# A STUDY OF THE PATHOLOGY IN ITS RELATION TO THE ETIOLOGY WITH THE END RESULTS OF TREATMENT OF STERILITY

By John Osborn Polak, M.D., F.A.C.S.
*Brooklyn, N. Y.*

---

Probably no question is of such sociological significance to the gynecologist as that of sterility. Homes are wrecked, lives are sacrificed, and fortunes lost, all because of the inability of a woman to conceive or to successfully bring forth the fruits of her conception. Certainly no subject taxes the resourcefulness and ingenuity of the gynecologist more. Do what we will, many women from one cause or another are destined to remain fruitless.

It would seem from an extensive study of our case records that the number of sterile women is increasing; at least an increasing number are applying for relief; yet a large majority of those who apply present such gross lesions that little or nothing can be done to help them.

*We may define sterility as the inability on the part of a woman to produce a living child.* This inclusive definition is propounded in order that we may include in this discussion the part which syphilis plays in the etiology. Sterility may further be divided into the so-called primary sterility, where the woman has never been pregnant, and the secondary type where she has borne a child or has had a miscarriage and remains sterile thereafter. *In this study, which is a personal review of seven-hundred and ninety-eight*

*case histories of patients from the writer's private practice, we will attempt first to analyze the many etiological factors which have entered into the causation of this symptom; second,* to discuss the treatment of the individual case based upon an etiological diagnosis, and *finally* summarize our end results, in the hope that this contribution may add something to this already overwritten but unsolved subject.

It must be primarily admitted that conception depends *first* upon the perfect consummation of the sexual act; *second,* on the proper fecundation of the ovum, and *third* on the proper nourishment of the impregnated ovum during its growth and development after its final location in the decidual bed. It is thus apparent that certain conditions are essential for conception. Findley has tersely summarized these as follows:

1. The deposit of semen containing active, living spermatozoa in the upper portion of the vagina.

2. The passage of the healthy spermatozoön to the ovule, through the cervix, into the cavity of the uterus and into the tube.

3. A healthy ovum which has uninterrupted transit from the ovary, and after impregnation through the tube into the uterine cavity.

4. A decidual bed for the impregnated ovum to find a permanent resting place in the endometrium until the period of viability.

These conditions entail a healthy male, producing a healthy, active, well developed spermatazoid with long cilia and capable of rapid movement through the semen. Furthermore, the seminal discharge must be free from infective bacteria. For these reasons, the husband of each woman in this series has been subjected to a most exacting examination by a competent urologist. This examination has not only included an investigation as to his potency but as to the presence of past or present infective disease. *The*

*passage of the spermatozoön through the cervix is dependent upon the activity of the particular spermatazoön and the amount, character and reaction of the glandular secretion from the cervix. Acids in very weak dilutions are destructive to the spermatozoa and thick mucopus acts as an almost insurmountable barrier to the progress of the male element.*

Proper ovulation depends on the efficiency of the individual ovary. *This implies a healthy egg bearing area and the free delivery of the ovule through the ovarian tunic.* Consequently conditions which have resulted in a thickening of the tunic militate against conception. *Chronic inflammatory changes, prolonged acute infection, fatty degeneration, tumors, adhesions and senile atrophy* all impair the egg producing quality of the ovary as well as tend to thicken the tunic to such an extent that ovular rupture may be prevented.

*The proper transit of the ovum from* the ovary to the uterus *requires a healthy patent fallopian tube.* Fecundation is supposed to take place at the outer end of the Fallopian tube, from whence the impregnated ovum is propelled along the course of the tube into the uterus, where the endometrium has been prepared by the development of a decidua for its reception and permanent nutrition. Hence, *conditions which interfere with this free transit may be accepted as causes of sterility.* While a tube may not be patent to an impregnated ovum, its lumen may still be sufficient to allow the passage of the spermatozoön, and impregnation of the ovule in its distal portion. This is shown by the great frequency of tubal pregnancies, occurring after long periods of sterility which were due to chronic inflammatory disease.

*The conditions of the tube which may impair the transmission of the impregnated ovum are either congenital or acquired.* Of the former we may mention tortions, constrictions, angulations, and diverticula, while acquired lesions are commonly the result of inflammatory processes, which either occlude the lumen or destroy the epithelial lining of the tube, or

produce peritubal adhesions which distort the tube and thus prevent the passage of the ovum.

On arriving in the uterus *the impregnated ovum locates in the decidual bed prepared for its nourishment,* which is usually situated just below the uterine ostium of the tube on the anterior or posterior wall of the uterus, and unless the endometrium has been the seat of disease, the ovum develops at the site of its primary implantation. Syphilis of the endometrium may prevent implantation of the ovum or cause its early discharge from the uterus. Circulatory derangements which produce *hyperplastic and fungoid changes in the endometrium contribute largely to the unrest of the ovum.* These circulatory changes may be produced by displacements, fibroid tumors, sexual excesses, lacerations, and subinvolutions, and result in a endometrial hyperplasia. *Such conditions change the character of the uterine secretion, producing toxic discharges, from the involved surfaces of both the body and cervix, which may cause the death of the sperm cell,* and thus produce another factor which is antagonistic to the occurrence of pregnancy.

The foregoing may therefore be considered the essential factors in the fecundation and the development of the impregnated ovum. Hence, it may be deduced that where any of these elements are defective sterility may result. McDonald claims that there is primarily a congenital anomaly (hypoplasia of the genitalia) in the etiology of all cases of primary sterility. This however, has not been the experience of the writer who has found that *a preceding salpingitis has been responsible for more cases of sterility than all other causes combined.*

It is commonly admitted that the general health of the woman has much to do with the occurrence of pregnancy. It is also known that men become less potent from the strain of overwork, and that nervous excitability decreases the individual's potency. Women who have become rapidly

obese are not infrequently sterile. Hence it will be seen that each individual case must be analyzed as to its etiology, before any form of treatment can be considered, and *this analysis must include an investigation of both contracting parties*, for in our opinion, the operative treatment of a woman for sterility alone, without the actual inspection of her husband's spermatozoa, is not only unjustifiable but frequently does actual harm to that woman and brings discredity to gynecology. Reynolds in a recent paper presented before the obstetric section of the American Medical Association, offers the following working hypothesis for determining the cause of sterility in the individual case:

1. He states that when the spermatozoa are abundant in number, normal in form and appearance, furnished with long cilia and capable of rapid movement through the semen, the male may be considered as *satisfactorily potent*. While this is essentially true, our experience has taught us that the *presence of infective bacteria in the semen or prostatic discharge*, even if the spermatozoa are well formed, will often vitiate their potency because of the effect produced by these bacteria on the generative organs of the receiving female.

2. When the normal spermatozoa are killed or lose their vitality over rapidly in the secretions of the individual woman, the chemico-physiologic character of her secretions furnishes an effective cause for the sterility.

These alterations in the secretions of the woman which are fatal to the spermatozoa may be located in the vagina, in the cervix, in the body of the uterus, or in one or both tubes. Any of these secretions may exist with normal secretions above it, but alterations in the secreting surface in any of these localities, usually vitiates all the secretions below it owing to the admixture which takes place, for acids in very weak dilution are rapidly fatal to the spermatozoa. *Finally, when the spermatozoa are observed to penetrate without apparent loss of vitality, to the fundus of the uterus*

*and to survive there, for a normal length of time, deficient quality of the ova* may be considered as the probable cause of the sterility. Lade estimates that there are 227,500,000 spermatozoids in a single ejaculation, and it is stated that the spermatozoa will not live longer than twelve hours in the acid secretion of the vagina, yet in the normal secretion of the uterus and the tubes, they will commonly retain their activity and vitality for six or eight days. In Leopolds case, the woman had not had sexual intercourse for thirty-seven days prior to the abdominal section which he performed, when active living spermatozoa were found in large numbers in the fimbrinated end of the tube. *We have frequently noted during microscopic examination of the withdrawn semen, the effect of the mucopurulent secretion from an infected cervix on the activity and life history of the spermatozoa.* They may be seen struggling around trying to free themselves from the sticky mucus, and finally exhausted from their struggle to push on, die. Hence *we feel that the tight-fitting plug of mucus in endocervicitis is a real obstacle to the advance of the spermatozoid.* Lespinasse claims that the secretions in different women dissolve the spermatozoa of different men and thus produce a sort of immunity action. This is probably the explanation of why certain healthy women fail to conceive by apparently healthy males and then upon remarriage promptly conceive.

Huhner has checked up the progress of the spermatozoid by microscopic examination of the spermatozoa *in situ*, in the genitals of the woman, by taking the woman's secretions at different locations at definite periods after the intercourse, and in this way has determined the action of the secretions and the compartive vitality of the spermatozoa at different locations in the genital tract. This has in his experiments given a direct index of the chemicophysiologic action of the individual secretions and affords valuable evidence as to the possibility of impregnation in a particular case.

While acute anteflexion of the cervix, infracervical hypertrophy and pronounced retroversion of the uterus act as causes of sterility by mechanically removing the cervix from its position in the seminal lake, they will not prevent conception unless there is some change in the chemicophysiological action of the cervicovaginal discharge.

Aside from these factors already referred to, certain clinical observations are worthy of mention, as they contribute materially in determining the value of treatment. The average interval between marriage and the birth of the first child is seventeen months and the probability of impregnation decreases thereafter. Only 25 per cent. of women bear their first child after four years. Therefore, a union may be regarded as presumptively sterile when after three years of married life no child has been born. Hypoplasia of the genitalia is a common cause of sterility. Infantilism may be found in the uterus alone, or in the uterus, vagina, and external genitals, or associated with other evidence of congenital hypoplasia as loose right kidney, justo-minor or funnel pelvis, long back, "cannon-ball" abdomen, intestinal ptosis, small head, weak ligaments, high-roofed mouth, under weight, and unstable nervous system. When the uterus *is infantile*, it retains the shape and appearance of the uterus of the girl before puberty. It may take one of two types. It may be long and slender with a small fundus, a long isthmus and a long conical cervix, or it may be shorter with a long isthmus, small fundus and a small cervix, with most of the cervix placed above the insertion of the vagina and but little projecting into it. The first type has usually a marked anteflexion while the second is frequently associated with marked narrowing of the vagina in its upper part. The infantile uterus usually has a long isthmus with the plicæ palmatæ of the mucosa of the isthmus well marked and longitudinal instead of being thin and horizontal or twisted. The vagina is commonly involved with infantilism

of the uterus. This takes the form of a narrowing, particularly of the upper part of the vagina, thus obliterating the seminal lake, consequently instead of being balloon or pear-shaped with the largest end upward, the vagina is tubular or sausage-shaped. As a result of this the semen is not retained where it should be after coitus, but is expelled from the vagina. Fruitful normal women retain the semen, while sterile women usually lose it. The vulva may also show signs of infantilism, *e. g.*, lack of development of the *labia majora* or *labia minora.*

*In managing our cases of sterility, we have begun with a thorough investigation of the life and functions of both contracting parties.* In no case included in this report was the examination of the male omitted. These examinations were conducted by Dr. J. S. Read and include investigation as to the past peformances of the man as well as for his present potency; for men who have infective bacteria in their prostatic secretion can produce such inflammatory changes in the femal genitalia as to prevent all hope of future pregnancy.

Unless the man was potent, no attempt was made to improve the woman's condition as regards her sterility, though many women were operated for the cure of complicating lesions. If the man was found potent, the woman was put through a thorough and painstaking routine, beginning with her previous history, including the history of her development, illnesses, nutrition, habits, occupation, rest, and general health. Inquiry was always made into the habits of her sexual life. This was followed by a general examination of the heart, lungs, nervous system, statue, nutrition, whether emaciated or obese, and followed by a pelvic examination to determine the presence of anomalies at the vulva, of the vagina, in the cervix or uterus, or the presence of the results of infection, as shown in Skene's glands, in Bartholin's glands, in the cervix, in the uterus, tubes, ovaries and adjacent peritoneum.

The *reaction of the vaginal and cervical secretions was thoroughly investigated and the presence of gross pathology in the fornices noted. A Wassermann test was made in all of those who presented themselves with histories of abortions or premature labors with or without death of the fetus.* To make this study 798 case records have been reviewed; 231 were found to be inaccurate or incomplete, the patients failing to return for subsequent examination or the husband's record having been omitted, or for some such reason these histories were excluded from our consideration, making a total of 567 from which we can draw our conclusions. From this number, however, there must be some further deductions, such as those cases where the man was impotent, having aspermia, or deformed and sluggish spermatozoa, or where the original infection remained uncured. These cases total up to 64. Furthermore, we have excluded those women who were found to have such gross lesions of the uterus and adnexa as to bar them from even the possibility of pregnancy, and those constitutional conditions as cardiac decompensation and diabetes, which should forbid conception. Of the former there were 70; of the latter 6. Subtracting these cases, we begin with 427 women in whom pregnancy is a possibility. Many of these, however, presented such pathology that we could not say that conception was even probable. For this reason I propose to consider the etiology and the end results of the several forms of treatment instituted in two general classes. In the one we will include infantilism and congenital anomalies, 73; normal pelves, free from circulatory or inflammatory complications, 146; uncomplicated retroversions, 20; and infracervical hypertrophy, 5; making 244 in all. While in the *second class* we will place the remaining 183 cases, all of whom *presented some evidence of the results of an infective process at one or more locations along the genital tract.* It is intensely interesting to note the frequency with which infection has invaded these several sus-

ceptible points. Our records show that the glands at the introitus were infected 43 times, while 104 cases presented an endocervicitis with a mucopurulent discharge. These were complicated with a posterior parametritis in 78 instances. Fibroid tumors of varying size, and of the subperitoneal type, producing no symptoms and only discovered in the course of the examination, were recorded in 54 cases. Ovarian cysts varying in size from that of an orange to that of a seven months' pregnancy, was the apparent cause of sterility in 10 instances. The results of infective processes in the tubes were found in 96 cases. These were almost always associated with inflammatory or cystic changes in the ovary. In 11 cases the tubal infection had extended to the pelvic peritoneum and the patient, though presenting no gross lesion which was palpable at the examination, was the subject of recurrent attacks of pelvic peritonitis. In each of these cases a double hydrosalpinx was the resulting lesion. Retrodisplacement of the uterus complicated by tubal or ovarian disease was noted in 61 women. Prolapsed ovaries, palpable and tender, often producing severe dyspareunia, were relatively frequent, as we find that they were noted as a complicating lesion in 92 histories. Only 3 patients with acute vaginal inflammation presented themselves. In 2 of these the Neisser bacillus was isolated. The other showed numberless diplococci that would not stain Gram negative.

*In the first class which includes all the cases of infantilism, mention should be made of the frequent association of bony pelvic anomaly.* Funnel pelvis, male pelvis and justo-minor contraction was noted with such frequency, that we feel that the subject should have more consideration than has been given it by the gynecologist in the past, for it seems questionable when a woman has a definite bony pelvic deformity, whether we are right in employing operative measures for the cure of her sterility when we know she will

have a difficult operative labor. Certainly, the patient or her husband has a right to the knowledge of these facts. In the 73 cases recorded as having an infantile uterus, bony pelvic anomaly was recorded 41 times. This was shown in the short external measurements, the depth of the symphysis pubis, a narrow subpubic arch, the short bi-ischial diameter or faulty inclination of the pelvic brim.

TREATMENT. Our treatment, as may be supposed from a glance at the foregoing statements, was in all cases directed toward the correction of the existing causative lesion. In the first class, this included the employment of alkaline douches, of the graduated dialators, the Baldwin or Davenport stem, discision of the cervix, after the methods of Dudley or Pozzi, amputation of the cervix and correction of uterine displacements.

In the second class both local and operative measures were employed. In those cases of uncomplicated cervicitis and endocervicitis where the tenacious mucus plug presented the obstructing lesion, the mucus was removed with peroxide of hydrogen paste on a rotary applicator, the mucosa sterilized and an iodized phenol solution applied. The patient directed to follow this application with douches in the recumbent position before retiring, using a solution of bicarbonate of soda, a tablespoonful of the soda to a quart of water. Vaccines and destruction of the cysts with the electric cautery knife have also been employed, but our best results have been obtained from simple antiseptic measures. Women who have repeatedly aborted, in whom the Wassermann test was reported negative, were curetted and the cavity of the uterus thoroughly iodized by packing the uterus with strip gauze soaked in iodine. *This was left in place for twenty minutes* and was then removed. These patients were then advised not to cohabit for a period of three months. In the meantime, special attention was given to improving the condition of their general health, by exercise, tonics and

fresh air. Those presenting large fibroids not involving the uterine cavity, had the tumor removed by myomectomy. Small tumors received no surgical consideration. *In the* 10 *cases of large ovarian cyst, unilateral oöphorectomy resulted in* 8 *of the women becoming pregnant.* From this observation it would seem that a large cyst of one ovary militated against the proper functionating of the other ovary, until that cyst was removed. Infective processes in the tubes were dealt with by unilateral ablation, bilateral ablation with resection of the uterine ends or of the fundal segment of the uterus, or by salpingostomy. It was frequently found that the inflammatory process had passed through the tube, and time had allowed considerable resorption, and that it was the resulting adhesions which had closed the abdominal ostium and embarrassed the ovarian function. Freeing these and suspending the ovary has occasionally resulted in pregnancy. In the series of retroversions complicated by tubal and ovarian disease, all the women were subjected to abdominal exploration and investigation. In these the tubes were freed from adhesions, ablated or resected, the ovaries suspended after the method suggested by my associate, Dr. William P. Pool, and the round ligament shortened by one of the methods following the technics suggested by Webster, Gilliam, Simpson, Coffey or Neel.

Of the cases of prolapsed ovary we have found that *an ovary out of place has its tunic thickened* from circulatory stasis, so we have been in the habit of suspending such ovaries after puncture of the superficial cysts, to reduce their weight and have thus established a better ovarian circulation. *No resections have been done except in* 6 *cases of large white ovary,* in obese women with amenorrhea, where the tunic was extensively thickened. In these cases a large wedged-shaped piece of cortex was removed and the area of excision closed with fine catgut sutures. This has reëstablished menstruation in all 6 cases and resulted in a pregnancy in 3.

In the 73 cases of *congenital anomalies*, which include extreme anteflexion of the cervix, with deep posterior invagination, anteflexion of the body and cervix, and infantile uterus, the following corrective operations were done. In the anteflexions of the cervix in which the invagination of the posterior lip was 5 cm. or more in length, a posterior decision after Dudley's technic was always elected in order that the cervical os, so constructed, could be placed in the seminal lake. In the anteflexions of the body alone we have elected the use of the Reynolds procedure combined with the use of the intra-uterine stem (Baldwin). In anteflexions of the body and cervix our procedure has always been dependent upon the amount of cervical invagination. If this was considerable, a posterior discission in conjunction with the Reynolds anterior colpoplasty will straighten the canal. On the other hand, when the portio was short, gradual dilation, anterior colpoplasty and the introduction of a glass stem will often produce the desired relief.

In the true infantile uterus it is questionable whether much should be done. Our only pregnancy results in this type have been two *ectopics* and five miscarriages, for not only is the anomaly in the uterus, but in tubes, ovaries, and vagina, and the dysmenorrhea which is prominent, is only temporarily relieved by operation. In this class we doubt if any plastic procedure is of much avail, as we have found that the presence of scars in a small vagina, embarrasses sexual relations. *Slow dilation* with Hegar's sounds, up to 16 to 20 mm., and the introduction of a Davenport stem, has afforded some relief, but no infantile uterus in this series has developed a pregnancy and gone to term. Seven have conceived, the two ectopics referred to above, and in five the impregnated ovule has reached the uterus and developed there, only to end in an abortion at the second or third period.

Included also in our first general classification are 146 normal pelves, free from circulatory or inflammatory changes

of any sort. These women had been married for periods of three years or more and had never been pregnant before applying to us for relief. The husband was potent, The reaction of the secretion of the vaginal vault was determined in each case; 109 showed varying degrees of acidity. Examination of the semen *in situ* in *these cases showed* many immobile spermatozoa. *In all who gave an acid reaction* alkalin douches of soda bicarbonate and sodii phosphate, 1 ounce to the quart, were advised to be taken on a douche pan, after retiring. Pregnancy resulted in 75 or about 70 per cent. making this our most successful series; 37 showed no change in secretion, yet only 4 have become pregnant as the result of local treatment. No operative procedure of any sort was done in this apparently normal pelvis class. This rather goes to confirm the theory that certain women are immune to impregnation by certain men.

Of the 20 uncomplicated retroversions, 11 were repositable and could be maintained in position with a pessary; 6 of these women became pregnant; 9 because of a deep posterior invagination of the cervix, could not be held in place with a support. These were operated by the Webster-Baldy or Gilliam technic and a Dudley discission. Of these 5 have become pregnant. This shows conclusively to my mind that the position of a cervix in its relation to the seminal lake has much to do with conception, provided the secretions are not destructive to the life of the spermatozoön.

Infravaginal hypertrophy of the portion has given us not only the best surgical cures, but amputation of the hypertrophied portion of the cervix has been followed by pregnancy, going to full term, in each of our cases 5 in all.

In the second class made up of 183 women presenting some evidence of the results of an infective process, postpartal, postabortal, or gonococcic in origin, pregnancy has been relatively infrequent. Of the 104 women subjects of endo-

cervicitis with a mucopurulent discharge, only 21 became pregnant; 8 conceived as a result of one local treatment in which the mucous plug was removed with a bicarbonate paste, and the canal swabbed with iodized phenol; 3 became pregnant promptly after the glands were destroyed with the cautery, and 10 following the persistent use of the carbonate of soda douche.

Of the 90 cases which were found to have the results of infective processes in the tubes, uterosacral ligaments, and cervical canal, the intra-uterine and tubal pregnancies are equally divided, there being 3 of each. The abdomen was opened in all of these patients because of the history, not because of the gross pelvic findings. There was invariably present a history of infection, with sterility, dyspareunia, and local discharge. Tubal ablations were done 35 times, resections 31, and freeing of adhesions thirty times; 2 ectopics occurred in resected tubes, against 3 intra-uterine pregnancies; 1 ectopic occurred in a freed tube, but no uterine pregnancy. Of the 54 fibroids, myomectomy was done in 20 and hysterectomy in 34; 6 pregnancies occurred following myomectomy, 4 going to term. Following the 10 unilateral oöphorectomies for large ovarian cysts, 8 women became pregnant.

132 uterine and 3 ectopics are the sum total of pregnancies occurring in 358 women in whom conception was a probability, or 37 per cent.

This study has shown us *first*, that a very large number of the sterility cases applying for relief, have no chance whatever of becoming pregnant, as the pathology is such as to make conception impossible. *Second*, that the male is largely responsible for our poor results in treatment. *Third*, that there is a definite chemico-physiologic factor in conception, at present unexplainable, which is a cause of preventing conception. *Fourth*, that operative procedures on the uterus, except amputation of the hypertrophied portio, have but

a slight influence on the end results in the treatment of sterility: and *finally*, that each case must be individualized and both contracting parties carefully studied before any treatment is inaugurated.

---

## DISCUSSION

DR. ROBERT L. DICKINSON.—Mr. President, as one of the members of the Council I regret that this paper escaped being a referat because it would have turned an important contribution loose upon this Society for six months' preliminary study for a report from many members. Thus stimulated we would have brought together most valuable material. Perhaps we can still make this good, and three years from now it may become the subject of a referat. If the meeting takes place in Washington we can readily bring in genito-urinary men and others interested in all phases of sterility.

Since intensive study has been initiated on the part of some of the members of my staff I believe that if we should confine our gynecological work to the treatment of sterility alone we should be kept busy. There is a clamor for more knowledge from the public and it behooves us to take it up. We should start such study, not as we do, from the wrong end, but from the right end. Dr. Polak has shown us once more that salpingitis is the great cause of sterility, so let us begin at right in two ways—first, join the campaign to prevent salpingitis and educate the public; and second, study physiology.

As an example, take the physiology of conception. Little has been written on some important phases of the subject. I started Dr. Cary on getting together the literature concerning the semen and in a month, at odd times, he gathered together all there had been written. In another month or two of clinical study he was an authority on the subject. Now he is often summoned to give lantern slide demonstrations on these studies. And yet this is mere A B C. But it is an example of the need of this work.

As a further example, nobody knows anything about catheteri-

zation of the inner end of the tube, or much about how the kinks of hydrosalpinx and pyosalpinx close the bristle-sized opening of the inner end of the tube. In other words, here is a big field for study. Nobody knows the exact behavior of the semen in the vagina. There is no method of determining degrees of vaginal acidity and their effect on the semen, and on different semens. Stuff the introitus with a condom covered tampon after coitus and study the behavior of the semen one to three or four hours later, and you will see that the behavior of semen in the vagina is different from that on the warm stage. I am touching merely on the high spots. Hühner wrote a book with an important false concept. He would suck mucus from without the body of the uterus after coitus, at varying lengths of time. If the tails of the spermatozoa were curled up they were dead; if their tails were straight they were alive. If you take any semen and suck it roughly into any narrow tipped pipette the spermatozoa curl up.

The study has only been scratched on the outside. Little is known about the life history of semen. The vaginal secretions must be put against the semen on the special slides that let the two gradually fuse in view, and see what happens. And so with a lot of chemical tests, combined with semen. The usual examinations of the semen are nearly worthless.

Let us then consider taking up the whole subject three years from now.

Dr. Charles P. Noble.—The first point I wish to stress is the large percentage of gonorrhea in these cases of sterility. I think Brooklyn, judging from my experience, has a larger percentage of gonorrhea than Philadelphia.

So far as syphilis is concerned, when I was a medical student in Baltimore, one Professor, a man of the widest clinical experience used to teach us that one-third of the inhabitants of Baltimore had syphilis. I happened to meet, recently, one of my old quiz teachers, who is an ophthalmologist, and I asked him, after reminding him of this old statement, what his judgment was as to the present status of syphilis in Baltimore; and he said it was far more prevalent than it was thirty years ago.

The point, however, I wish to discuss is the one touched on by Dr. Polak under the term infantilism. The doctor did not go into particulars about infantilism, nor did he show how much attention he had paid to the subject. If the question of infan-

tilism is studied biologically we find it is a far more prevalent condition than is recognized from the ordinary medical standpoint. In other words, men who are not trained to investigate individuals from a biological standpoint only note the more extreme cases, and therefore the percentage which Dr. Polak found in his series, I am sure, is an understatement of the facts.

I am very much pleased that one of our Council has proposed the subject of sterility for a referat three years from now. The way we should study this question is from the standpoint of the teratologist. What is called infantilism is in no small part caused prior to conception in the dual life of the human being as an ovum or as a spermatoblast in the testis, or the ovary. In other words, the toxins circulating in the bodies of human beings will influence the chromatin in the ova and in the spermatoblasts, unfavorably.

Quite recently Dr. Stockard, who has given much attention to this subject, has succeeded in absolutely demonstrating that this is true; and not only is it true, so far as the progeny of the first generation studied is concerned, but it is also true of the great-grandchildren. This past year he published the final results of his study on alcoholism in guinea-pigs. Of course, these guinea-pigs were far more intoxicated than even the worst chronic drunkard in the human ever gets. They were made drunk six days a week during their lifetime, and were then cross-bred, the drunken male and healthy female, and the healthy male and drunken female, and vice versa. The whole series of degenerate phenomena has been demonstrated in the great-grandchildren—although the subsequent generations were free from alcohol.

The point I wish to emphasize just now is that where the succeeding generations have not been alcoholized the great-grandchildren are far more affected than are the children, showing the effect is permanent, and related to heredity; when once the chromatin is affected. This has to do with the influence of disease upon progeny, prior to pregnancy. All during pregnancy the toxins in the mother can likewise poison the growing ovum, and can bring about what is sometimes called infantilism. It does not make any difference what name we give it. The offspring may be or may not be injured prior to conception, or during intra-uterine life. The term congenital

we will also have to revise. In fact, we will have to stop using it because it is true that growth in people can become arrested after they are born, and all of us who have been clinicians long enough to have accumulated clinical experience know that whenever the growing child gets sick it stops growing. If these children suffer serious illnesses, long continued, prior to puberty, growth is arrested, and this may include the sexual organs. All these factors underlie the problem of so-called infantilism. The truth is we use all these words loosely and use them from habit. I doubt very much whether any woman, except in rare anomalies, has an infantile uterus. What they have is an adolescent uterus.

Dr. Walter P. Manton.—As an obstetrician, I have listened to this paper of Dr. Polak's with a great deal of interest, and I had in mind to make the same criticism as Dr. Noble has made with regard to the findings in the male: After a considerable number of examinations of the spermatic fluid I have rarely found the male at fault. Of course, sterility may be relative or absolute, and I believe it is very largely relative excepting in malformations of the genital organs or following gonorrhea. Roughly speaking, I cannot make an accurate statement, I have found that practically 85 per cent. of women, who come to me with sterility, where there is no deformity of the local organs and no evidence of gonorrhea, are cured by local treatment. I say this condition is relative because I find that a very large proportion of women become pregnant after a little and simple treatment. In some there is sexual antagonism! There may be sufficient affection between the husband and wife, but there is this antagonism between them sexually to which Dr. Polak has referred. A woman may have been married a number of years and not become pregnant; she marries another man and immediately pregnancy ensues. We have also a good many cases of one child sterility, and I find that usually there is some slight local condition at fault in most of the cases.

I recall a woman of this class who had been married for a number of years and had one child ten years previously. The husband had a watering pot perineum where the spermatic fluid was discharged through the openings, yet this woman became pregnant within two years after treatment.

We expect too much from treatment; that pregnancy should

immediately follow any treatment is not to be supposed. If the patient should not become pregnant within two years following a treatment, I think the effect of what has been given is *nil.*

DR. CHARLES G. CHILD, JR.—The work of H. Unna has been mentioned twice, once with praise and once in condemnation. Of course, nobody knows it all, but I believe H. Unna's work is a particularly valuable one.

The fertility of the male is something which concerns us in our work more vitally than Dr. Manton has laid stress on, because in the cases that have come under my observation the gonococcus is responsible for nearly one-half of all unfruitful marriages. The method of determination of the fertility of the male was by the inspection of condom specimens of vagina pools, as H. Unna aptly shows, this is insufficient. We must trace the spermatozoa farther, find out whether they reach the cervical canal, how long they live there, and whether they gain access to the uterine cavity. H. Unna did not say that if you examine these spermatozoa and find them with crooked tails they were alive, and if they had straight tails they were dead or *vice versa.* He recognized that the immature spermatozoön were the ones with the crooked tail; that if the tail was straight that spermatozoön had lived. The passage of the ovum may take place through a very small opening in the Fallopian tube. I do not think Dr. Polak is fair to his statistics because in a small percentage of cases of probable pregnancy he says the pathology at times is such as to make conception impossible. It is my experience that the pathology at times is such as simply to make one marvel at the results which Nature accomplishes in these cases. Numerous women, with only a uterus and ovaries, but no tubes, have conceived so that I think Dr. Polak is too pessimistic in regard to the pathology which he may encounter at operating.

I have had in the past one woman who conceived after both tubes were removed. Murphy removed the left tube in Chicago and I removed the right one in New York. Murphy did his work well. The pregnancy was interrupted, for toxemia and the uterus was subsequently removed. The pathologist, after an exhaustive search was unable to find any opening from the outside of the uterus to the cavity yet the woman had conceived. Cases where conception has occurred following the

removal of both tubes is quite frequent. In one case where I produced artificial sterility on account of cardiac decompensation the woman conceived within two years. I had again to empty the uterus by the abdominal route and inspected the condition of the tubes. The tubes were absolutely occluded at the time of operation by burying the fimbriated ends between the folds of the broad ligament. There was a small opening by the side of the left tube which barely admitted a filiform bougie. One of the sutures which had been too tight, had left a little sinus not larger than the finest filiform bougie, yet the ovum had worked through this tiny opening and the woman became pregnant again within two years.

With regard to the removal of the mucous plug in the cervix, I have had more success in removing this plug by a Bier's cup and suction which removes the mucous plug without traumatizing or causing bleeding of the cervix; three or four treatments produce a marked diminution in the amount of discharge. It is a most successful way of treating chronic cervicitis and of doing away with the formation of this mucous plug.

DR. RICHARD R. SMITH.—Dr. Polak and Dr. Dickinson have not exaggerated the importance of this subject, and I only want to speak of one phase of it that has not been touched upon.

Out of Dr. Polak's large group of cases of sterility he was able to relieve a remarkable number of women. There still remains a very large number that, with all of his care and treatment, he was unable to help. What shall we do for such women? Shall we go on attempting to cure their sterility, allow them to drift about from doctor to doctor, fostering the hope that they may become pregnant? Or shall we face the problem fairly and squarely, admit the improbability of their ever becoming pregnant, and advise them differently? It seems to me that this has not always been sufficiently considered. We are constantly seeing women made year after year unhappy because of their sterility, and for whom we really are doing nothing. The maternal instinct is strong in the minds of the majority of women, and its gratification necessary to contentment. To be sure, women are best satisfied with the children they have borne themselves, but it is also true that those they adopt go a long ways toward satisfying the maternal instinct, and after the adoption of children these women become surprisingly content. They are often much bettered nervously.

The adoption of children, it seems to me, is what we should advise in these cases when there does not seem to be a reasonable certainty of their becoming pregnant. This if possible should be done early. They should not be allowed to drift on until they are thirty-five or forty years of age, to a time when they are no longer so active and capable of taking care of young children. I have adopted this plan of advice for a number of years, and it has been to me the most satisfactory thing that I have found for the treatment of sterility that could not be relieved within a reasonable length of time.

DR. JOHN OSBORN POLAK (closing).—I appreciate very much the cordial reception which my effort has received.

Referring to Dr. Noble's criticism, I am sure that if all of our cases had been as carefully examined as those during the past three years, it is possible that the number of cases of infantilism would be increased. Seventy-three out of 437 is however a fair proportion, though not so large as Dr. Noble thinks should be found. The total percentage of cures in this series only amounts to a little less than 37 per cent.

I wish to call the attention of Dr. Child and Dr. Manton to the fact that in this 37 per cent. we had 146 pelves, free from inflammatory or circulatory changes of any sort. These women had been married for periods of three years or more before they came for treatment. The reaction of the secretion of the vaginal vault in each case was determined, and 109 showed varying degrees of acidity. Examination of the semen in situ in these cases showed many immobile spermatozoa. In all whose secretions gave acid reactions alkaline douches were given, and from this simple treatment there were from 70 to 75 per cent. of pregnancies, which makes the largest percentage of cures next to the five cases of amputation of the cervix. In the next series 37 showed no change in the secretion, yet only four have become pregnant as the result of local treatment. No operative procedure of any sort was done in these cases of normal pelves, and our results seem to confirm the theory that certain women are immune to impregnation by certain men. It is this point we are up against and will have to work out more fully than any of us have done at the present time.

In regard to the other point made by Dr. Child and Dr. Manton, I will say that Brooklyn is known as the city of churches, and we have, as you can readily realize, a better class

of men after they get married and settle in Brooklyn, but they come from New York and marry Brooklyn girls. (Laughter). The result of this is that they bring the products of their infection with them, and it is this prostatic pus which under a certain stimulus develops or brings out the latent gonococcus that causes the inflammatory changes which we find along the genital tract of the female, and which has so much to do with the prevention of impregnation.

In regard to Salpingostomy as a curative measure, brought into the discussion by Dr. Child, I wish to say I am not a pessimist as I appreciate the penetrability of the spermatazoa, and I have reported three cases of pregnancy before the American Medical Association some years ago, where both tubes had been removed and where the uterine ostium had been excised. I look at these as accidents and curiosities.

In regard to one child sterility, we have not included this phase of the subject in this paper because personally I find that one child sterility is in most cases due to a mixed infection. There is always a history of infection, and if we open the abdomen in these cases of one child sterility, we find definite pathological changes as a result of a low type, late infection following labor or miscarriage. It is a mixed infection in which the streptococcus or staphylococcus and gonococcus take part, the latter predominating. Even where a Neisser infection is denied we have found a diplococcus which may develop in certain instances into definite activity. We find a large number of these diplococci in locations where they should not be. They do not stain Gram negative, and yet I believe they bear some relation to some of these cases of sterility.