremely rare. The tables of Späth¹⁰⁵ and Mosler,⁷⁶ based respectively upon 119 and 46 cases collected from the literature, show that the ovary was affected in from 12 to 15 per cent of all cases. Their tables do not, however, include the "unsuspected cases"; but if, as our results in a small number of cases would indicate, the macroscopic cases of genital tuberculosis only represent about 25 per cent of all cases, their figures would correspond very closely with our own.

As we had to deal with only one case of tuberculosis of the uterus (case 8), we are absolutely unable to make any statement as to its frequency, and are compelled to refer to the figures of Mosler⁷⁶ and Späth,¹⁰⁵ which state that it occurs in 66 to 76 per cent of all cases of genital tuberculosis.

There can be no doubt that tuberculosis of the uterus, like tuberculosis of the tubes, occurs far more frequently than is generally supposed and is deserving of more attention than is generally given it.

From what has been said under the head of pathological anatomy it is evident that, while both tuberculosis of the cervix and of the vagina are rare, they also occur more frequently than is generally supposed.

According to our own observations and those of other workers in the field, we may say that tuberculosis may affect any portion of the genital tract, but that certain portions are far more prone to be attacked than others, and that the order of frequency for the various portions of the genital tract is as follows: tubes, uterus, ovaries, vagina, cervix, and vulva.

ETIOLOGY.

The causal relation existing between the tubercle bacillus and tuberculosis has been so conclusively demonstrated and so universally accepted that any consideration of that question becomes absolutely unnecessary on our part.

Whether, under any circumstances, there exists a predisposition to genital tuberculosis is a question we are unable to answer; but reasoning by analogy, it is quite probable that such may be the case.

The consideration of the etiology of genital tuberculosis resolves itself into a consideration of the various modes by which tubercle bacilli may gain access to the genital tract.

Generally speaking there are three modes by which it is possible: 1. From areas of tuberculosis already existing in the patient; 2. from the outer world by direct infection; and 3. by bacilli which have their origin in the patient gaining access to the outer world, whence they invade the genital tract, as infection by the various excretions of tuberculous patients. The third is really a variety of the second class, but at the same time, in this class, the possibility of a blood infection can never be entirely eliminated and it is convenient to consider these cases separately.

1. *a. Infection through the blood.*—From the facts brought forward under the consideration of frequency it will be remembered that a large number of cases were met with at autopsies on phthisical patients. In many of these instances blood infection is by far the

most probable explanation of the occurrence of the disease in the genital tract. In the few cases of general miliary tuberculosis in puerperal women in which the genitals are affected the proof is absolute, for the disease is most marked at the placental site. And in the cases occurring in phthisical women in which there is no involvement of the peritoneum, intestines or mesenteric glands, blood infection is by far the most plausible explanation. The fact that, excepting the lungs, the genitals present the only localization of tuberculosis in the body does not militate against this mode of origin; for genital tuberculosis is quite as susceptible to such an explanation as the occurrence of localized tuberculosis in parts distant from the lungs, as in the bones, for which blood infection alone is held responsible.

The fact that in many instances the tubercular process is most marked at the fimbriated extremity of the tube and entirely limited to it, is usually considered as proof that infection took place from the peritoneum (Kiwisch,⁵³ Rokitansky,⁵⁶ Forster,⁵⁵ Cruveilhier,²⁸ etc.). Of course in many instances this interpretation is perfectly correct; but when we consider that the fimbriated extremity of the tube is extremely vascular in comparison with the other portions, it becomes evident that it is the portion of the tube that would offer the most favorable conditions for the deposit of bacilli by the blood. This would also apply to the ovary (Klebs,⁵⁹ Mosler⁷⁶). How often blood infection is the cause of tuberculosis of the genitals we are unable to say, but we do not think that we will go far wrong if we state that it occurs more frequently than is generally believed. (See case 8.)

It is not always necessary to have a large tubercular focus somewhere in the body to give rise to blood infection, for it must be remembered that in some cases of bone tuberculosis no trace of tuberculosis can be found elsewhere in the body; but, even in many of these cases, careful observers would hesitate to exclude blood infection from some small primary process elsewhere. The statements of Salleron⁹⁷ concerning genital tuberculosis in the male are also of interest in this connection; for in fifty-one cases which he saw as a French army surgeon, in only one did he find any signs of tuberculosis elsewhere. Now it is hardly possible that so great a number of cases were due to external infection, particularly when so excellent an observer as Kraske⁶⁸

almost completely denies its occurrence; the only alternative, therefore, must be infection through the blood analogous to that in bone tuberculosis.

The same line of reasoning also applies to genital tuberculosis in women, and we do not hesitate to state that we believe that some of the apparently primary cases originate in this way, and that in any given case it is almost impossible to exclude the possibility of blood infection. The analogy of primary bone tuberculosis indicates that tubercle bacilli may be conveyed by the blood current without causing any demonstrable lesion at their point of entrance to the body.

b. Infection from the Peritoneum.—That tubercular peritonitis may extend to the tubes and *vice versa* has long been recognized, and the fact that their abdominal ends are usually most diseased has served to confirm this idea. This for a considerable period was considered almost the only mode of origin for genital tuberculosis, Kiwisch,⁵⁷ Rokitansky,⁵⁶ Virchow,¹²⁰ Cruveilhier, Bandl,⁴ Cohnheim,¹⁸ Mosler,⁷⁸ and many others having indorsed it (case 9). No doubt it is one of the most frequent sources of origin for genital tuberculosis. Schramm¹⁰¹ states that in 34 cases there was tubercular peritonitis in 21; Oppenheim⁵¹ in 21 out of 23 cases; and Osler⁸⁴ in his monograph on tubercular peritonitis states that the tubes are affected in from 30 to 40 per cent of all cases of tubercular peritonitis in women, while Kaulich⁵⁴ states that it occurs in 50 per cent.

Pinner⁹⁰ found that small solid bodies, as powdered cinnabar, etc., introduced into the peritoneal cavity of rabbits and dogs, in a short time made their way through the tubes and uterus to the vagina. This he considered was due to the current produced by the action of the cilia in the tubes and uterus. This would readily explain how the bacilli find their way into the genital tract in these cases, especially as Weigert¹²³ has shown that in slight cases of tubercular peritonitis the eruption of tubercles is most plentiful in the pelvic cavity, and is frequently limited to it, thus indicating that bacilli, gaining access to the peritoneal cavity, fall in obedience to the law of gravity to the lowest part of the pelvic peritoneum and are there placed in the most advantageous position to be taken up by the currents of the tube. As illustrated in case 9, the ovaries are frequently affected in tubercular peritonitis. It is possible that tubercle bacilli from various sources (tuberculous

mesenteric and retroperitoneal glands, intestinal ulcerations, etc.) may gain access to the peritoneal cavity and gravitate into Douglas cul-de-sac and thence be wafted into the tubes without giving rise to any signs of tubercular peritonitis. The only possible proof in this direction was adduced by Jani,⁴⁸ a worker in Weigart's laboratory, who, in sections of a normal Fallopian tube from a woman dead of tuberculosis of the lungs and intestines without any signs of tubercular peritonitis, found several perfectly typical tubercle bacilli in the lumen. Their presence is most readily accounted for by the supposition that they made their way from an intestinal ulcer into the peritoneal cavity, whence they were carried into the tube. This find is extremely suggestive and indicates that infection through the peritoneal cavity may play even a larger part in the production of genital tuberculosis than is generally supposed. As is well known, a crop of miliary tubercles usually appears on the peritoneum over an intestinal tubercular ulcer, and frequently without general tuberculous involvement of the peritoneum. Tubercle bacilli might readily make their way from these localized areas of peritoneal tuberculosis to the pelvic peritoneum and thence into the tubes.

c. Infection from other organs.—Besides infection from the blood and peritoneum, tubercle bacilli may gain access to the genitalia from other organs which are the seat of tuberculosis, by the perforation of tubercular ulcers and the formation of fistulæ between the diseased structure and various portions of the genital tract. Thus, the bowel may become adherent to either the uterus or tubes, with subsequent perforation of a tuberculous ulcer, resulting in the formation of a fistulous tract between the two organs, as in a very interesting case reported by Kaufmann,⁵³ in which there were several fistulous tracts of tubercular origin existing between the small intestine and the cavity of the uterus, in whose walls there was an abundant formation of myomata, by which the cavity of the uterus became as it were a mere cul-de-sac from the intestine. In two of Mosler's cases⁷⁶ the fimbriated end of the tube was adherent to the rectum, and by perforation of tubercular rectal ulcers direct infection followed. Tubercular ulcers of the rectum may also perforate the recto-vaginal septum and lead to the formation of recto-vaginal fistulæ, as in the cases of Babes³ and Jones⁵⁰. Perirectal abscesses may likewise perforate into the vagina and thus afford an opportunity for infection; and

lastly, tubercular ulcers of the bladder may perforate the vesico-vaginal septum and give rise to vesico-vaginal fistulæ, as in the case of Catuffe¹⁵ already mentioned.

It is due only to the difference in the anatomical arrangement of the male and female genital systems that genito-urinary tuberculosis is of so much rarer occurrence in women than in men. For in women the genital and the urinary tracts are two separate systems, and genito-urinary tuberculosis in them can only be the result of a simultaneous infection of both systems, or of the formation of fistulæ between them, or of the introduction into the vagina of tubercle bacilli which have escaped from the urethra or *vice versa*, or, lastly, of the infection of the peritoneum by the tubercular process in the bladder, from which the tubes are in turn infected (Marchand and Schücking⁷¹), and none of these conditions are of frequent occurrence; while in man, on the other hand, the urethra serves as a common outlet for the secretions of both systems, and it is readily seen how much greater opportunity there is for mutual infection. According to Oppenheim's⁸¹ statistics, its relative frequency in women as compared with men is as one to three.

2. *Infection from without.*—The possibility of tubercle bacilli gaining access to the vagina from the outside world becomes evident to any one who considers the almost universal distribution of the organisms.

No doubt bacilli are often introduced into the vagina by the examining finger, the use of dirty instruments, the use of foul syringes; perhaps by unclean linen, or by sleeping in the same bed with a tuberculous patient, or in a multitude of other ways, and particularly by coitus with men affected with various forms of genito-urinary tuberculosis.

The question as to the introduction of organisms excreted by the patient herself will be considered later on.

No one can doubt for a moment that bacilli not infrequently gain access to the vagina by the various modes mentioned above and many others, but the point of interest for us is to ascertain whether bacilli thus introduced ever give rise to genital tuberculosis.

As the introduction of bacilli by coitus is the most important and practical of all the modes just mentioned, we will consider that in full, and it will then serve as a type for all other modes of infection

from the outside world. That infection may take place in this way is *a priori* possible and quite probable; its possibility was first suggested by Cohnheim¹⁸ in his article "Tuberculose vom Standpunkte der Infectionslehre," but he stated that, if it ever occurred, it was only in very rare instances. Verneuil¹⁹ in 1883 was the first to consider the question seriously and wrote to Fournier, asking his opinion of the following theory: "La tuberculose genitale primitive, independent de la scrofule, naît peut-être simplement à la suite de coït par contagion directe, c'est-à-dire, par progression du microbe tuberculeux à travers les voies genitales jusqu'en un point de l'appareil où il trouve les conditions favorables à son installation et à son développement." Since then the question has been considerably discussed, particularly by French writers.

A priori there is no possible objection to such a theory, and its proof would enable us to explain some of the apparently primary cases. It is only necessary to consider the frequency of genito-urinary tuberculosis in men to see that an opportunity for infection frequently occurs; the tubercular affection may not only occur in the well-known forms affecting the bladder, epididymis, testicle, etc., but in some instances it may occur as a tuberculous peri-urethral abscess (Englisch²⁰), or even a tuberculous ulceration of the glans penis (Kraske⁶¹). Indeed, Jani⁴⁸ has shown that tubercle bacilli may be found in the testes and prostate glands of phthisical men, without those organs exhibiting any evidence of tuberculosis; thus, in eight cases of phthisis, he found bacilli five times in the testicle and four times in the prostate gland, but not at all in the semen. This find is very suggestive and would apparently indicate that in some instances a phthisical man might introduce bacilli into the vagina without presenting any sign of tuberculosis of his genitals.

Owing to the resistant structure of the vagina and cervix we should not expect to find either of them the seat of primary tuberculosis except in the rarest instances, and it would be only after the bacilli had gained entry into the uterus or tubes that it could be expected that infection would result. In a very considerable number of cases it is improbable that the bacilli, even though introduced into the vagina, would ever enter the uterus, and consequently could not be expected to give rise to infection; on the other hand, even should a miliary tuberculosis of the endometrium follow their introduction,

it is probable that the exfoliation of the superficial layers of the mucosa at each menstrual period, in a large proportion of cases, would cause the minute newly-formed tubercles to be thrown off with it. Accordingly, granting that infection may occur in this manner, it would be likely to lead to the permanent production of disease only in cases in which the bacilli entered the Fallopian tubes, in which they could multiply unmolested, and in a small number of cases in the uterus, in which the bacilli and the beginning tubercles were not carried away at the menstrual period. If this should hold good, it will explain why the tubes are so much more frequently affected than the uterus, even in primary cases.

Cornil²² and others state that infection by coitus rarely occurs; basing their statements on the rarity of tuberculosis of the vagina and cervix as compared with the uterus and tubes, for they say that they should be more often the seat of disease if infection follows the introduction of bacilli into the vagina. It is only necessary to consider the great rarity of tuberculosis of the mouth and pharynx in pulmonary tuberculosis, in which infection from without is the rule, to recognize the fallacy of such an argument.

In instances in which there are areas of the vagina or cervix denuded of their epithelium, it is possible that bacilli may be taken up by the lymphatics and by their aid reach the internal genitals.

Of course, if infection by coitus holds good for women, it also applies to men, and Petit²³ lays great stress upon the danger to either party to the coitus.

In 1884 Verchere¹¹⁷ took the ground that while infection by coitus is probable, it had not been proven up to that time. The same year Fernet³¹ stated that it did occur, and that coitus was dangerous not only when one party had genital tuberculosis, but even phthisis, and also that painless blennorrhagic affections, when not of undoubted gonorrhœal origin, should be regarded with suspicion and examined for tubercle bacilli.

Numerous cases of suspected infection by coitus have been reported by Borjes,²¹ Uhland¹¹⁶ and others, but they are not conclusive.

The most conclusive work on the subject is that of Derville²⁷ (1887), who in 8 cases of genital tuberculosis in women found bacilli in the secretions from five cases, and on examining the husbands or lovers of these women found that all of them had hard masses in their

epididymes, which he considered were of tuberculous origin. In 1889 Jouin⁵¹ published an article in which he stated that chronic tubercular endometritis is of frequent occurrence and that he had met with it in nine cases, but from his own statement in only three of his cases was their tubercular nature demonstrated. He believes that most cases are primary and are due to infection by coitus. His paper, however, is not of a character to convince any one who doubts the occurrence of this mode of infection.

The article of Derville⁵² makes infection by coitus practically certain, but it still lacks scientific proof in that he did not demonstrate that the affections in the men were undoubtedly tuberculous.

In 1889 Cornil⁵³ and Dobrolonsky⁵⁴ stated that they had been able to produce tubercular endometritis by injecting pure cultures of tubercle bacilli into the vagina of rabbits, but thus far no one has substantiated their results. Indeed, later work tends to show that their results were erroneous; for in 1890 Oncarani⁵⁵ stated that the introduction of tuberculous material into the vagina of rabbits, even if previously irritated by rubbing with tincture of iodine, never produced genital tuberculosis, but that the animals usually died of general tuberculosis.

In several instances we have injected pure cultures of tubercle bacilli into the vagina of rabbits, but in none of our cases was there any reaction on the part of the animals, and on killing them at periods of 4 to 6 weeks afterwards we were unable to find the slightest trace of tuberculosis anywhere in the body. Our experiments were made only in a limited number of cases, and it is possible that the cultures were not very virulent, but as far as they go, both the results of our experiments and those of Oncarani⁵⁵ are directly opposed to those of Cornil⁵³ and Dobrolonsky,⁵⁴ in the light of which we do not feel justified in stating that it has ever been satisfactorily proven that genital tuberculosis occurs as the result of infection by coitus.

By this we do not mean to state that it cannot occur; on the contrary, we are inclined to believe that it does occur in some instances, but we do not consider that its occurrence has as yet been proven by scientific methods, and indeed strict scientific proof is manifestly difficult to bring. A similar opinion is likewise expressed by Pozzi⁵⁶ in the last edition of his *Traité de Gynaecologie* (1892).

3. *Infection by organisms excreted by the patient herself.*—In cases of phthisis and tuberculosis of the urinary organs or intestines, it is perfectly possible for the organisms which have passed out of the patient's body to gain access to the vagina by various means.

These cases practically come under the same category as those we have just considered and, as there, we cannot admit that such a mode of infection has yet been proven, and in none of the cases for which such a mode of origin has been suggested is it possible to exclude blood infection.

(See cases of Virchow,¹²⁰ Chiari¹⁶ and others, under pathological anatomy.)

CLINICAL HISTORY.

No period of life is exempt from genital tuberculosis, cases having occurred at every age between the extremes of 10 weeks (Brouardel¹⁴) and 83 years (Krzywicki⁶⁴); but the period of life in which its occurrence is most frequent is that of the greatest sexual activity or between the ages of 20 and 40 years. It is during this period that the cases of primary genital tuberculosis have been observed, while the cases occurring at the extremes of age have been due, almost without exception, to secondary infection.

Unfortunately, the clinical history of genital tuberculosis, like that of tubercular peritonitis, does not present the clear-cut characteristics which are so necessary to the early recognition of a disease, its symptoms being only too often so masked by those of the primary affection that the involvement of the genitals is not suspected and is only found accidentally at the autopsy. Even in the rarer cases of primary infection of the genitals, the symptoms are often so obscure that the tuberculous nature of the affection is not only not suspected, but its discovery at operation or autopsy is a matter of surprise.

Of course, tuberculosis of the vulva and lower portions of the vagina gives rise to the symptoms common to all ulcerative processes and soon leads the patient to seek medical aid. In these instances simple inspection is frequently all that is required to direct one's attention to the true nature of the affection, but a perfectly positive diagnosis can only be made by means of the microscope. In this variety of genital tuberculosis there are two points that should always be borne in mind, namely, the chronicity of the affection and

its ready amenability to treatment, which, however, is only apparent, for the ulcerations are particularly prone to recurrence.

In several instances of tubercular ulcerations of the cervix (Pean,⁸⁷ Zweifel¹⁸¹), profuse hemorrhage and suppuration were the symptoms which led the patient to consult a physician, and in each instance a diagnosis of carcinoma was made; but in Zweifel's case, after the microscopic examination of curetted portions of the ulceration, the diagnosis was changed to that of tuberculosis.

In many instances, to tuberculosis of the internal genitals is assigned a prominent part in the production of symptoms, which in reality are due to tuberculosis of other organs. This is particularly true of the cases of general miliary tuberculosis associated with tuberculosis of the genitals which have been reported by Rokitansky,⁹⁸ Schellong,¹⁰⁰ Heimbs,⁴⁵ and others.

In Heimbs' ⁴⁵ case there was, beside the genital affection, general miliary tuberculosis, yet the title of his article reads: "Miliary tuberculosis of the puerperal uterus with the symptoms of puerperal fever," when it is well known that precisely the same symptoms may be produced by a miliary tuberculosis without any involvement of the genitals. On the other hand, in the cases occurring during phthisis, the symptoms on the part of the genital tract are either entirely overshadowed by those due to the pulmonary process, or are considered as the result of an ordinary endometritis or salpingitis.

It is the primary cases and those secondary cases in which the pulmonary process has not attained a great headway that symptoms are occasionally observed, which serve to direct one's attention to the tuberculous nature of the genital affection.

In the cases in which the uterus is affected there is frequently a very profuse leucorrhœa, which in some instances consists of a mixture of the caseous material and the usual secretions of the uterus. We, however, do not believe, as did Madam Boivin¹⁰ and others, that it is possible from the macroscopic appearance of the leucorrhœal secretions to reach even a probable conclusion as to a tuberculous affection of the uterus.

As the disease progresses there is frequently a considerable hypertrophy of the uterus, but neither of these signs, either singly or combined, would direct one's attention to a possible tuberculous affection, unless some point in the history of the patient or her husband (as a

genito-urinary tuberculosis on his part) or the development of pulmonary symptoms were to suggest such a possibility.

Späth¹⁰⁵ and Derville⁸⁷ lay great stress upon the occurrence of menstrual disturbances as important symptoms in the early periods of the disease, but, as we will demonstrate further on, no great value should be attached to them.

The symptoms produced by tubercular disease of the ovaries and tubes, whether associated with tuberculosis of the uterus or not, vary greatly according as the process is limited to them or has involved the peritoneum. Of course the symptoms may be merged with those of phthisis or tubercular peritonitis and the genital affection be entirely overlooked; on the other hand, primary tuberculosis limited to the tubes may produce no symptoms at all, and the fact that there is any disease of the genitals may be discovered only at autopsy after death from some other cause, as in the cases of Thompson¹¹⁴ and Tomlinson.¹¹⁵ As long as the process is limited to the tubes and ovaries and has not led to the production of disease elsewhere, the symptoms may vary from those of a simple salpingitis to those of the most severe forms of pelvic abscess (see cases 1 to 7), and in spite of careful examination nothing will be found to indicate the tuberculous nature of the affection. Thus, in none of our cases was a diagnosis made previous to operating, and in each instance it was thought that we had to deal with either an ordinary case of "adherent tubes and ovaries" (peri-salpingo-oöphoritis) or a pus tube. In some instances the first sign of disease is the discovery by the patient of tumor masses occupying the lower portion of the abdomen, as in a case reported by Münster and Orthmann.⁷⁷

Amenorrhœa, as stated by the older writers, is not necessarily an accompaniment of genital tuberculosis, but, if it occurs, it is usually due to the coincident phthisis. An analysis of six of our cases, in which we have notes concerning the menstruation, demonstrates that the menstrual disturbances attending tubercular disease of the genitals do not vary from those accompanying other inflammatory diseases of the tubes and ovaries; and, as in them, we find no menstrual derangement in some instances, while in others menstruation may be very irregular and scanty or even completely suppressed, and in still others there may be marked menorrhagia, in some instances the loss of blood being almost constant. Thus, in two of our cases there was

no change; in two, menorrhagia; in one, scanty, irregular menstruation, and another, amenorrhœa. Strange to say, in the two cases in which the disease was most advanced there was absolutely no menstrual disturbance, even though one of them exhibited signs of phthisis.

That our experience is not isolated is shown by the fact that Daurios²⁶ makes the same statement; and in reviewing the literature we met with cases described by Boivin,¹⁰ Kiwisch,²⁷ Brouardel,¹⁴ and Gardner,²⁷ in which the occurrence of menorrhagia was also noted.

It would thus appear that tuberculosis, so long as it is limited to the tubes and ovaries, does not give rise to any symptoms which would of themselves cause us to suspect its occurrence, and accordingly its physical diagnosis becomes impossible in most instances.

Not so, however, when the disease is associated with pulmonary or peritoneal tuberculosis, for in these instances the discovery of tumor masses involving the tubes and ovaries should at once lead us to suspect tuberculosis.

It would lead us too far, however, to attempt to discuss the protean clinical pictures which may be presented by this affection when combined with tuberculosis of the peritoneum, and we would refer the reader to the admirable articles of Kaulich,²⁴ König²¹ and Osler²⁴ in this connection.

Tuberculosis of the genitals, when primary, may lead to the secondary infection of other organs and produce tubercular peritonitis, phthisis, or general miliary tuberculosis, and thus indirectly lead to the death of the patient. In other instances, whether the genital affection be primary or secondary, it may lead to death by marasmus and hectic fever, or by the rupture of tubal or ovarian abscesses into the peritoneal cavity, to the production of a septic peritonitis from secondary infection.

Rupture of a pregnant tuberculous uterus with the production of peritonitis and death has been reported by H. Cooper,¹⁹ but the tuberculous nature of the affection is open to doubt.

DIAGNOSIS.

When we consider the clinical history of the affection it becomes evident that prior to the discovery of the tubercle bacillus a positive diagnosis of genital tuberculosis could not be made *intra vitam*, and only in very rare instances a probable one. Thus in 1881, Gehle²⁸ stated that a positive diagnosis was impossible.

The difficulty of diagnosis varies considerably according to the portion of the genital tract involved by the process, it being much easier when the more readily accessible portions are affected, as vulva, vagina and uterus.

Tuberculosis affecting the vulva and vagina may be confounded with a number of affections to which it bears a superficial resemblance; but in all doubtful cases the microscope will be able to render a final decision. Thus, miliary tubercles occurring in the vagina should be diagnosed from the granulations due to a granular vaginitis. The frequency of the latter, compared with the great rarity of vaginal tuberculosis, is of itself almost sufficient for diagnosis, but when one considers that tuberculosis of the vagina usually occurs in phthisical women whose internal genitals usually present marked changes, while granular vaginitis is so frequently associated with pregnancy or gonorrhœa—a mistake should not occur. They should also be diagnosed from the papular and ulcerative syphilides by the history, total lack of pain, and principally by the total disappearance of the latter under anti-syphilitic treatment. Herpetic eruptions occurring about the vulva and entrance to the vagina may occasionally be a possible source of confusion. Their anatomical character, occurring as small cysts filled with clear fluid, should be abundant evidence of their nature; and this in connection with the fact that they usually occur about the menstrual period and disappear soon after it, should render all mistake impossible.

Tuberculous ulcers may possibly be mistaken for both hard and soft chancres, but the well-known characteristics of both these varieties of ulcerations and their history should not make the diagnosis doubtful for any great length of time. And lastly, they may be mistaken for carcinoma. If in any case the diagnosis appears doubtful, the microscopic examination of a small portion of the suspected area will conclusively settle the question.

That tuberculous ulcerations of the cervix have been mistaken and operated upon for carcinoma has already been mentioned, and no doubt this mistake has frequently occurred. It only serves to show the necessity for the microscopic examination of an excised portion of the cervix previous to any radical operation, for, while it will only rarely result in the discovery of a tubercular ulcer, it will at least demonstrate in many instances that the growth is benign and will spare the patient a serious operation.

In any case in which there is the slightest suspicion of genital tuberculosis, the vaginal and uterine secretions should be examined with the greatest care for tubercle bacilli; and if that should prove negative, the uterus should be curetted and the scrapings hardened in alcohol and submitted to microscopic examination; if tuberculosis exists, its histological characteristics will be amply sufficient for diagnosis.

To Babes⁸ (1883) belongs the credit of being the first to demonstrate tubercle bacilli in vaginal secretions, and since then the method has passed into routine practice. By this means Derville,²⁷ Jouin⁵¹ and others have been able to diagnose with certainty cases of tuberculosis of the uterus in which there was apparently no trace of tuberculosis elsewhere; and Derville²⁷ states that Nocard has diagnosed tuberculosis of a cow's uterus by finding tubercle bacilli in the vaginal secretion, and that the diagnosis was verified at the autopsy.

In suspected cases in which bacilli are not found in the secretions and the histological character of the uterine scrapings is not satisfactory, small portions of the endometrium should be inoculated into the peritoneal cavity of rabbits or guinea pigs, when the production of tuberculosis would confirm the diagnosis.

We would not only recommend the examinations of the secretions and curetted portions of the endometrium in suspected cases of genital tuberculosis, but also in every intractable case of endometritis for which a perfectly definite cause cannot be assigned, and we feel confident that by so doing we shall not infrequently meet with and diagnose cases of this variety.

The diagnosis of tubercular disease of the tubes and ovaries is more difficult than that of the uterus, for the reason that their secretions are not so readily obtained for examination.

We consider that it is practically impossible to diagnose tuberculosis of the tubes and ovaries by bimanual palpation *alone*, and attach no importance to the thickened and nodular condition of the uterine end of the tube, to which Hegar⁴³ attaches so much importance; for a thickened condition of the uterine end of the tube is met with in many cases of pyosalpinx in which there is absolutely no trace of tuberculosis (case 10). The nodular condition of the tubes is likewise of no diagnostic value, for while it was present in one of our cases (case 7), a similar condition has been described by Chiari¹⁷ and Schauta⁹⁰ resulting from catarrhal salpingitis, and it is evident that small myomata of the tube may also give rise to a similar condition. Various observers have called attention to the hardness of tuberculous tubal tumors (case 1), Orthmann⁸⁸ in one instance having mistaken such a case for a myoma uteri; as this, however, is occasionally noted in ordinary cases of pyosalpinx, it cannot be considered as at all pathognomonic of tuberculosis. In cases in which the process has extended to the peritoneum it is possible in rare instances, if the pelvic organs are not too much matted together by adhesions, to feel tubercular granulations on the posterior surface of the uterus and broad ligaments; this, however, is only possible in the rarest instances. A probable diagnosis of tuberculosis of the tubes may be made in any case when in addition to distinct tubo-ovarian masses we are able to diagnose tubercular peritonitis, or, as Osler expresses it, "the association of a tubal tumor with an ill-defined anomalous mass (tubercular tumor) in the abdominal cavity should arouse suspicion at once."

And Edebohl,⁸² in his excellent article on the subject, lays the greatest stress on the value of plaque-like thickenings of the sub-peritoneal tissues of the abdominal wall in the diagnosis of tubercular peritonitis and states: "The co-existence of tubal tumor or tumors with plaque-like thickenings of the sub-peritoneal tissues, points with the greatest distinctness to tuberculosis. The tuberculosis under these conditions may fairly be assumed to be primary in the tube or tubes, if no other deep-seated tumors can be palpated in the abdominal cavity."

If, on the other hand, the tubal tumor occurs in a phthisical woman who presents no trace of tubercular peritonitis, we will not even be able to make a probable diagnosis, but in these cases we

should always bear in mind the possibility of the tuberculous nature of the affection.

And lastly, if the tuberculosis be limited to the tubes and ovaries, without any pulmonary or peritoneal involvement, we do not consider that it is possible to diagnose the affection purely by the physical examination of the patient. In some instances, no doubt, the examination of the vaginal secretions might reveal the presence of tubercle bacilli, but in the vast majority of cases it would yield negative results. In a case of pyosalpinx which is suspected of being tuberculous, a positive diagnosis may occasionally be made by the vaginal puncture of the pus sac, under the guidance of careful bimanual palpation, as recommended by Edebohls,² and the examination of the fluid removed for tubercle bacilli. In one case Edebohls was able to make a positive diagnosis by this method.

While it is possible that the method may enable us to make a diagnosis in some instances in which the process has gone on to abscess formation, it is evident that the diagnosis of a large proportion of primary cases becomes practically impossible.

Even though this outlook does not appear especially promising, we cannot lay too much stress on the frequent examination of the uterine secretions, and are confident that its more general adoption will lead to the recognition of not a few cases which now pass unrecognized.

PROGNOSIS.

Generally speaking, the prognosis of genital tuberculosis is grave, whether it be of primary or secondary origin. Primary tuberculosis of the genitals is always to be regarded as a serious affection; for, even if it remain limited, it always presents the possibility, as does any other focus of tuberculosis, of a general infection, with its uniformly fatal termination.

Tuberculosis of the tubes and ovaries, as previously indicated, has a marked tendency to lead to the production of tubercular peritonitis. And even if the process remain limited to the genitals, it is always possible that it may go on to suppuration, with the formation of abscesses in the tubes or ovaries, which in turn may lead to a fatal termination by marasmus and hectic fever, or by their rupture to peritonitis.

If, on the other hand, the genital tuberculosis be secondary to tuberculosis of the lungs or peritoneum, the above-mentioned possibilities are added to the already serious primary affection of the other organs.

That genital tuberculosis may undergo conservative fibroid changes has already been mentioned (case 6), and it is possible that healing by calcification may occur as mentioned by the older writers. But it must be admitted that these conservative processes occur but rarely and that the usual course of the affection is one of progressive advancement.

TREATMENT.

As in some instances it appears quite probable that infection of the genital tract has occurred from without, the necessity for prophylaxis becomes apparent. Of course, possible infection by the physician and attendants should be carefully guarded against by attention to the well-known rules of cleanliness. This should be particularly borne in mind in the conduct of obstetrical cases.

The danger of infection by coitus being more than theoretical, we should attempt to impress upon persons afflicted with genital tuberculosis, whether male or female, the dangers of the situation and the advisability of abstaining from coitus.

The ideas as to the treatment of genital tuberculosis have undergone great changes during the past ten years; for it was only in 1881 that Gehle³⁸ stated that any operation for the removal of tubes and ovaries, the seat of tuberculosis, was absolutely unjustifiable, even if a diagnosis could be made, while now in many instances operative treatment is urgently advocated.

It is particularly to Hegar⁴³ that credit is due for insisting upon the value of laparotomy and the removal of the tubes and ovaries, and his monograph on genital tuberculosis may justly be regarded as marking the turning-point in the sentiment of the profession as to the treatment of these cases.

Of course, the treatment varies according as different portions of the genital tract are affected, and, whether the affection is primary or secondary, it is also greatly influenced by the condition of the patient and the various complications which individual cases may present.

Tubercular ulcers of the vagina and vulva are in the vast majority of cases secondary to tuberculosis elsewhere. It was pointed out by Cornil,²¹ Vermeil¹¹⁸ and Derville²⁷ that they are very amenable to treatment; in these cases the application of the tincture of iodine is frequently followed by their rapid disappearance. But unfortunately they have a marked tendency to recurrence, and frequently before one ulcer is quite healed another will make its appearance alongside of it. In some instances, however, the application of tincture of iodine, iodoform or lactic acid will lead to the total healing of the ulcer by granulation. In the few instances in which the ulceration is isolated, as in Bierfreund's⁹ case, and resists the more palliative methods of treatment, it should be excised and the edges of the incision brought together by sutures.

If a tubercular ulcer of the cervix be recognized and fails to respond to conservative treatment, we should not hesitate to amputate the cervix by one of the recognized methods, if we feel reasonably sure that the rest of the uterus is not also affected.

If we have to deal with tubercular endometritis we should first satisfy ourselves that the tubes are intact. Any apparent inflammatory disease of the tubes along with tuberculosis of the uterus would indicate that they are likewise involved. If the process be limited to the uterus, we should at once curette it thoroughly and then introduce suppositories of iodoform, as recommended by Hegar⁴⁸ and Derville;²⁷ and if after this there is the slightest recurrence of the affection, there should be no question as to the propriety of the vaginal extirpation of the uterus (Zweifel¹³¹). In all such cases it is best to remove the tubes and ovaries at the same time, as it is impossible to tell whether they are perfectly healthy or not, especially in the light of the great frequency of "unsuspected tuberculosis."

The question as to the removal of the tubes and ovaries when the seat of tuberculosis, becomes very complicated in many instances. On account of the great difficulty of diagnosis of primary tuberculosis limited to the tubes and ovaries, it is very rare that one has to face the question of their removal, except in cases of laparotomy undertaken for other indications, when their condition is a matter of surprise. Of course, in these instances, there can be no hesitation as to the propriety of their removal. But when, on the other hand,

Tuberculosis of the Female Generative Organs.

the process is secondary and associated with phthisis or tubercular peritonitis, the question as to the propriety of operating becomes a grave one, and can only be decided by the operator after a careful survey of the general condition of the patient.

Generally speaking, in advanced cases of phthisis there should be no thought of operating, but in the early stages of the disease the general condition of the patient should be our guide; certainly as long as the condition of the lungs holds out any hope of recovery, the operation should be undertaken with the view of preventing the complications which might arise from the disease of the genitals.

In cases associated with tubercular peritonitis, we should not hesitate to perform laparotomy and remove the tubes and ovaries, if possible, unless the general condition of the patient is particularly unfavorable (advanced phthisis), for we should bear in mind the curative influence which laparotomy sometimes exerts in tubercular peritonitis and the possibility of the affection having originated in the tubes.

In the cases in which both the tubes and ovaries and the uterus are involved, the problem becomes very complicated; it is doubtful whether many operators will adopt Hegar's⁴⁸ suggestion of a supra-vaginal amputation of the uterus, or will prefer to remove the tubes and ovaries and treat the uterus, by curetting and iodoform. Of course, it is unnecessary to state that the patient should be put upon general treatment, cod liver oil, guaiacol, etc., and placed in the best hygienic surroundings both before and after the operation.

The results after operations for this class of cases certainly afford encouragement enough for us to continue to advocate their operative treatment. In a number of cases, the women have been perfectly well four and five years after the operation (Wiedow⁴⁹ and Hegar⁴⁸).

In our cases, the results have not been unsatisfactory, for of the four cases from whom we have heard since their departure from the hospital, three were greatly improved, while the fourth, who had dullness at the apex of one lung, states that she is better than before the operation. All of these cases were, however, operated upon too recently to justify any definite statement as to their ultimate recovery.

CONCLUSIONS.

The general outlines of this article may be summed up as follows :

I. Genital tuberculosis may occur at any age from 10 weeks to 83 years, but usually between the 20th and 40th years.

II. It is usually secondary to tuberculosis elsewhere, but in a considerable number of cases is primary in the genitals.

III. Its frequency is much greater than is usually supposed. A careful microscopic examination of all tubes and ovaries removed by operation demonstrates that a considerable number of cases are tuberculous, even when macroscopically they present no trace of tuberculosis. Such cases we have designated as "unsuspected genital tuberculosis."

In our experience about 8 per cent of all appendages removed for inflammatory diseases are tuberculous : in other words, every 12th case of adherent tubes and ovaries or pus tubes is of tubercular origin. Only 25 per cent of the cases are recognized on macroscopic examination and the other 75 per cent occur as "unsuspected tuberculosis." Wider experience from various sources is necessary before positive laws on these points can be formulated.

IV. Every portion of the genital tract may be affected, the order of frequency for the various portions being : tubes, uterus, ovaries, vagina, cervix and vulva. The tubes are affected in nearly all cases, the uterus in from 60-75 per cent and the ovaries in from 40-45 per cent of all cases.

V. Tuberculosis of the cervix no doubt occurs more frequently than is usually supposed, and may be mistaken for carcinoma.

VI. Tuberculosis of the tubes and uterus is usually limited to the mucous membrane, and occurs in three forms :

Miliary tuberculosis.

Chronic diffuse tuberculosis.

Chronic fibroid tuberculosis.

Chronic diffuse tuberculosis is much the most frequent and represents the well-known caseous form of the disease.

VII. Genital tuberculosis may be due to direct infection from without. The occurrence of infection by coitus is very probable, but has not yet been conclusively demonstrated. The majority of cases are secondary to tuberculosis elsewhere, and are due either to infec-

tion from the blood or the neighboring organs. Even in the apparently primary cases, it is impossible to exclude blood infection.

VIII. The symptoms are not characteristic. In primary cases they may be entirely absent or vary from those of simple endometritis and salpingitis to the most severe forms of pelvic abscess. In secondary cases, the symptoms of the primary affection may so overshadow those of the genital tract that its involvement may only be recognized at the autopsy.

IX. The prognosis is always grave. Primary cases may lead to phthisis, tubercular peritonitis or general infection, and either primary or secondary cases may go on to suppuration and abscess formation, and death may result from marasmus and hectic fever or peritonitis, or from the primary affection.

X. Primary cases can only be diagnosed by the discovery of tubercle bacilli in the secretions or the demonstration of the histological characteristics of tuberculosis in the scrapings from the uterus. The co-existence of tubo-ovarian masses with phthisis or tubercular peritonitis should at once arouse suspicion as to the tuberculous nature of the affection.

XI. Treatment may be prophylactic, palliative and operative. Prophylactic treatment consists in cleanliness and the prohibition of coitus between persons, one of whom has genito-urinary tuberculosis.

Ulcerations of the vulva, vagina and cervix should be treated with applications of tincture of iodine and iodoform and excised if isolated and intractable to treatment.

Tuberculosis of the uterus should be curetted and iodoform introduced; if the disease recur, the uterus should be removed per vaginam.

Tuberculous tubes and ovaries should be removed by laparotomy, unless contraindicated by the general condition of the patient (advanced phthisis). Tubercular peritonitis and the early stages of phthisis are not contraindications to laparotomy.

The specimens upon which this article is based were obtained in seven instances from the Gynecological Department of the Johns Hopkins Hospital and in two instances from the autopsy table of the Pathological Laboratory of the Johns Hopkins University and Hospital.

In conclusion we desire to express our indebtedness to Professors Welch and Councilman for their interest and kind assistance in the preparation of this article.

CASUISTIC.

Case 1.—Tuberculous peritonitis; tuberculosis of both tubes and ovaries and tuberculous ovarian abscess.

Case 2.—Tuberculous peritonitis; tuberculous salpingitis and peri-salpingo-oöphoritis.

Case 3.—Tuberculous pyosalpinx; tuberculous abscess of ovary; hydrops folliculi.

Case 4.—Miliary tuberculosis of the tube; tuberculous tubo-ovarian abscess, gonococci in its contents.

Case 5.—Miliary tuberculosis of the tubes; intraligamentous hydrops folliculi; peri-salpingo-oöphoritis.

Case 6.—Fibroid tubercular salpingitis; intraligamentous hydrops folliculi; peri-salpingo-oöphoritis.

Case 7.—Miliary tuberculosis of the left tube; dermoid cyst of the right ovary; peri-salpingo-oöphoritis.

Case 8.—Diffuse tubercular endometritis and salpingitis.

Case 9.—Tubercular peritonitis, involving the external surface of the tubes and ovaries.

CASUISTIC.

Case 1.—Tuberculous peritonitis, tuberculosis of both tubes and ovaries and tuberculous abscess of right ovary.

September 24, 1890.—J. S., colored, aged 19 years, 0-para, no miscarriages. Menses first appeared at sixteenth year. Occur three or four days sooner than normal, last four days, with slight loss of blood and considerable pain, especially for the past year. No leucorrhœa until six months ago, when it appeared suddenly and has continued ever since. Bowels regular, micturition painful and occasionally has incontinence of urine. Patient was never sick until two years ago, when she was confined to bed for two months with "lung troubles"; ever since then has had a slight cough. Family history negative; father, mother and eight brothers and sisters living and in good health.

Five months ago was confined to bed a second time for two months, with abdominal pain and swelling; was unable to walk on account of great weakness and increased pain on exertion. At present she complains of constant pain in lower portion of abdomen, worse on

the right side, constant backache and headache, and for the last five months swollen abdomen and fever.

On vaginal examination large adherent tubo-ovarian masses were felt on each side of the uterus.

October 5, 1891.—Laparotomy for the removal of the adherent tubo-ovarian masses.

The entire surface of the peritoneum as well as the surface of the masses were found covered with grayish granular masses, 0.5–2 mm. in diameter. The masses from each side were removed without great difficulty; the mass on the left side was densely adherent to the sigmoid flexure and the surrounding parts.

Examination of the specimens.—The specimens consisted of the tubes and ovaries from both sides, several bits of omentum, and a small mass of tissue adherent to the sigmoid flexure.

Left side.—The tube is 12 cm. in length, 8 mm. at its uterine and 2 cm. at its lateral end. Its consistency is extremely dense, almost like stone. About its middle, it is bent sharply upon itself, so that the two portions lie in close apposition, and are bound together by dense adhesions, upon whose surface there are large numbers of grayish tubercles. The fimbriated extremity is apparently occluded, and with the internal extremity of the ovary, to which it is adherent, takes part in the formation of a ragged ulcerated surface about 4 cm. in diameter, which was previously adherent to some other structure.

The left ovary measures 4, 3, 2.5 cm. in its various diameters; it is soft, covered by dense adhesions and densely adherent to the tube by its anterior and inferior surfaces. In its centre is an apparently fresh blood clot, 2x1 cm.

Right side.—The right tube and ovary are fused together by dense adhesions into a hard irregular mass 6, 5, 3.5 cm. in its various diameters. The tube is greatly contorted, is 10 cm. in length and 0.7 and 1.5 cm. at its thinnest and thickest parts; it is adherent throughout its entire extent, and profusely studded with tubercles on its exterior. Right ovary measures 4, 3, 1.5 cm. in its various diameters, soft. Between its anterior surface and the posterior surface of the lateral end of the right tube is found an abscess cavity about 3 cm. in depth, which communicates with a ragged ulcerated surface 5x2 cm., which is formed by both tubes and ovaries and was formerly adherent to some other structure. The fimbriated extremity

of the tube is not wholly occluded, and opens into the above-mentioned cavity.

The omentum is studded with numerous tubercles, and the mass, hanging to the sigmoid flexure, resembles an epiploic appendage and is made up of an aggregation of tubercles. Both tubes and the abscess cavities were filled with typical caseous pus, in which after hours of search no perfectly typical bacilli could be found; several suspicious rods containing granules were, however, found, and in all probability represented degenerated bacilli. Glycerine agar tubes gave no growth of organisms.

Examination of the hardened specimens.—Left side.—The wall of the tube is filled with miliary tubercles. Its mucous membrane shows no trace of its original epithelium, and is converted into diffuse tubercular tissue, and its lumen is filled with caseous material. On its external surface there is typical tubercular peritonitis. The ovary is densely adherent to the tube, small areas of germinal epithelium, which are left here and there, indicating their original division. The entire ovary on section is sprinkled with typical miliary tubercles. The blood clot mentioned above is a typical early stage of a corpus luteum.

Right side presents the same condition, except that the ovary is converted into a large abscess, with diffuse tubercular tissue and miliary tubercles in its wall; most of what appeared to the naked eye as miliary tubercles are seen to be small areas of caseation in the diffuse tubercular tissue.

Bacilli were readily demonstrated in the tissues.

The patient recovered from the operation, but her temperature remained at about 100° to $100\frac{1}{2}^{\circ}$, and she had a small fistulous tract discharging a serous fluid from the abdomen. Dr. Osler carefully examined her before her discharge from the hospital and could find no trace of tubercular trouble in her lungs, nor could tubercle bacilli be found in the sputum, even after most patient and often repeated search. In December, 1890, when Koch's lymph first came to this country, she was sent for and given several injections, after which she exhibited the usual reaction. She was considerably better than before the operation, though not restored to perfect health.

Case 2.—Tuberculous peritonitis, tuberculous salpingitis and peri-salpingo-oöphoritis.

M. W., German, aged 28 years, married 6 years, 4-para, oldest child being 5 years old and youngest 2, no miscarriages. Menses first at 14 years, regular, lasting 6 to 8 days, moderate in amount, no pain; last period only lasted 3 days, was scanty, with slight pain. Last summer she noticed dull pain in hypogastric region, which has continued to the present time; for past seven weeks has had sharp pain in both ovarian regions, no pain in back, constant headache. Previously was always healthy; family history good.

Status præsens.—Fairly well nourished, has lost a good deal of flesh since last summer; appetite good, bowels regular. No cough. No urinary trouble.

Examination of the lungs: Increased vocal fremitus and dullness at both apices, bronchial breathing in right lung, and a few moist rales in left. Has sweated a good deal at night for the past few weeks. There is also a systolic murmur at apex of heart, which can be traced into the axilla.

Examination under chloroform: Vaginal outlet relaxed, anterior and posterior vaginal walls protruding; cervix descended to the neighborhood of outlet, bilaterally lacerated. Uterus enlarged just above cervix, fundus low down in the pelvis, resting on the pelvic floor. On the right side is a somewhat movable tubo-ovarian mass, which is irregular, nodular and adherent to the posterior surface of the broad ligament. On the left side, near the uterus, is a similar nodular mass.

March 7, 1892.—Laparotomy; the omentum was found somewhat adherent to the abdominal wall and the intestines firmly matted together and studded with small tubercles. Both tubes and ovaries removed without any considerable difficulty, the right side being least diseased.

April 10, 1892.—Discharged greatly improved, the temperature not having reached a higher point than 101°. Patient seen three months later, much better than before operation.

Description of specimens.—Tube and ovary from one side.

Tube 8 cm. in length, 0.7 and 2.4 cm. at its thinnest and thickest parts; is covered with dense adhesions and studded over its entire external surface with small miliary tubercles up to 2 to 3 mm. in

diameter, which are especially plentiful at its lateral end. Portions of the tube are covered by a thick fibrinous deposit, which is somewhat adherent, but may be readily stripped off. The fimbriated extremity is greatly thickened, but not occluded; caseous material may be seen protruding from it. On section, the tube is found to be filled with a greenish caseous mass which constitutes the greater part of the thickness of the tube, the thickest portions of the tube walls being only 2 to 3 mm. in thickness. The ovary is 4.5, 2.5, 1.5 cm. in its various diameters and covered by dense adhesions. On section it is very cedematous; contains two oldish corpora lutea, and several dilated follicles; no trace of tuberculosis. Numerous bacilli in the caseous pus from tube.

Microscopic examination of hardened specimens.—Sections through the uterine end of tube show that its entire lumen is filled with the caseous material. No trace of its epithelium is left, and the folds of mucosa are either caseous or infiltrated with round cells and contain typical giant and epithelioid cell tubercles. The formation of tubercles is limited to the portion of tube adjoining the lumen, while none are found in the more peripheral portions of the tube wall. The wall of the tube is the seat of a marked small cell infiltration, and on its external surface is a marked, organized perisalpingitis.

Sections from the lateral end of the tube show the lumen filled with caseous material, but here and there portions of normal ciliated epithelium are preserved, and occasionally we find small cysts lined with ciliated columnar epithelium. The folds of the tubal mucous membrane are for the great part obliterated and their place taken by necrotic material; where this is not the case, the tissue is infiltrated with round cells and contains typical tubercles. The appearance in this part of the tube gives one the impression that the process is not so marked as at the uterine end. The greater part of its external surface is covered by dense adhesions, in which typical tubercles and necrotic areas may be seen. The ovary is covered in places by a few thin adhesions, but is otherwise normal.

From this condition of the tube we consider that we are justified in concluding that the trouble originated in the uterine rather than the lateral end.

Case 3.—Tuberculous pyosalpinx, tuberculous abscess of ovary, hydrops folliculi.

P. H., colored, aged 17 years; 0-para, no miscarriages. Menses first at 16 years, very irregular, occurring at intervals of one to six months, usual duration about a week, free in amount, painful at times. For the last year has had a bloody discharge, "mostly every day." For past year has complained of pains in abdomen, back and hips, occasionally extending down the thighs. Has had two attacks of fever and chilly sensations, with swelling of the abdomen, which confined her to bed for a week or ten days. Bowels regular, burning on micturition, rises several times at night. Constant leucorrhœa for the last year, worse when not losing blood.

Vaginal Examination.—Vaginal outlet tight, hymen destroyed, uterus anteverted, with the fundus directed to the left side; on either side of uterus and extending behind it are hard nodular masses.

April 30, 1890.—Laparotomy; very adherent masses on either side of uterus.

In shelling out the masses they ruptured, and each contained about two ounces of yellowish pus, with a very fetid garlicky odor, which escaped into the abdominal cavity. After enucleating the masses, a large jagged surface was left on the posterior surface of the uterus and the anterior face of the rectum, from which free hæmorrhage took place; the area was cauterized, and the pelvis packed with iodoform gauze, whose end was brought out through the drainage tube.

Convalescence interrupted by a fæcal fistula, which was about two months in closing. After the operation the temperature was elevated for about three weeks, but never higher than 102°, while before the operation it varied from 99° to 104°. Dismissed cured, July 8, 1890. Was perfectly well one year later.

Examination of specimens.—They consist of tubes and ovaries of both sides.

Left side.—Tube is 10 cm. in length, 0.5 and 2.5 cm. at its thinnest and thickest parts. Its lateral end is dilated into an abscess cavity. It is covered with the densest sort of adhesions. The ovary is represented by a very jagged mass of tissue adherent to the posterior wall of the tube.

Right side.—Tube is 7 cm. in length, and 1.5 cm. at its thinnest and thickest portions; the fimbriated extremity is occluded, and is covered by many adhesions, which are not so dense as those on the left side. The ovary, roughly speaking, may be divided into two parts: a superior portion, which is converted into a pus sac, 5 cm. in diameter, filled with thick yellow pus and has a rough irregular lining membrane; and an inferior portion, which consists of a cyst 2.5 mm. in diameter, with smooth walls and filled with a clear yellowish fluid. The walls of the abscess vary from 1 to 5 mm. in thickness. The entire ovary is covered by adhesions; here and there on section follicles may be seen.

Examination of hardened specimens.—Sections through the uterine end of the right tube show that its lumen is intact, only presenting a small amount of small cell infiltration. In the portion of the tube wall adherent to the ovary a number of typical miliary giant-epithelioid cell tubercles may be seen. There is no trace of acute inflammation. In the lateral part of the tube, on the other hand, the lumen is almost entirely obliterated, no trace of its epithelium being left. Here and there the margins of the lumen are caseous, and the entire tissue, corresponding to the mucosa and the underlying portions of the muscularis, is composed of epithelioid cells, in which are scattered a few typical tubercles, not caseous. The exterior of the tube, except for adhesions, is intact, except at its posterior part, where it is adherent to the ovary, where there are numerous miliary tubercles. Here and there in the wall of the tube are a few areas of small cell infiltration.

The surface of the ovary is covered with adhesions, in which there are no tubercles. The smaller cyst with clear contents is seen to be a typical hydrops folliculi. The pus sac has a distinct wall 2 to 4 mm. in thickness, which is composed of diffuse tubercular tissue, which contains many miliary tubercles, which occasionally are caseous. This tuberculous tissue is remarkable in its resemblance to the large cells which enter into the formation of the corpus luteum. The other portions of the ovarian stroma are unchanged.

The specimens from the left side present the same changes, but to a less degree. Tubercle bacilli were demonstrated in the tissues. To the naked eye this specimen did not at all suggest tuberculosis, and its nature was not suspected until the hardened specimen was

examined; accordingly, we may designate it as unsuspected tuberculosis of the tubes and ovaries.

Case 4.—Miliary tuberculosis of tube, tuberculous tubo-ovarian abscess, gonococci in its contents.

Mrs. C. Unfortunately we are unable to procure the history of this case. Both tubes and ovaries were removed by laparotomy, December 20, 1890.

Description of specimens.—Left side.—The tube is 10 cm. in length and 0.7 and 1 cm. in diameter at its thinnest and thickest portions; it is wound round the ovary and adherent to it by its occluded fimbriated extremity. A short distance from its uterine end, the tube presents a very marked constriction; at this point it is only 3 mm. in diameter; this condition extends for a distance of 7 mm., on either side of which the tube regains its usual diameter. This condition was produced by a very dense adhesion passing around the tube at this point. The tube is covered with numerous adhesions. Except for adhesions, the ovary presents its usual appearance.

Right side.—The specimen from the right side consists of the greatly enlarged tube, an abscess cavity in the ovary and a mass of small cysts with clear contents. The tube is 10 cm. in length and 1 and 4.5 cm. in diameter at its thinnest and thickest portions, and is converted into a pus sac; its fimbriated extremity is apparently closed and densely adherent to the ovary. The ovary is represented by a pus sac 4.5 cm. in diameter, whose walls vary from 2 to 5 mm. in thickness. On cutting the specimen open, it is distinctly seen that the ovarian abscess communicates with the enlarged tube by an opening 5 mm. in diameter, situated at the original situation of the fimbriated extremity of the tube, so that it is evident that we have to deal with a tubo-ovarian abscess. The specimen is covered with a large quantity of very dense adhesions. Adherent to the posterior surface of the tube is a mass of small thin-walled cysts, with clear yellow contents, which appear to be of peritoneal origin. Scrapings from their walls show that they are lined by very flat non-ciliated epithelium. Microscopic examination of the pus from the tubo-ovarian abscess shows that it contains typical gonococci, some of which present the typical appearance within the leucocytes, while others are free. Cultures were made on both gelatine and agar, but after three days in the thermostat they showed no trace of any growth.

Examination of the hardened specimens.—Sections through the left tube show that it is the seat of an intense purulent inflammation, and that a large number of typical miliary tubercles are scattered through the mucosa. On its exterior is a marked perisalpingitis, which presents absolutely no trace of being tuberculous. The constricted portion of the tube, on section, presents the same appearance, except that it is much smaller than the other portions of the tube. Except for peri-oöphoritis, the left ovary does not present any sign of disease.

Sections through the right tube show that it is the seat of a very intense salpingitis, its lumen being filled with a caseous mass and the portions of the mucosa adjoining the lumen are completely robbed of their epithelium; outside of this there is an abundant formation of tubercular tissue and miliary tubercles; in the deepest or most peripheral portions of the mucosa cut-off portions of the epithelium are seen, just as in ordinary cases of purulent salpingitis. The muscular wall is atrophied and infiltrated with round cells and leucocytes, but neither it nor the peritoneum contains any tubercles.

The wall of the ovarian abscess is made up of granulation tissue, inclosing immense numbers of sharply circumscribed miliary tubercles. The abscess wall, which contains the miliary tubercles, has an average thickness of 1.5 mm. and is sharply separated from the rest of the tissue by a definite line of round cell infiltration. In the ovarian tissue outside of the abscess wall there are small foci of miliary tubercles and larger caseous masses, probably resulting from their confluence and breaking down. The small clear cysts are seen to be of peritoneal origin. Tubercle bacilli were abundantly demonstrated in the tissues.

In this specimen we have an example of a mixed infection, but whether the two processes were coincident or not, or whether a possible primary gonorrhœal salpingitis afforded a favorable soil for the development of tuberculosis, we are unable to state.

Diagnosis.—Left side.—Perisalpingo-oöphoritis and miliary tuberculosis of the tube.

Right side.—Tuberculous tubo-ovarian abscess; mixed gonorrhœal and tubercular infection.

Case 5.—Miliary tuberculosis of the Fallopian tubes, intraligamentous hydrops folliculi, perisalpingo-oöphoritis.

Mrs. C., aged 29 years, married 7 years, 0-para, 2 miscarriages, both at three months, last one 18 months ago, no subsequent trouble. Menses occurred first at 14 years, never regular, occurring at intervals of one to three months, of 2 to 7 days duration, profuse, accompanied by great pain in back and lower abdomen. Menses still more irregular since marriage. Moderate leucorrhœa at present, formerly very profuse. Occasionally suffers from frequent and painful micturition. Has had several attacks of pelvic inflammatory trouble, confining her to bed for six weeks or more at a time; first attack at sixteenth year, last one four years ago.

Vaginal Examination.—Vaginal outlet moderately relaxed; cervix pointing towards hollow of sacrum, small, with patulous os. Uterus reclining in pelvis, small, fixed and sensitive; pushed to the left side of pelvis by a large adherent tubo-ovarian mass, which fills up the broad ligament. Smaller mass on left side.

Feb. 20, 1890.—Laparotomy. Removal of densely adherent cysts from both sides; rupture of the right-sided one during evacuation. Intestines adherent in several places to the cysts and also to each other, wounded in several places during the operation; sutured.

Typical recovery, highest temperature being 99.8° F.

Description of specimens.—Specimens consist of the tubes and ovaries from each side, those from the right side, however, being so torn that their description is impossible. Specimen from the left side consists of the tube, ovary and a clear cyst within the folds of the broad ligament. The tube is 7 cm. in length and 0.5 and 1 cm. at its thinnest and thickest portions. The fimbriated extremity is occluded, and the tube covered by numerous adhesions. It appears to lie in a depression between the intact portion of the ovary and the clear cyst beneath it. A portion of the ovary, measuring 4, 3 and 2 cm. in its various diameters, is preserved above it and presents numerous follicles on its surface, and is more or less covered with adhesions. The lower margin of the tube appears to be continuous with the wall of the cyst, which is enclosed between the layers of the mesosalpinx and is therefore intraligamentous. The cyst is 5 cm. in diameter, with thin, almost transparent, walls and filled with a clear yellowish fluid, which contains many whitish particles in suspension, which under the microscope are seen to be fatty compound granular bodies. Extending obliquely across the anterior

and inferior surface of the cyst is the thinned-out parovarium, which presents a typical appearance. On section, the cyst is found to be monolocular and to have a glistening white interior, with here and there ecchymotic patches; corresponding to the under portion of the ovary are several dilated follicles. Scrapings show the epithelium to be rounded or cuboidal in shape, very fatty, with large vesicular nuclei.

Examination of hardened specimens.—Sections through the tube show that its entire mucous membrane is studded with miliary tubercles of very small size, directly under the epithelium, which is intact. The lumen of the tube is not distorted, nor is there any accompanying inflammatory change. The formation of the tubercles is limited to the mucosa, and does not extend into the muscularis. On the surface of the tube there are well-marked signs of perisalpingitis, but absolutely no trace of tuberculosis. Bacilli were demonstrated in the tissues. The cyst within the fold of the broad ligament presents the typical structure of a dropsical Graafian follicle, being lined by cuboidal epithelial cells, with large nuclei arranged in from one to many layers. As there were no signs of tubercular peritonitis nor of any affection of the lungs, the case was regarded as a simple case of salpingitis, and it was only on examination of the sections that its tubercular nature was recognized. It may, without hesitation, be regarded as a case of primary tuberculosis of the tubes.

Case 6.—Fibroid tuberculous salpingitis; perisalpingo-oöphoritis; intraligamentous hydrops folliculi.

S. R., colored, aged 34 years, married 16 years, 6-para, oldest 16, youngest 4 years; all her labors difficult, three of them twins; after all except the first child there was more or less puerperal trouble; 2 miscarriages 10 or 12 years ago, no trouble following them. Menses first at 16 years, monthly, lasting 3 days, profuse, with great pain in lower portion of abdomen. The menses were the same after marriage until four years ago, when they began to appear at intervals of two weeks and frequently continued for a week, very profuse. Profuse leucorrhœa for the past four years. Burning and bearing-down sensation on micturition. Bowels constipated, defecation very painful. After birth of last child, 4 years ago, was in bed four months, then she thought she felt a tumor in her left side, and has

never been well since. For the past four years complains of sharp pain in left side of lower abdomen, aggravated on exertion. Appetite poor, has lost flesh; no cough; complains only of the constant pain. Examination without an anæsthetic showed that the uterus was enlarged, and on either side of it were indistinct tubo-ovarian masses.

October 7, 1891.—Laparotomy. Removal of very adherent tubes and ovaries on each side.

Typical recovery, temperature not rising above 101° F.

Description of specimens.—Right side—The tube is 8 cm. in length, 0.5 and 1 cm. at its thinnest and thickest parts. The fimbriated extremity is occluded and its place is taken by a thin-walled cyst 1.5 by 2 cm., with clear contents. The tube is covered by many tolerably dense adhesions. For 3 cm. at its uterine end, the mesosalpinx is free, but beyond this point it is occupied by a small cyst. The ovary is converted into a thin-walled cyst 5 cm. in diameter, with many dense adhesions on its posterior surface. The anterior surface of the cyst is covered by peritoneum, which represents the unfolded mesosalpinx, in proof of which is the fact that the unchanged parovarium extends across the anterior and inferior surface of the cyst. The cyst contains about 100 cc. of a clear, straw-colored, albuminous fluid, containing whitish particles in suspension, specific gravity 1030. Its interior is white and glistening, and scrapings show that it is lined by non-ciliated cuboidal and cylindrical cells, with large nuclei.

Left side.—The tube is 7 cm. in length, 0.5 and 1.5 cm. at its thinnest and thickest parts; its fimbriated extremity is occluded and its place taken by a small cyst 1 cm. in diameter, with clear contents. It is covered by many adhesions and is densely adherent to the ovary. The ovary measures 4, 2 and 2.5 cm. in its various diameters; is considerably torn and covered by adhesions. Its germinal epithelium is not ciliated. On section it contains three corpora lutea.

Examination of the hardened specimens.—Sections through the median part of the right tube show that its lumen is much distorted, and that a few miliary tubercles are scattered through the mucosa. The epithelium is preserved in most places, but the stroma is infiltrated with masses of small round and epithelioid cells, even where there are no well-marked tubercles. Many of the tubercles present

a great amount of fibrous tissue, both within and surrounding them, and very few areas of caseation are seen. Accordingly, we may designate the tuberculosis as of the fibroid variety and as a chronic process. The lumen is greatly constricted, apparently by the contraction of the surrounding tissues. There is no evidence of purulent or catarrhal inflammation and no exudation within the tube. This is seen even more strikingly in the left tube. The cyst at the end of the tube is lined by flattened epithelium, and here and there in its walls are seen miliary tubercles. Sections from the superior part of the ovarian cyst show that it is lined by a single layer of flat, non-ciliated epithelium, the tissue beneath it being poor in cells, beyond which is found the typical structure of the mesosalpinx. At one point on its superior surface, just adjoining the tube and below the peritoneum, is found a small mass of tubercles in the mesosalpinx.

The lumen of the left tube has lost its characteristic arborescent appearance, and given place to a sieve-like structure, apparently composed of small cysts similar to the condition found in the so-called follicular salpingitis. None of the mucous membrane shows any sign of inflammation, but at several points typical tubercles are seen under the epithelium; none in the muscular wall of the tube. On the surface is a marked perisalpingitis, but no trace of tuberculosis is seen. The cystic condition at the end of the tube is only an exaggeration of the condition in the rest of the tube, except that no tubercles can be found in it. On the surface of the ovary are numerous adhesions, but it contains nothing else of pathological interest.

No bacilli could be found in this specimen, even after hours of search. This must likewise be regarded as a primary process and certainly a very chronic one. Its tuberculous nature was not suspected until examined with the microscope.

Case 7.—Miliary tuberculosis of left tube; dermoid cyst of right ovary; perisalpingo-oöphoritis.

H. S., age 24 years, married 18 months; no-para, no miscarriages. Menses first at 15 years; at 17th year had a dark grumous discharge and constant pain in lower part of abdomen, which lasted for two years. Since then menses have been irregular and scanty; amenorrhoea for the past eight months. For past two weeks constant pain in left ovarian region. Complains of headache, pain on defecation

and micturition, general malaise and pain in left ovarian region. Family history good; no cough. Vaginal examination revealed little of importance, no definite diagnosis being made.

Laparotomy, April 18, 1892. In making the abdominal incision, an abscess was found in the left inguinal region between the peritoneum and the transversalis muscle; on account of the difficulty of removal it was stitched up and left to itself. Tubes and ovaries on both sides were densely adherent and removed. On the right side there was a small dermoid cyst, the size of a hazelnut, which was enucleated from a mass of adhesions.

Typical recovery, temperature not rising above 100.5° F. Three weeks after operation several small abscesses formed in the line of the incision and formed fistulous tracts, which are still discharging (July 25, 1892).

Description of specimens.—Specimen consisted of the left tube and ovary and a small dermoid cyst of the right ovary.

Left side.—The ovary measures 3, 2 and 1 cm. in its various diameters; is greatly torn and covered by very dense adhesions. Only a small portion of the tube is present. The uterine end is apparently intact, 2 mm. in diameter for about 2 cm., when it dilates into a hard, rounded mass 1 cm. in diameter, beyond which it is represented by a ragged mass of tissue. On section through the rounded mass, no trace of lumen can be seen; its place being taken by a yellowish tissue, in which there are numerous whitish nodules 1 to 3 mm. in diameter; some of them are caseous and are, in all probability, tubercles. No tubercles can be seen either in the intact uterine or the ragged lateral portions of the tube. Numerous tubercle bacilli found in the caseous material.

The right ovary is converted into a small dermoid cyst 3 cm. in diameter; on its exterior are many dense adhesions. Its interior is generally smooth, except at one point, where there is a slight development of bone and hair. Its contents are the typical yellow fatty material, with a few black hairs.

Examination of the hardened specimens.—Sections through the uterine end of the tube show that its lumen is perfectly intact; it presents no sign of disease except for the adhesions on its surface. Sections, however, through the above-mentioned nodule show that it is the seat of a most typical miliary tuberculosis. At this point the

lumen is greatly distorted and in many places there are cut-off portions of epithelium, simulating small cysts, in the wall of the tube and at a considerable distance from the lumen. The epithelium is well preserved and in places is distinctly ciliated. The folds of the mucous membrane are infiltrated with leucocytes, showing that an inflammatory process is going on. Beneath the epithelium, and extending well into the muscularis, are many typical giant-epithelioid cell tubercles, and here and there are masses of lymphoid cells. Some of the tubercles are caseous. On the external surface of the tube there is a well-marked perisalpingitis, but no trace of tuberculosis. The ovary is densely adherent to the tube, no trace of their original separation being left; except for the adhesions, the ovary is perfectly normal.

The dermoid cyst of the right ovary presents the typical structure. Externally this specimen did not present the slightest sign of being tuberculous, and it was only on careful examination that the condition was discovered. It also may be considered a case of primary tuberculosis of the tube, possibly in an early stage.

Case 8.—Diffuse tubercular endometritis and salpingitis.

M. J., colored child, aged — years. Operated upon by Dr. Halsted for tubercular peritonitis. Death. Autopsy 308 of the Johns Hopkins Hospital, from which we extract the anatomical diagnosis. "Acute purulent peritonitis, operation wound in abdominal wall, chronic peritonitis, with adhesions, circular suture of the intestines. Primary intestinal tuberculosis; secondary tuberculosis of the mesenteric glands; tuberculous caseous masses in the adhesions of the peritoneum over the intestines. Acute parenchymatous degeneration of the viscera."

Description of genitals.—The uterus is 3 cm. in length, 1.5 at fundus and 0.5 cm. in its antero-posterior diameter. The cervix and the cervical canal are intact, while the body of the uterus is filled with caseous pus; on removing the caseous material, the internal surface of the uterus is seen to be jagged and irregular. The greatest thickness of the walls of the uterus is 2 mm. Both cornua are dilated and filled with caseous material, the right cornu being 5 mm. in diameter. The right tube and ovary are missing. The left tube measures 6.5 cm. in length and 1.5 and 5 mm. at its thinnest and thickest parts; the fimbriated extremity is free. Except for

2 cm. adjoining the uterus, it is dilated and filled with caseous pus. The left ovary has the typical foetal shape, and measures 25, 4 and 3 mm. in its various diameters ; there are no adhesions about it or the tube.

Examination of hardened specimens.—The cavity of the uterus is filled with caseous material, and the tuberculous process is almost entirely limited to the endometrium ; here and there typical glandular tissue is still preserved. There are no well-formed miliary tubercles, but the entire mucosa is infiltrated with epithelioid cells, with here and there caseous areas ; accordingly, the process may be designated as a diffuse tubercular endometritis.

The cervical canal is perfectly normal. Sections through the cornua show that the mucous membrane of the interstitial part of the tubes is not affected, but that in the surrounding tissue there are considerable quantities of caseous tubercles. As we approach the lateral end of the tube, we see that the process becomes limited once more to the mucosa, which has lost its typical appearance, and in places is entirely destroyed. Its lumen is almost entirely filled with caseous material. The left ovary is perfectly normal.

Isolated tubercle bacilli may be demonstrated close under the epithelium of the tube. From the intact condition of the interstitial portion of the tube, when both its lateral end and the endometrium are the seat of marked tuberculosis, it becomes apparent that the process did not extend from the lateral end of the tube to the uterus or *vice versa*, as in either instance the interstitial portion of the tube would be affected ; accordingly, we consider that the process is coincident in both the uterus and the tube, and that it is due to a blood infection.

Case 9.—Tubercular peritonitis, involving the external surface of the tubes and ovaries.

Autopsy 194, Johns Hopkins Hospital. Anatomical diagnosis "Tuberculosis of Fallopian tubes ; general miliary tuberculosis of peritoneum ; miliary tuberculosis of the pleura ; miliary tuberculosis of lungs and caseous pneumonia ; tuberculosis of the mesenteric and post-peritoneal lymph glands, bronchial and mediastinal glands."

Description of internal genitals.—Numerous miliary tubercles on the posterior surface of uterus ; none in its cavity. The tubes contained a small amount of pus ; fimbriated extremities not occluded. The

tubes are split open and are covered by tubercles on their exterior; tubercles most marked at the lateral end. Ovaries present nothing of interest except adhesions, in which tubercles are seen.

Sections through the tube show that it is the seat of a marked catarrhal salpingitis; many desquamated epithelial cells in its lumen. Only a few tubercles found in the mucous membrane near the fimbriated extremity; the connective tissue is made up almost entirely of large epithelioid cells. In the outer portion of tube wall are typical miliary tubercles and free giant cells. On section the ovaries are covered with adhesions, and near the surface are many small tubercles, some of which are caseous. No tubercles are found in the deeper portions of the ovary.

It is evident that the process started in the peritoneum and then affected the surface of both tubes and ovaries, and that it was just beginning to invade the lumen of the tube.

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