

when submitted to the action of pepsin-hydrochloric acid. The value of the procedure remains to be determined.  
*Ernest Ellsworth Smith.*

**FAHRENHEIT AND CENTIGRADE SCALES.**—The following table, showing the value in degrees, tenths of a degree, and hundredths of a degree, according to the Fahrenheit scale, of every tenth of a degree of temperature from 44° to 32° Centigrade, while perhaps belonging more properly in the article entitled *Thermometer*,

| Cent. | Fahr.  | Cent. | Fahr.  | Cent. | Fahr.  |
|-------|--------|-------|--------|-------|--------|
| 44.0  | 111.20 | 0.9   | 0.82   | 0.9   | 0.82   |
| .9    | 111.02 | .8    | .64    | .8    | .64    |
| .8    | .84    | .7    | .46    | .7    | .46    |
| .7    | .66    | .6    | .28    | .6    | .28    |
| .6    | .48    | .5    | 103.10 | .5    | .90    |
| .5    | .30    | .4    | .92    | .4    | .72    |
| .4    | 110.12 | .3    | .74    | .3    | .54    |
| .3    | .94    | .2    | .56    | .2    | .36    |
| .2    | .76    | .1    | .38    | .1    | .18    |
| .1    | .58    | 39.0  | .20    | 35.0  | 95.00  |
| 43.0  | .40    | .9    | 102.02 | .9    | .82    |
| .9    | .22    | .8    | .84    | .8    | .64    |
| .8    | 109.04 | .7    | .66    | .7    | .46    |
| .7    | .68    | .6    | .48    | .6    | .28    |
| .6    | .50    | .5    | .30    | .5    | .94.10 |
| .5    | .32    | .4    | 101.12 | .4    | .92    |
| .4    | .14    | .3    | .94    | .3    | .74    |
| .3    | 108.14 | .2    | .76    | .2    | .56    |
| .2    | .96    | .1    | .58    | .1    | .38    |
| .1    | .78    | 38.0  | .40    | 34.0  | .20    |
| 42.0  | .60    | .9    | .22    | .9    | 93.02  |
| .9    | .42    | .8    | 100.04 | .8    | .84    |
| .8    | .24    | .7    | .66    | .7    | .66    |
| .7    | .06    | .6    | .48    | .6    | .48    |
| .6    | 107.06 | .5    | .30    | .5    | .30    |
| .5    | .88    | .4    | .12    | .4    | 92.12  |
| .4    | .70    | .3    | 99.14  | .3    | .94    |
| .3    | .52    | .2    | .96    | .2    | .76    |
| .2    | .34    | .1    | .78    | .1    | .58    |
| .1    | 106.16 | 37.0  | .60    | 33.0  | .40    |
| 41.0  | .80    | .9    | .42    | .9    | .22    |
| .9    | .62    | .8    | .24    | .8    | 91.04  |
| .8    | .44    | .7    | 98.06  | .7    | .86    |
| .7    | .26    | .6    | .88    | .6    | .68    |
| .6    | 105.08 | .5    | .70    | .5    | .50    |
| .5    | .90    | .4    | .52    | .4    | .32    |
| .4    | .72    | .3    | .34    | .3    | 90.14  |
| .3    | .54    | .2    | 97.16  | .2    | .96    |
| .2    | .36    | .1    | .98    | .1    | .78    |
| .1    | 104.00 | 36.0  | .80    | 32.0  | 89.60  |

is introduced in this place for the reason that such early introduction is likely to prove a convenience to many readers of the HANDBOOK. In the determination of the limits of this short table only the needs of the clinician have been considered.

**FAINTING.** See *Brain, Anæmia of, and Syncope.*

**FALKENSTEIN, GERMANY.**—There is nothing remarkable about the climate of Falkenstein which would warrant any extended account of it as a health resort. The name "Falkenstein," however, has become famous in connection with the renowned sanatorium situated there, and this demands notice as being one of the best exponents of the sanatorium treatment of pulmonary tuberculosis in the world.

Nine miles out of Frankfort is the picturesque village of Cronberg in the Taunus Hills, where resided the late Dowager Empress of Germany for a good part of the year. A walk of about forty minutes up the hill from here brings one to the tiny village of Falkenstein, commanding an extended view over the valley of the Main with Frankfort in the distance. Here, in a location protected on the north, west, and east is situated the sanatorium, 1,300 feet above sea-level. The institution consists of a main building with two wings joining it at an obtuse angle and enclosing a large terrace, and two annexes united to the main building by covered promenade galleries. The terrace enclosed by the wings of the main building and looking toward the south, has a continuous broad veranda of glass, provided with sun blinds and curtains, where upon cushioned reclining chairs one sees long rows

of patients lying rolled in rugs, taking the rest cure, some reading or writing, others conversing, and a few sleeping. There are also, near by, pavilions, some revolving, affording further opportunity for the same treatment. The climate is that of central Germany, its principal characteristic being a pure atmosphere free from dust, which, from Dettweiler's point of view, is the chief consideration in the climatic treatment of phthisis, provided it can be utilized continuously. Only about half the days in the month are sunny.

The internal arrangements are similar to those in the other large sanatoria: A large, well-ventilated dining-hall accommodating two hundred persons; reading, music, and billiard rooms; post and telegraph office; bacteriological and analytical laboratory; throat and douche rooms; various offices and consulting rooms. Each sleeping-room has a special ventilating flue and the usual simple furnishings; linoleum floors, washable walls; they are never swept but cleaned with damp or wet cloths. The windows are always open. Near by are the dairy and stable, gas-works, and a disinfecting apparatus. As in most of the other sanatoria the system of drainage is on the principle of chemical precipitation with cleansing basin. The large corridors for rest treatment (*Liegehallen*), which were first introduced as a means of treatment at Falkenstein, have a powerful gaslight between the heads of every two chairs, permitting the patients to read as they lie out in the evening. Blue-glass spittoons containing water are distributed in the halls on brackets, smaller ones in the rooms, and white crockery ware ones on the grounds. Each patient is required to carry with him the Dettweiler pocket spit-cup, and expectoration except in these receptacles is absolutely prohibited—handkerchiefs or cloths not being allowed. The compliance with this law seemed to be perfect. The sputum is disposed of by throwing it into the waste water or by burning.

The *jour médical* for an average patient, as told by one of them, is as follows:

7 A.M. Rubbing—dry or wet—or a douche.  
8. Breakfast, consisting of coffee, tea, or chocolate, with rolls, butter, honey, and milk.

Until 10, the rest treatment in the reclining chairs.

10. Second breakfast, of bread, butter, milk and soup, with wine or cognac. (Upon this latter Dr. Dettweiler places a high value.)

10:30 to 1 P.M. The rest treatment again.

1. Dinner: soup, fish, vegetables, several kinds of meat, fruit, dessert, and coffee.

2 to 4:30. The rest cure again.

4. Milk.

4:30 to 7:30. Rest or walking.

7:30. Supper, consisting of soup, hot and cold meats, salads, preserves.

After supper the rest treatment until 10, with milk at 9.

10. Retire.

It will be seen from the above that the rest treatment in the open air (*Ruheluft-Kur*) occupies most of the day, and herein is a marked difference between Görbersdorf and Falkenstein. Dettweiler lays great stress upon rest in the open air, while Brehmer puts the emphasis upon methodical *hill-climbing*. Dettweiler so insists upon this system of open-air rest treatment that the most of his patients spend from seven to eleven hours daily in the open air in spite of rain, fog, or snow, and of cold, even to 12° below zero. As Ransom observes: "This form of treatment is almost independent of weather." Each patient on admission is carefully studied, not only his physical condition, but his temperament and will power, and his intelligent and willing co-operation with the physician is obtained. His plan of life is then arranged in all its details. He is constantly under the eye of the physicians, and always sees them at the principal meals. To this skilled watchfulness and care, the hygienic-dietetic measures, and the hyperæration is due the success attained in such an institution. Here, as at the other sanatoria, the treatment of fever is continued rest, physically and mentally, and this applies to all patients who have a temperature of 37.5° to 38° C.

(99.5° to 100.4° F.) or over. At some sanatoria, as at Hohenhonnef, the patient is not even allowed to lie out in the *Liegehallen*, for fear the moving and excitement may keep up or increase his fever, but is kept absolutely quiet in his room. Generally this treatment alone, with some Hungarian wine or cognac, suffices in a short time to reduce the temperature to normal. Knopf explains this disappearance of fever after a short sojourn at a sanatorium by the almost total absence of pathogenic microbes, especially the streptococci, in the pure atmosphere.

I was struck with the appearance of the patients as I saw them at dinner; they hardly differed from the persons one would see in the dining-room of an ordinary hotel, and presented only to a slight degree, if at all, the appearance one usually associates with a consumptive. During the entire meal I hardly heard a cough. More-

siasm, and well illustrates the power of the personal factor in the success of the physician. He makes his patients love him, and in consequence they readily yield to his will and guidance. "In him," as Dr. Thorne says, "reason, science, and long experience are correlated into action by discrimination, adaptability, sympathy, and unbending will. In both of the senses in which the term can be employed, he is a presiding genius."  
*Edward O. Otis.*

**FALLOPIAN TUBE. (ANATOMICAL.)**—See *Generative Organs, Female.*

**FALLOPIAN TUBES, DISEASES OF.—ANATOMY.**—In order to comprehend completely the nature of the diseases and neoplasms of the Fallopian tubes or oviducts, a thorough knowledge of their anatomy and embryology

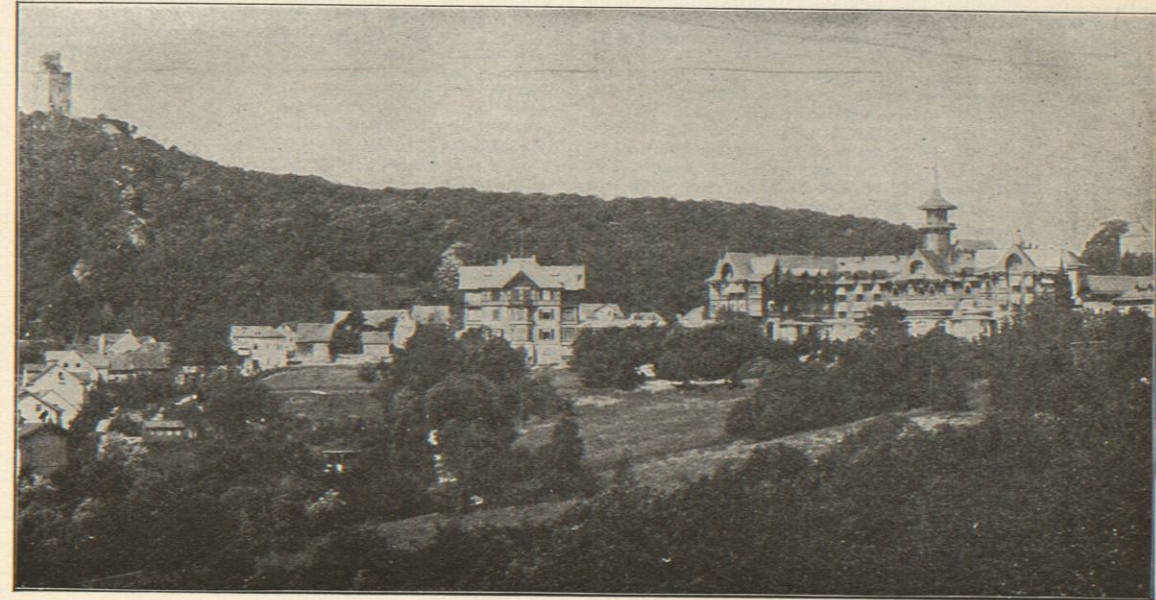


FIG. 2060.—The Sanatorium at Falkenstein, as seen from Adolfsfelsen.

over, it was as contented and happy-looking an assemblage as one would see anywhere. The average length of residence is about three months.

The results at Falkenstein, from 1876 to 1886, of the patients who have been kept under observation since their discharge, is 13.2 per cent. of complete cures, and 11 per cent. of relative cures (disease arrested), a total of 24.2 per cent.; 60 per cent. or more are improved. The expense here, as at most of the other sanatoria, is from \$20 to \$25 a week.

One cannot leave Falkenstein without carrying away a lasting impression of its founder and guiding genius, Dr. Dettweiler. It was my good fortune to ride up to the sanatorium with him from his modest home in Cronberg. It was a chilly, disagreeable morning in May, much like our March weather, which perhaps suggested his remark that it was not so much a climate as a method; tuberculosis could be cured in any climate. He told me of his early struggle with tuberculosis in his own case, when it seemed that he could not live. But the struggle was successful, and now he is a man of middle age or more, and has accomplished an immense amount of work, and is still the inspiration of his sanatorium. He is a man of great simplicity and sympathy, inspiring enthu-

is requisite. The oviduct has a common origin with the vagina and uterus from the Müllerian ducts. The upper portion of these ducts remains open externally and that portion forms the pavilion of the tube. The occurrence of secondary pavilions, or ostia, may be explained by supposing that the canal of Müller is not completely closed in all its extent at that period of embryonic life when the two borders of the gutter which give origin to it are turned toward each other to transform the channel into a tube. The Müllerian ducts unite lower in their course to form the uterus and vagina, and the limit of this union is the insertion of the round ligament. The similarity in structure and the continuity of mucous membrane explain how readily disease of vagina and uterus extends to and involves the tubes. These structures are veritably the excretory ducts of the ovaries and are placed, one on each side of the uterus, to permit the passage of the spermatozoid toward the ovary and to transmit the ovule from that organ to the uterus. They are in the upper folds of the broad ligaments, and their average length is from 10 to 12 cm. Their length may be unequal and is subject to considerable variation, as in cases of ovarian tumors, when it may be very much increased. The tube consists of three coats, the incomplete peritoneal, the

longitudinal and circular muscular, and the mucous. It is divided into the isthmus, the ampulla, and the fimbriated extremity. The uterine extremity, or isthmus, is its narrowest portion and will barely admit a bristle. The ostium abdominale is surrounded by a number of fimbriae which are formed by the outward bulging of the mucous membrane. These fimbriae are lined upon the inner surface by mucous membrane and externally by the peritoneum, so that there is a direct continuity of mucous and serous membranes at this point. No distinct glands, such as are found in the cervix and uterus, have been observed in the tubes. The mucous crypts formed by the folds of the mucous membrane are probably glandular in character and secrete an albuminous fluid. This membrane has a single layer of ciliated columnar epithelium upon two or three layers of supporting cells which are round or pyriform. The cells abruptly terminate at the ends of the fimbriae, where the margin between the columnar and pavement epithelium is distinctly marked.

**MALFORMATIONS.**—Malformations of the Fallopian tubes are rare. One tube may be longer than the other. Sometimes the lumen of the tube is increased. The abnormality which is most likely to attract attention is the presence of one or more accessory abdominal ostia. They are usually situated near the abdominal end of the tube, in the upper part of its wall, and are surrounded by fimbriae. Ferraresi found six openings upon one tube, all of which were surrounded by fimbriae. These openings are probably due to failure in closure of the groove in the germinal epithelium, or to splitting of the Müllerian duct after it has closed. There may also be accessory tubes, either as cystic diverticula starting from the tube, or as independent tubes with fimbriae starting from the mesosalpinx. The tubes may be absent on one or both sides, which absence is due to a destruction of the corresponding part of the Müllerian ducts in the embryo. Very often a small pedunculated cyst, about the size of a hazelnut, is found attached to the fimbriae or to the outer aspect of the tube. These cysts are called hydatids, or cysts of Morgagni. They are said to occur in eight per cent. of adults, and are not of surgical interest.

**DISEASES OF THE FALLOPIAN TUBES.**—The diseases of the Fallopian tubes may be either *inflammatory* or *neoplastic*. The inflammatory changes produced in the Fallopian tubes are variously classified according to the extent of involvement. Salpingitis is the ordinary term applied to inflammation of the oviducts. Perisalpingitis is inflammation of the peritoneal covering of the tube, a condition which occurs only as a part of a more extended pelvic peritonitis. Endosalpingitis is the term applied to inflammation of the mucous lining of the tube. Hydrosalpinx indicates an accumulation of serous fluid within the structure. If it is distended with blood, it is termed hæmatosalpinx; or, when a purulent collection is present, the term pyosalpinx is applicable. Hydrops tube profuens is the term applied to an accumulation of fluid in a tube in which the uterine end remains permeable, and, as the fluid increases, permits the excess to be drained through the uterine canal. The open tube acts as a safety valve, preventing the overdistention of the oviduct which occasionally completely collapses after evacuation. Tuberculosis will be discussed under infections of the tube, and the neoplasms affecting the tube will be considered later.

**ETIOLOGY.**—A knowledge of the causation of salpingitis is requisite for its prophylaxis and treatment. According to Noeggerath gonorrhœal infection is the most usual cause of inflammation of the tubes. Polk believes that puerperal endometritis is the most frequent cause of salpingitis, while the most destructive form is that produced by gonorrhœal infection. Salpingitis is hardly ever a primary disease, being as a rule secondary to inflammation of the uterus or peritoneum. The inflammation may follow the mucous membrane by a direct extension, or be propagated from the uterus through the lymphatics of the broad ligament. It may be due to infectious and exanthematous disease. Malposition of the

uterus, neoplasms affecting the uterus, or stenosis of the uterine os with retention of secretion in its cavity, may produce tubal inflammation. Exposure to cold, too frequent coition, or violent exercise immediately before menstruation are causative factors. Puerperal infection following labor or abortion under septic conditions may be placed among the chief causes of inflammation of the appendages. Unfortunately, in many cases unwise surgical interference, intra-uterine exploration, the introduction of the sound, and the employment of stem pessaries, are to be classified among the sources of tubal infection. Too often the gynecologist is called upon to perform sacrificial operations upon the adnexa to relieve the patient from the results of gynecological tinkering. The practice of some physicians, now fortunately nearly obsolete, of making intra-uterine application of caustics or astringents with routine introduction of the sound, is responsible for endometritis and a secondary salpingitis. There is a direct relationship between the diseases of the endometrium and tubal affection. Salpingitis cannot be considered an uncomplicated entity; it is invariably associated with more or less metritis or ovaritis, and there is the constant danger of the process involving the pelvic peritoneum. The various micro-organisms that have been identified in tubal affections are the gonococcus, the staphylococcus, streptococcus, and Bacillus tuberculosis. In a few cases the presence of the Bacterium coli commune has been demonstrated. Frommel and Witte have found the pneumococcus in puerperal salpingitis. One of the saddest things to contemplate is the possibility of the innocent, newly married woman being infected with the gonococci, and yet this is observed over and over again and emphasizes the necessity for complete cure of men contemplating marriage. The ravages of gonorrhœal infection and the dire results produced upon the appendages demand plain speech and earnest teaching upon this point. Another cause of these diseases is the neglect of proper attention being paid to the pubescent girl. Engelmann in a tabulation of 5,000 cases among school girls found that 66 per cent. were afflicted with more or less menstrual suffering; and no doubt a large proportion of these cases presented more or less symptoms of tubal congestion.

**PATHOLOGY.**—Many classifications have been presented of the various forms of tubal disease; but here simplicity is the secret of lucidity. Like inflammations of other structures, salpingitis may be either acute or chronic and it may affect one or both tubes. As it becomes chronic, or the infection increases in severity, the various changes noted occur, such as the formation of hydro-, hæmato-, or pyosalpinx.

**Acute Salpingitis.**—In the first stages of acute salpingitis the disease is confined to the mucous membrane of the tube, whence it quickly extends to the muscular and peritoneal coats. The whole tube is soft, congested, and friable. In early salpingitis a prominent feature is small-celled infiltration of the plicæ which causes them to become thick and club-shaped. Blood-vessels, at first dilated, soon appear narrower than in health. The folds become oedematous and hyperæmic. The epithelial cells are swollen, show slight increase in the size of their nuclei, and vacuoles form in their protoplasm. The secretion is increased and contains mucus, albuminoids, and epithelial debris. This secretion exudes from the abdominal ostium when the tube is squeezed. When the infected material escapes into the peritoneal cavity, the danger of pelvic peritonitis is great. The direct channel established by the tubes between the uterine and peritoneal cavities facilitates peritoneal infection. But the frequency of this is diminished by nature's provision in producing occlusion of the abdominal ostia of the tubes, which closes these orifices. Many cases of acute salpingitis undergo resolution and the tubes are restored to their normal condition. This is particularly true of the milder forms of catarrhal salpingitis.

In *chronic salpingitis* there is an extension of the inflammation and the formation of adhesions with more definite changes in the tubal structure. Many cases are

either subacute or chronic from the beginning; that is, they never present violent or acute symptoms. The lesions produced are numerous. The tube may become enlarged and more tortuous than normal, its muscular coat more extensively involved, producing interstitial salpingitis. As it progresses, the cilia of the lining cells disappear, the wall of the tube becomes thicker and harder, with an increased amount of connective tissue. The conservative closure of the abdominal ostium is of much importance, because it prevents leakage of the septic material through this channel and consequently diminishes the danger of peritonitis. When the inflammation extends from the tubal mucous membrane to the peritoneal covering, the fimbriae retract and become invaginated in the tube; and this opening, instead of being surrounded with protruding, divergent fimbriae, becomes rounded and smaller. The process continues until the edges finally meet and unite by peritoneal adhesions, causing complete closure of the opening. As the tube increases in size and weight its position is frequently changed and it becomes adherent to the uterus, ovaries, or the pelvic peritoneum. Usually there is obstruction of the uterine extremity of the tube, which is produced by swelling of the mucous membrane in the narrow isthmus, by cicatricial contraction, or by a sharp flexure along the course of the tortuous tube. The greatest distention is at the outer extremity of the tube so that it assumes a pear shape. If the tube be brought into connection with the ovary, either by agglutination of the fimbrial extremity to the surface of that organ or by burrowing between the layers of the broad ligament, the tissue intervening between the cavity of the tube and the cyst of the ovary may be absorbed or perforated, and the two cavities thrown into one, forming a tubo-ovarian cyst; or, if infection has occurred, a tubo-ovarian abscess.

**Hydrosalpinx.**—The fluid of a hydrosalpinx may be colorless, slightly yellow, or brownish when colored by the presence of blood. As the accumulation increases, the walls of the cyst atrophy and become very thin; the epithelium and the mucous membrane in time disappear until nothing but a thin-walled sac remains. The size of the tube varies from that of the finger to that of a fetal head. In a case reported by the writer, the hydrosalpinx was the size of a coconut and was mistaken for an ovarian cyst. As a rule the fluid from a hydrosalpinx is sterile, unirritating to the peritoneum, and readily absorbed.

**Hæmatosalpinx.**—True hæmatosalpinx rarely occurs. Extra-uterine pregnancy is the most common cause of an accumulation of blood in the Fallopian tube and should not be termed hæmatosalpinx. [The subject of ectopic gestation is treated elsewhere.] Hæmatosalpinx may occur, however, when hemorrhage takes place into a tube previously closed by inflammatory action. Such an accident may result from traumatism or by the torsion of the pedicle of a tubal cyst, or when there is an obstruction to egress of menstrual fluid. The writer has never seen a case of tubal hemorrhage in which ectopic gestation could be excluded. Although the positive evidence of impregnation may not be present, yet undoubtedly the vast majority of these cases are of such origin.

**Pyosalpinx,** or a collection of pus in the closed Fallopian tube, produces a gradual thinning of its wall. This thinning predisposes to rupture and the escape of the pus into the peritoneal cavity. The pyosalpinx often becomes adherent to the posterior wall of the uterus, to the rectum, or to the small intestine. The contents of the sac are usually at first clear, non-odorous pus; but proximity to the bowel frequently causes this to assume a more offensive character. The possibility of a pyosalpinx being evacuated through the uterus has been asserted by some authorities. This, however, is a very unusual occurrence, and it is probable that in such cases the escaped fluid has been retained uterine secretion. The pus of a pyosalpinx varies greatly in character. In the early stages of the disease it is actively septic; but later the micro-organisms become inert, die, and disappear. According to Penrose, out of 133 cases of acute and

chronic suppuration of the uterine appendages in which the pus was examined bacteriologically, no organisms whatever were found in 82 cases; in other words, the pus was sterile in about 61 per cent. of the cases. Out of 116 cases Wertheim found that in 72 there were no bacteria at all; in 32 there were gonococci; in 6 there were streptococci, and in 1 staphylococci. It is only when the pus is in contact with an absorbing surface, or escapes into the peritoneal cavity, that general inflammation or septic symptoms develop. It is surprising what a quantity of pus may exist in cases in which there has been no deviation of the pulse or temperature from the normal. In this connection it is well to call attention to the frequent coexistence of appendiceal and adnexal disease. Adhesions will be found between the appendix and the tube and ovary in about fifteen per cent. of all cases of tubal disease. The proximity of the appendix to the right appendage and the frequent coexistence of inflammation in both are often perplexing to the diagnostician.

**SYMPTOMS.**—In acute salpingitis the patient usually complains of pelvic pain and tenderness which is most marked in the ovarian regions. The temperature is elevated, the pulse rapid, and the knees are often drawn up as in peritonitis. There are no pathognomonic symptoms. A chill may occur. Bimanual examination reveals marked tenderness upon pressure in the vaginal fornices, and there is a sense of fulness in the region of the tubes. If the pelvic peritoneum and cellular tissues are involved, the whole vaginal vault will feel resistant. If the patient is thin and the abdominal walls are sufficiently relaxed, the enlarged, tender tube may be palpated by the conjoint method. When the disease becomes chronic, with more extensive pathological changes, the symptoms vary and may in part be attributed to associated ovarian disease. Pain is generally continuous, but may be relieved by the recumbent posture. It is increased by exercise, coition, and during defecation. It may be felt in one or both ovarian regions or in the sacral region. It often has a colicky character due to the contractions of the inflamed muscular coat. It may be dull and aching, or at times sharp and lancinating, and is very much worse at each menstrual period. The dysmenorrhœa in salpingitis is usually characteristic, beginning several days before the flow and lasting throughout the whole of the period. While the disease is quiescent there may be no acceleration of the pulse or increase of the temperature. The patient frequently has marked exacerbation of the pain and sometimes acute attacks, with symptoms of local peritonitis. Her life is in constant jeopardy, as there is the ever-present possibility of intraperitoneal rupture, with escape of septic material and consequent peritonitis. Leucorrhœa is common, more or less constant, and may vary from a slight, thin watery to a profuse, purulent, or sanguinolent discharge. Menorrhagia or metrorrhagia is frequently present. The general health suffers, the patient loses flesh and strength, and marked nervous and reflex symptoms develop. Sterility is the rule in these cases, as the disease of the mucous membrane and destruction of the ciliated epithelium render the passage of the ovum into the uterus difficult. A careful study of the history of the patient will aid in diagnosis; but our chief reliance must be upon our bimanual examination. If the diagnosis is obscure and the patient's abdominal walls are rigid, it is wise to employ an anæsthetic. For this purpose the bromide of ethyl is convenient. The small amount of anæsthetic required, the rapidity of its influence, and the quick return to consciousness make this anæsthetic of distinct value where a brief period of anæsthesia is desired. By bimanual examination the tube may be felt lying beside the uterus or behind it in Douglas' pouch. The shape of the tube and its connection with the uterus may be traced, and it will appear tender, thickened, and often distorted. Fluctuation may not be elicited even when there is a large amount of fluid, if the sac is much thickened. If the inflammation has been extensive and the disease is bilateral, the tubes, ovaries, and uterus may form one conglomerate mass filling the true pelvis. Usually the uterus is pushed for-

ward in the pelvis and the appendages occupy the recto-uterine space. Frequently the appendage primarily diseased becomes prolapsed first, and the other appendage rests upon it and may be felt by the abdominal examining hand. Recto-abdominal examination should also be practised. Disease of the tubes may be mistaken for cellulitis, oöphoritis, or pelvic hæmatocele. An adherent, retrodisplaced uterus must also be differentiated. In women with very thick abdominal walls physical examination is unsatisfactory, but the history of the case and the symptomatology usually justify the diagnosis.

**TREATMENT.**—The treatment of tubal disease is *prophylactic, palliative, and surgical*. In order to prevent disease of the tubes attention must be paid to the woman's health from puberty to the menopause. At puberty the young girl should be carefully advised by her parents or physician in regard to the menstrual function. The false modesty which keeps her in ignorance of her sexual physiology is responsible for untold suffering. During menstruation she should avoid exposure or violent exercise and should evacuate the bladder whenever the desire is present. Proper clothing should be worn at all times; and corsets, if worn at all, should support rather than compress the viscera; but they should be positively interdicted until complete development has occurred, since it is reprehensible to compress the waist of a growing girl by anything tight or constricting. In married women tubal trouble may be prevented by the rules of health already mentioned, by careful attention after abortion or labor, by repair of all lacerations of the cervix or perineum which do not heal immediately after labor. If gonorrhœa develops, energetic treatment will often prevent the disease extending from the vagina and uterus to the appendages. Whenever there is metritis or endometritis, palliative measures should be used. Careful antiseptics in the treatment of abortion or during the puerperium will diminish the frequency of salpingitis. As gonorrhœa and sepsis are two great causes of inflammation in these organs, our attention should be devoted to their prevention. In all necessary intra-uterine exploration there should be the same rigid asepsis as though the peritoneal cavity were to be invaded; for the tube is a direct channel of communication between the uterus and that important serous membrane, the peritoneum.

**Palliative Treatment.**—When a patient is suffering from *acute salpingitis* in its early stages, the treatment should be expectant: 1. Absolute rest in the recumbent position. 2. The administration of saline purgatives: from one to two drachms of Rochelle salts every two hours until the bowels have moved freely; or four to six ounces of liquor magnesiæ citratis may be given in the same manner. It is far better to keep the bowels open by such drugs as these than to keep the patient under the influence of opiates. Hot vaginal douches of some antiseptic solution such as corrosive sublimate, creolin, or lysol, of a temperature of from 100° to 110° F., and not less than one gallon in quantity, should be employed two or three times a day. Much relief will be afforded by the use of ice-bags over the lower abdomen. In fact the cold applications are preferable to hot fomentations, as the cold relieves the pain and has a tendency to prevent the extension of inflammation. If there is elevation of temperature, with a rapid, high-tensioned pulse, tincture of aconite in small doses is indicated. If there is a tendency to abdominal distention, high enemata of sulphate of magnesia, glycerin and water, or of the milk of asafetida, will favor peristalsis and the expulsion of gas. All examinations should be made with great care and gentleness and no oftener than is essential to determine the progress of the disease. The patient should be carefully watched, and if the temperature and pulse rate decrease and the tenderness is subsiding, the palliative treatment should be continued; but if the symptoms are increasing in severity and the possibility of peritonitis or abscess formation is at hand, operation is demanded for the purpose of removing the source of infection. In some cases of acute salpingitis with virulent infection fatal peritonitis will result in three or four days after the onset of the at-

tack. On the other hand, in a great number of these cases the closure of the abdominal ostium of the tube prevents extension to the peritoneum; but the tube itself is badly damaged by the disease and remains in a condition of chronic catarrhal or purulent salpingitis.

The treatment of *chronic salpingitis* varies somewhat from that of the acute. It must be borne in mind that tubal disease is almost invariably associated with metritis and oöphoritis, and that these must be considered if effective treatment is to be given. The patient's condition and the degree of suffering experienced are to be our guides in deciding whether we shall employ palliative treatment or surgical interference. Curative measures should be directed to any accompanying endometritis. If this is chronic, aseptic curetting is the proper remedy; but it must be used with great caution, as intra-uterine manipulations are apt to produce an acute attack of the tubal trouble. For chronic salpingitis hot, germicidal solutions should be daily employed; and vaginal tampons of sterilized lamb's wool saturated with fifty-per-cent solution of boroglyceride in glycerin, or a fifteen-per-cent solution of ichthyol in glycerin, should be inserted two or three times a week. The tampon improves the pelvic condition by raising the uterus to a higher level and maintaining it there. The tampon may be left in position twenty-four hours; and, after its removal, a copious vaginal douche of the antiseptic solution should be used twice daily, with the patient in a recumbent position. The same attention should be paid to the bowels, diet, etc., as in acute salpingitis. Rest at the menstrual period, the avoidance of exposure to cold, and abstinence from coition will aid in relieving the symptoms. Internally, preparations of viburnum, hydrastis, or ergot may be given. In some cases of chronic salpingitis beneficial results have been derived from the use of pelvic massage as advocated by Thure Brandt. It produces a rapid alteration in the inflammatory accumulations, setting free the uterus and its adjacent organs. It may be employed in subacute or chronic inflammation unassociated with pus formation. American physicians, however, have not secured the same brilliant results by massage as have been reported by European gynecologists. The writer has found that patients were unwilling to undergo the discomfort of the prolonged séances of pelvic massage necessary to secure definite results.

**Surgical Treatment.**—When palliative methods have failed and the woman experiences suffering constantly, or at the menstrual periods, and is unwilling longer to lead the life of an invalid; then it is necessary to consider surgical interference. When there are gross tubal lesions such as hydro-, hæmato-, or pyosalpinx, or retrodisplacements of the uterus with adherent tubes and ovaries, nothing but operation will afford permanent relief. One of two routes may be selected according to the individual preference of the surgeon. These are the vaginal and the abdominal; but no fast rule can be laid down as to which route should be preferred, as the choice depends upon the condition of the patient, the environment in which the operation must be performed, and the skill of the surgeon. Often both routes will be employed in the same operation, as in the evacuation and irrigation of a tubal abscess per vaginam prior to its removal by abdominal section. If the patient is very weak, the pulse rapid, and the abscess bulging into the vagina, a vaginal cœliotomy may be rapidly performed, the pus evacuated, and drainage introduced without anesthesia or with a very brief period of it. In a great many cases of vaginal section the patient will so far recover her health as to obviate the necessity for abdominal cœliotomy. The technique of the vaginal operation is as follows: After complete evacuation of the bowels and the necessary anesthesia, the vagina should be thoroughly scrubbed with a solution of creolin or lysol, 3 i.; tincture of green soap, ʒ i.; hot water, O. i.; after which it should be irrigated with sterilized water and alcohol. A curvilinear incision is then made through the posterior vaginal wall and the finger, or a pair of scissors, is carefully pushed into the tubal mass. The pus or blood is evacuated, the

cavity being constantly irrigated with hot normal salt solution. Care should be taken that all accumulations be evacuated and that no injury be done to the viscera. After the cavity has been perfectly cleansed, it should be packed with iodoform gauze, which by its pressure controls any slight oozing that may occur and serves as a vaginal drain. If the vagina is capacious and the adhesions are not too firm, salpingo-öphorectomy, if indicated, may be done through this incision. The gauze packing is allowed to remain for three or four days, and after its removal vaginal douches of normal salt solution, or of a 1 to 2,000 formalin solution, should be given. The advantages of the vaginal route are the absence of abdominal incision, less shock, less danger of hernia, and more rapid convalescence. There is, however, always the possibility of a secondary operation being required.

The operations which may be done by the abdominal route are: salpingotomy, salpingostomy, and salpingectomy. In all of these the same general preparation is to be observed as in other abdominal operations. *Salpingotomy*, or resection of the Fallopian tube, is the result of conservative evolution; and it has been proved that, after the resection of a diseased portion of the tube, regeneration may take place and the tube continue to functionate. Dudley, of New York, has reported some splendid operative results and has resected the tubes even when gonorrhœal pyosalpinx was present. The success in these conservative operations depends upon the careful selection of cases and the skill of the individual surgeon.

*Salpingostomy* is the establishment of a new opening in the Fallopian tube when the normal one has been closed by some inflammatory process, and is particularly indicated when it is desirable to retain the child-bearing function. The new opening in the tube may be sutured directly over the ovary so that when the Graafian follicle ruptures the ovule may pass directly into the tube. In all conservative surgery upon the tubes care must be taken thoroughly to cleanse that canal and to protect the peritoneal cavity from its contents.

**Salpingectomy.**—In nearly all cases requiring removal of the tubes, the ovary demands extirpation also. Salpingectomy is required when the symptoms are marked and the tube is irreparably diseased. There must be danger to life or serious impairment of health before this operation is resorted to. The exact nature and the extent of the operation depend upon the disease for which it is performed, the age and social condition of the patient, and the ability of the operator. In performing salpingectomy the abdomen is aseptically prepared, and an incision, from two to three inches in length, is made in the median line, midway between the umbilicus and the pubes. An examination is made to ascertain the position, extent, and strength of adhesions. When the pelvic viscera are found in one conglomerate mass, it is well first to find the fundus of the uterus and then proceed to the tubal enucleation. The intestines and general peritoneal cavity should be walled off by gauze pads. The use of the Trendelenburg position is of great advantage, as it permits the operator to see as well as feel the visceral adhesions. In old cases in which the adhesions are firm and organized, great care must be taken to prevent visceral injury. If the tubal sac in a pyosalpinx ruptures during removal, gauze pads should be at hand to catch the escaping fluid and the cavity should be irrigated with a large quantity of normal salt solution. After the appendages have been freed, chromicized catgut ligatures should be applied to the pedicle in small sections rather than *en masse*. A supporting button should be left beyond the ligature to prevent its slipping and the possibility of secondary hemorrhage. If the interstitial portion of the tube is involved, it is often wise to remove the fundus of the uterus also. Frequently there will be denuded peritoneal surfaces which require suturing to control oozing. A careful examination should be made to find whether the rectum, sigmoid flexure, or small intestine has been injured. Drainage is not so often employed as formerly, as it has been shown by Clark that by thorough irrigation and postural drainage the use of tubes or

gauze is unnecessary. If there is an extensive raw oozing surface or fear of infection, then the pelvic cavity may be packed with iodoform gauze, one end of which is carried through a posterior vaginal incision into that canal. The great advantages in such vaginal drainage are that drainage takes place from the most dependent portion of the pelvis and there is no danger of a ventral hernia or abdominal fistula along the drainage tract. After the appendages have been removed and a most vigilant examination has been made to see that all bleeding is controlled and all injuries are repaired, the abdominal incision should be closed and the patient treated according to the usual methods employed in abdominal surgery. These, however, cannot be discussed here for lack of space.

*Tuberculosis* is more apt to affect the tubes than any other part of the genital apparatus. They are involved in nearly all cases of genital tuberculosis, which is much more common than was formerly supposed. According to Penrose and Beyea, it is present in eighteen per cent. of cases subjected to the operation of salpingo-öphorectomy; while Williams found that in one out of every twelve operations for the removal of the tubes and ovaries that were the seat of inflammatory disease, this infection was present. It may be either primary or secondary, but is usually the latter. The infection may take place through the blood from the peritoneum or the uterus. Coition with men affected with genito-urinary tuberculosis may be an occasional cause. This disease may involve the tube long before puberty. Chaffey has described a case in which a child aged four died with tuberculosis in the lungs and abdominal organs, and the tubal walls presented caseous nodular masses. Silcock has detected a similar condition in a child aged five.

Tuberculosis of the tube may be divided into three classes: *miliary, chronic diffuse, and chronic fibroid* (Penrose). Miliary tuberculosis of the tube may be a part of a general condition, or it may belong primarily to the tube, when micro-examination shows giant epithelioid cell tubercles scattered through the mucous membrane. This is the first stage and the process may progress no further or may be converted into one of the other varieties. In the chronic diffuse tuberculosis the mucous membrane is infiltrated with epithelioid cells, miliary tubercles, and areas of caseation. The tube may be filled with cheesy material or with pus, and in time the mucous membrane becomes entirely destroyed. In the chronic fibroid variety, there is a great increase of connective tissue between the tubercles, the lumen of the tube is distorted, and a few miliary tubercles are found scattered through the mucous membrane. This form advances very slowly and not infrequently terminates in a spontaneous cure. The symptoms of tubal tuberculosis resemble those of salpingitis and are not at all characteristic. The diagnosis is often obscure, but occasionally it may be made by careful bimanual examination, by an inquiry into the question of hereditary predisposition, and by finding other signs of it, especially in the lungs. Most cases of tubal tuberculosis have been discovered unexpectedly at the time of operation or autopsy. The treatment is prophylactic, hygienic or medical, and surgical. If the condition of the patient permits, salpingo-öphorectomy should be performed; and if there is any evidence of disease of the uterus it should be removed at the same time. The presence of tuberculous peritonitis indicates rather than contraindicates operation. The curative action of cœliotomy in these cases is probably due to a combination of the peritoneal traumatism during the operation, thermic influence, penetration of air into the abdominal cavity, and the action of light. Therefore such operation offers to the patient the best chance of cure.

*Neoplasms* of the oviducts are exceedingly rare except as the result of inflammatory changes. *Cysts* varying in size from a pea to a walnut are found in all the walls of the tube but most frequently beneath the peritoneum. Sanger divides these cysts into three classes: 1. Serous cysts, which arise from the accumulation of serous fluid between the lamellæ of the mucous membrane. 2. Lymphangiectatic cysts. 3. The hydatid of Morgagni, which

is a physiological cyst at the end of the tubal fimbriae. *Myoma*.—Notwithstanding the fact that fibroid tumors of the uterus are of such common occurrence, myoma of the tube is very rare. Bland Sutton reports a case in which an interstitial myoma, the size of a Tangerine orange, was found in the walls of the tube at the juncture of the uterine and middle thirds. Most of the reported myomata of the tube are pedunculated and of the sub-peritoneal class. In Sir J. Y. Simpson's case the tumor was "of a size equal to that of a child's head"; but usually the growths are so small as to create no disturbance. Many observers have mistaken a collection of tuberculous matter and inflammatory changes in chronic salpingitis for minute fibroids. *Cancer*.—Carcinoma of the tube may be either primary or secondary, though the latter is more frequent and results from involvement of the tube in cancer of the uterus or ovaries. The disease is generally confined to one tube. Until recently it was asserted in text books that the secondary was the only variety, but at least seventeen authentic cases of primary carcinoma of the tube have been described. The cancer in nearly every case assumed a villous or papillomatous appearance. *Sarcoma* has also been noted. Montgomery refers to a case reported by Kahlden in which the tube formed a sausage-shaped mass filled with soft, cauliflower-like material. Under the microscope it showed various degenerations such as round-cell and spindle-cell sarcoma and a papillomatous structure wanting in connective tissue. *Lipomata*, or fatty tumors, from the size of a bean to that of a walnut, have been found in connection with the tubes. Parona reports a case in which the lipoma weighed a little under three ounces and measured three and a half inches in the longest diameter; traces of the wall of the tube with characteristic ciliated epithelium were seen through the adipose tissue of the lipoma. *Deciduoma malignum*.—Two cases of this remarkable disease have been described, both in Sanger's opinion quite authentic; and if we can have the malignant degeneration of a portion of the placenta or chorion within the uterus, it is not surprising that a similar malignant change may occur in the tubal sac of ectopic pregnancy. Sanger claims that this is an additional argument, not only for active interference in cases of extra-uterine pregnancy, but also for the extirpation of the appendages in which tubal abortion has occurred. *Papillomata*.—According to Doran papilloma is the term applied to an exuberant morbid growth which lies in the interior of the Fallopian tube. Sutton, however, classifies such tumors as adenomata. Doran considers that these tubal papillomata are allied to the condylomata and warts seen on the external genitals irritated by venereal discharges. These ordinarily are innocent but may undergo malignant degeneration. Sanger divides them into two forms: simple cystic and hydropic. *Dermoids*.—According to Doran there is no sound evidence that a dermoid tumor of the tube has ever been seen. *Enchondromata* are small, semitransparent, cartilaginous masses, occasionally situated on the ends of the fimbriae (Montgomery).

The general treatment for all these tubal neoplasms is salpingectomy. They are rarely differentiated, as subjective symptoms throw no light upon the diagnosis and examination reveals merely a tubal mass without any determination of its character. *Wilmer Krusen.*

FARCY. See *Glanders*.

FARMVILLE LITHIA SPRINGS.—Prince Edward County, Virginia.

POST-OFFICE.—Farmville. Boarding-houses. ACCESS.—Via Norfolk and Western Railroad to Farmville, thence one-half mile to springs. Farmville is a thriving town of 4,000 inhabitants, located 55 miles east of Lynchburg and 72 miles south of Richmond. The railroad depot is within convenient walking distance of the springs, but carriages are at hand for all those who prefer to ride. There are many features of interest in this historic region. The springs are beautifully situated about 550 feet above the sea-level. The surrounding

country is very pleasing to the eye, and on every hand the visitor is met by names and locations of familiar memory. Not far from the springs are found the battlefields of Chancellorsville, Appomattox, Rapidan, Five Forks, and others of lesser note. The climate here is bracing, the temperature ranging from 40° to 50° F. in winter and from 80° to 90° F. in summer. The springs are eight or ten in number, and yield about fifty gallons of water per hour. The following analysis is by Prof. E. T. Fristoe, of the Columbian University, Washington:

| ONE UNITED STATES GALLON CONTAINS:     |                 |
|--|-----------------|
| Solids.                                | Grains.         |
| Sodium chloride                        | 5.30            |
| Sodium sulphate                        | 3.59            |
| Potassium sulphate                     | .18             |
| Calcium sulphate                       | 1.81            |
| Lithium bicarbonate                    | 3.76            |
| Calcium bicarbonate                    | 1.33            |
| Magnesium carbonate                    | 2.71            |
| Ferrous carbonate                      | 1.25            |
| Manganous carbonate                    | Trace.          |
| Alumina                                | 2.52            |
| Silica                                 | 3.92            |
| Iodine                                 | Trace.          |
| Sulphuric acid                         | Trace.          |
| Organic matter                         | Small quantity. |
| Total                                  | 25.38           |
| Carbonic acid gas, 74.20 cubic inches. |                 |

It will be observed that this water contains a fair proportion of the bicarbonate of lithium. It is also abundantly charged with carbonic acid gas, and contains sufficient sulphate of sodium to give it a mild laxative action. The water has come into wide use as a corrective of the uric-acid diathesis, and is sold in all parts of the country. Its best effects have been observed in gout, renal and vesical calculus, Bright's disease, and dyspepsia. The iron in the water gives it also excellent properties as a ferruginous tonic. *James K. Crook.*

FAT NECROSIS. See *Pancreas, Diseases of*.

FATTY DEGENERATION; FATTY INFILTRATION. See *Lipogenesis*.

FAUQUIER WHITE SULPHUR SPRINGS.—Fauquier County, Virginia.

POST-OFFICE.—Fauquier White Sulphur Springs. Hotel.

ACCESS.—From Washington via Virginia Midland Railroad to Warrenton, 56 miles southward, thence a drive of six miles to the springs. The visitor to this favored locality is pleasantly impressed during the forty minutes' ride from the picturesque town of Warrenton to the springs. The drive is over a fairly graded road through a country where the well-stocked farms and handsome residences are indicative of an advanced degree of thrift and refinement. The springs are charmingly situated among the foothills of the Blue Ridge at an elevation of 1,000 feet above the sea-level. The surrounding grounds comprise an area of 400 acres in a high state of cultivation and abounding in shaded walks and drives through hills and valleys. Being sheltered on the west by wooded hills, the location admits of invalids enjoying the open air with safety almost daily throughout the year. The clear waters of the Rappahannock River border the western boundary of the park and sweep along the base of the mountains, where the huntsman or the disciple of Izaak Walton will find an ample reward for his tramp among the hills or his patience by the waterside. The waters of these springs have been well known for upward of seventy-five years. As early as 1834 a company was formed of well-known men from Maryland and Virginia, and two large hotels and a number of cottages capable of accommodating 1,000 persons were built. So attractive were the resort and its surroundings that the Legislature of Virginia held a summer session there in 1849. At the beginning of the war the place was in the full blast of prosperity. In August, 1862, it was the scene of a fierce fight between

the Federal and Confederate forces, and the two hotels were burned. In 1877 a company was formed for the purpose of restoring the famous old resort to public uses. The present accommodations consist of an elaborate and commodious fire-proof hotel fitted with all modern improvements. There are besides a number of cottages, capable of accommodating 500 guests; they are located in a fine grove of elms convenient to the main hotel.

The following analysis of the spring water was made in 1878 by Prof. Thomas Antisell, of Washington, D. C.:

| ONE UNITED STATES GALLON CONTAINS:      |                 |
|---|-----------------|
| Solids.                                 | Grains.         |
| Calcium bicarbonate                     | 7.88            |
| Magnesium bicarbonate                   | 2.47            |
| Sodium chloride                         | 3.75            |
| Calcium sulphate                        | 3.39            |
| Iron phosphate                          | 2.14            |
| Iron sulphate                           | 1.63            |
| Sodium and potassium sulphate           | .64             |
| Calcium and magnesium phosphate         | .10             |
| Gaseous matter, etc.                    |                 |
| Total                                   | 22.00           |
| Gases.                                  | Cu. in.         |
| Carbonic acid                           | 11.00           |
| Sulphureted hydrogen                    | Small quantity. |
| Temperature of water at springs, 55° F. |                 |

The source of the mineral ingredients of the springs lies in the country rock, which is an aluminum slate, the beds of which lie nearly horizontal, or with a slight slope, and hold between their layers sandy, ferruginous seams, in which are embedded crystals of iron pyrites with some hydrated oxide of manganese. The water is properly classed as a sulphureted alkaline-chalybeate, possessing alterative, tonic, and diuretic properties. It has long been recommended in the various forms of dyspepsia, in intestinal disorders and in liver complaints. Its diuretic properties are utilized in dropsical affections due to renal and cardiac diseases, as well as in the early stages of Bright's disease. In the condition known as neurasthenia, produced by overwork, anxiety, or other causes, a course of this water has been found to be markedly advantageous. In certain female complaints, notably in menstrual disorders due to anæmia, its action is prompt and permanent. *James K. Crook.*

FAVUS. See *Tinea*.

FEBRICULA (diminutive of *Febris*, fever).—(Synonyms: Simple fever, Simple continued fever.) Febricula is a convenient term which finds its justification in ignorance rather than in knowledge.

A pyretic state lasting from one (*ephemera*) to ten days, in which the temperature probably does not rise above 102° F. except temporarily, nor the pulse usually above 100 to 120, accompanied by a white, furred tongue, constipation, loss of appetite, by headache which may be sharp; but without other derangement of the bowels than constipation, without any exanthem, without any distinguishable internal or external local lesion, inflammatory or otherwise; ending in sudden resolution and rapid, easy recovery—this is febricula, and we agree to call this general condition, whatever may be the cause, by that name for want of a better, and because it requires some designation.

Febricula has no pathology, because it always ends in recovery. Febricula ending in death takes on another name. Abortive typhoid, typhus, or relapsing fever; scarlet fever or measles without their rash; tonsillitis with an inappreciable tonsillar affection; acute rheumatism or erysipelas without localization, may all conceal themselves under the term febricula.

On the other hand, the same symptoms—as shown in a mild or short continued fever—may result from exposure to extremes of temperature, from exhaustion, from digestive disturbances, from derangement of the nervous centres.

The *febris ardens* of the tropics, various degrees of which are encountered in the United States during the occasional hot "waves" of our summer months, belongs more appropriately under insolation, or heat- or sun-fever.

The DIAGNOSIS of febricula can be reached only by exclusion, and should only be made subject to ready revision.

The TREATMENT is simple and consists of a saline laxative, diuretics, diaphoretics, or refrigerants, as indicated in the particular case. *George B. Shattuck.*

FEEDING, FORCIBLE.—Forcible feeding means the introduction of food into the organism against (or without) the will of the individual. It is employed in two groups of cases: (1) In patients exhibiting a comatose or semi-comatose condition for a considerable period of time; and (2) in patients afflicted with brain troubles (insanity, melancholia), when they refuse nourishment.

The insane form the largest contingent of cases in which forcible feeding must be resorted to. Here it is the most important measure not only to prolong life but also often for the establishment of a cure, whenever this is possible.

In some instances small quantities of liquid or semi-liquid food are introduced into the mouth of the patient and the latter is told to swallow. In case this procedure is effective, enough nourishment may be slowly ingested in this way. But if this means fails, as it often does, or in patients who are not accessible to our exhortations, the principal measure of forcible feeding consists in the artificial ingestion of nourishment. The latter is performed in three ways: (1) Gastric alimentation by means of a tube inserted into this organ; (2) rectal alimentation; (3) subcutaneous alimentation.

By far the most frequently employed and the most efficient method of forcible feeding consists in the first measure. It seems that the stomach pump was used for this purpose long before its application in gastric affections as a therapeutic measure (Kussmaul, 1867); for in 1857 William Hamilton mentions the stomach pump as a well-known procedure in the feeding of the insane. The same writer had also introduced a new means of gastric alimentation by inserting a tube through the nostril into the œsophagus and providing it with a funnel. This method is still used nowadays, and I may, therefore, be allowed to cite Hamilton in full. He says:

"Acting upon a method advised, in cases of trismus, of introducing into the nostrils a tube to the posterior fauces, through which nourishment may be passed to a point beyond voluntary muscular control, an instrument was constructed which was efficaciously employed on the 24th of June last. It consists of an elastic tube, twenty-four inches long, the size of a catheter, at the open end of which a funnel is attached. Near its end the tube is slightly curved. The curve is maintained by the introduction of a silver wire, two inches in length, one end being bent upon itself to preserve it in position, to prevent its impinging at right angles upon the posterior wall of the pharynx during the first stage of the process, and, during the second, keeps the tube from interfering with the glottis. The tube being adjusted, the operator pours through it nutritious or medicated liquids, which are immediately, by automatic action, conveyed into the stomach. This operation is not disturbed, owing to the length and flexibility of the tube, by any considerable motion of the patient's head."

Forcible gastric alimentation is performed in the following manner: A soft-rubber tube (regular stomach tube), provided with a connecting glass-piece at the outside end, is introduced, either by way of the mouth (when this is possible, or after keeping the mouth open by a gag) or by way of the nostril, into the stomach. A rubber tube with funnel attachment is next slipped over the glass-piece, and the apparatus is then ready for the reception of food. The latter, in liquid or semi-liquid form, is poured from a pitcher into the funnel, which at first must be somewhat lowered, in order to prevent the entrance of too much air into the stomach, and then afterward raised to about the level of the patient's face, until the whole quantity desired has been ingested. Then the entire apparatus is quickly removed after compressing the tube with the fingers in such a manner that no con-