Chapter 14
STERILITY AND SEXUAL DISTURBANCES

The disturbances belonging in this chapter will be taken up in the following order:

Sterility.
Contraception.
Sterilization.
Dyspareunia.
Sexual Frigidity.
Sexual Hyperesthesia.

STERILITY

The problem of sterility has become one of increasing importance in gynecology. The estimates by different authorities of involuntary sterile marriages vary from one in ten to one in six. The need for detailed study of the various aspects of the problem by men in many related fields who were especially interested in barren couples led to the formation in 1944 of the American Society for the Study of Sterility. A small booklet prepared by their Research Correlating Committee, *Evaluation of the Barren Marriage,* enumerates the minimal procedures required and may be obtained from this organization for a nominal sum.

In recent years the heretofore underestimated male responsibility has been emphasized. This percentage ranges from 30 per cent in some series to 48 per cent in others. Only a small number of cases show a single lesion which can be held entirely responsible for the sterility. Usually there is a combination of lesions in the wife or husband or both, any one of which would probably not render the couple sterile; but their combined influence is enough to bring about that result.

It is usually the wife who seeks consultation on this problem because for some reason the couple assume that inability to conceive must be due to some feminine inadequacy. The physician on the first visit should explain with an understanding and sympathetic interest the various factors involved and should give the patient some estimate of the number of visits and tests needed and an approximate estimate of the expense so that the couple will not become discouraged after several visits. A conference should be arranged at which the problem can be discussed with both husband and wife so that they can both be aware of the need for a combined investigation. This will frequently

bring out some emotional tensions and psychosomatic factors and their fears and conflicts can be allayed. In many cases simple reassurance and instructions as to time of coitus and hygienic measures are all that is necessary, while in others, especially those with sterility of long standing, a complete and thorough workup is required.

The questions to be answered are: What is the cause of the infertility? What can be done to correct it? What are the chances of accomplishing this (prognosis)? What therapy is indicated?

It is the purpose here to give a comprehensive and systematic method of investigating and treating the sterile couple. On account of limited space, only essential items can be considered, and the statements concerning these must be concise and limited to points of diagnostic or therapeutic importance.

Causes

In order to assist in determining the exact cause of the sterility in the various cases, it is well to consider what is necessary that a normal pregnancy may take place. It is necessary ordinarily (a) that healthy spermatozoa be deposited in the vagina, (b) that the spermatozoa remain healthy and penetrate into the uterine cavity and into the fallopian tubes, (c) that a healthy ovum be formed in the ovary, (d) that it find its way into the fallopian tube, where it can be fertilized by a spermatozoon, (e) that the fertilized ovum pass into the uterus, and (f) that it find there an endometrium suitable for its implantation and development.

Some of these conditions are not always absolutely necessary. At least five cases of conception, with labor at term, have taken place in patients where both fallopian tubes and presumably both the ovaries were removed. Of course, some ovarian tissue was left. When a tube is removed by the ordinary technique, the tube end at the uterus may reopen and permit the ovum to pass. Fritsch ligated both fallopian tubes in the middle with silk and still pregnancy followed three years later. Ashton and also Roblee reported the occurrence of pregnancy in the cervix following the removal of the body of the uterus for fibromyomata, showing that even the body of the uterus was not absolutely essential to pregnancy. Again, pregnancy has occurred in cases where penetration of the male organ into the vagina was impossible, showing that the spermatozoa may pass from the external genitals up to the uterus. But these are all very exceptional cases. Ordinarily each of the conditions mentioned is a bar to pregnancy.

Assuming that the husband furnishes healthy spermatozoa, the sterility may be due to the following causes:

1. Some Conditions Interfering With Coitus.—Intact hymen, vaginismus, male impotence, or deformity.

2. Laceration of Pelvic Floor.—When there has been a marked laceration, the vagina may be so relaxed and patulous that the semen is not retained in contact with the cervix long enough for the spermatozoa to pass up into the uterine cavity.

3. Vaginitis or Profuse Discharge in the Vagina.—Either of these conditions may interfere chemically with the vitality of the spermatozoa or mechanically with their progress to, or entrance into, the cervix uteri. In either case the chance of pregnancy is diminished.

4. Cervical Conditions.—The viscosity of the cervical mucus was found by Shettles, Breckenridge and Pommerenke, and others to be related to the ability of the sperm to penetrate into the uterine cavity. This mucus should be thin, profuse, acellular, and exhibit a maximal fern pattern of crystallization, the Spinnbarkeit should be maximal, and it should be definitely alkaline. Roland has recently reviewed this subject.

Buxton and Wong have shown the infections of the cervix with *E. Coli, Str. viridans,* and hemolytic streptococci were highly spermicidal. Pin-point os and lesions of the cervical canal are occasionally factors.

5. Uterine Conditions.—Retrodisplacement may be a factor, especially when accompanied by vascular congestion and hyperemia of the uterus (as described by Taylor), or it may interfere with the entrance of the sperm into the cervix. Prolapse of course, if marked, would prevent retention of the semen.

Conditions within the cavity of the uterus favoring sterility are tumors, an inadequately prepared endometrium, and ordinary endometritis, and, as has been brought out recently by Halbrecht, Sharman, Schockaert, and others, the incidence of genital tuberculosis is much higher in sterility than was formerly realized.

6. Tubal Conditions.—Tubal conditions which interfere with migration of the sperm into the tube or the ovum's entrance into the tube or exit into the uterus are a frequent cause of sterility. Infections of the tube such as tuberculosis and gonorrhea impair its lining mucosa or, by causing adhesions, prevent its normal muscular movements. Closure of the fimbriated end prevents the entrance of the ovum and a block at the uterine end precludes the entrance of sperm. Tumors and malformation of the tubes are occasionally etiologic factors. Interference with peristalsis, ciliary action, or gross tubal movements may impede entrance and transport of the ovum.

7. Ovarian Conditions.—Displacement of the ovary may prevent its migration into the tube. Infections resulting in a thickened capsule or cystic ovaries, as are present in the Stein-Leventhal syndrome, may prevent ovulation. Tumors of the ovary and endometriosis, especially the latter, result in a high incidence of sterility.

8. Endocrine Disturbances.—Endocrine disturbances, especially those associated with an absence of ovulation and a hypoplastic uterus, comprise one of the most difficult groups to treat.

9. Psychogenic Disturbances.—These are now recognized as important etiologic factors in many gynecologic conditions. It is important to delve into any emotional conflicts that the patient has had from childhood on, for it is now known that sterility can be cured in some cases by psychiatric therapy.

10. General Causes.—Genetic aspects of sterility have been reviewed by Stern. Asdell, in a study of the "Relative Fertility of the Only Child," found that the fertility of these individuals is no different from that of the population in general, and he feels that there is no evidence that fertility is inherited.

General health may be an important factor in sterility; chronic wasting diseases, anemia, or semistarvation, impaired liver function, or obesity all affect the reproductive process. Hulme found that semistarvation caused profound deleterious changes in the semen but that these were reversible. Experimental work with vitamins E, B complex, A, C, and folic acid, as well as the minerals and trace elements have shown them to be important for the implantation and early life of the embryo. Certain toxins and drugs have been found to be harmful to the sperm and probably the ova. Collings exposed guinea pigs to sublethal doses of natural gas and found that there was a marked decrease in the number of mature follicles. Cameron used methane gas in male guinea pigs and found that even small amounts caused rapid, severe, and prolonged failure of spermatogenesis and deterioration of the germinal epithelium. It is known that tobacco smoke blown on a slide preparation containing a semen specimen will immobilize the sperm, and Phillips reports that a similar result occurred in one of his cases, as will be mentioned later.

Plan of Investigation

It is important to have a systematic plan of investigation and treatment so that no unnecessary time will be lost in arriving at the cause of the sterility and the institution of proper treatment. Every case, however, does not need a complete workup, for many of the patients will conceive before the entire

investigation is completed, since therapy is started for various conditions as they are discovered, and some of the tests themselves have a therapeutic value. Except for a few of the tests requiring special equipment most of the workup can be done by the general physician, and he can send the patient to the specialist for those tests which he is not prepared to do. This is not true of the difficult sterility problem which can tax the diagnostic and therapeutic acumen of the experts in this field. Buxton remarks, in reference to a case which had had all known tests without discovering the cause of the sterility, that there must be factors resulting in sterility in the human female which we are unable to uncover with means available at this time; he designates these as the "X" factors.

It is important to outline the procedures to be carried out with each visit and vary them as necessary. In some cases it is not possible to do a complete workup of the husband in the gynecologist's office; this can be done by his internist or he may be referred to a genitourinary specialist who is interested in sterility.

Some of the details of the outline below have been taken from the booklet of the American Sterility Society mentioned previously.

Outline of steps to be followed in the investigation of a sterile couple:

I. History
- General
  - Wife.
  - Husband.
- Sexual
  - Wife.
  - Husband.
- Psychosomatic Evaluation.

II. Examination
- General—Wife. Husband is referred to internist or genitourinary specialist who has special interest in sterility.
- Special
  - Vaginal.
  - Laboratory Tests.

III. Huhner or postcoital test with examination of sperm.

IV. Examination of ejaculated specimen, with complete examination of sperm.

V. Gas test for tubal patency.

VI. Uterosalpingography. Fractional if indicated.

VII. Complete endocrinologic examination of husband and wife, with any special tests that are needed.

VIII. Test of treatment.

The steps of this plan are followed ordinarily in the order given. After Steps I and II the patient is given general instructions as to approximate time of ovulation, use and type of douche, best position for retention of semen. She is also placed on a preparation of vitamins, minerals, and trace elements. The additional examination methods are employed subsequently, step by step, if and when the necessity for each appears.

I. History.—The general history should follow the form outlined in Chapter 2 and should include the following points of special interest:

FAMILY HISTORY.—History of fertility, age at onset of menses and of climacteric in the grandmother, mother, and sisters. Definite endocrine disturbances in the family, familial diseases.

PAST HISTORY.—Childhood diseases, especially mumps with any subsequent complications; tuberculosis; venereal diseases. Severe infections or illnesses; heart, kidney, lung, or gastrointestinal trouble. Operations, with a statement as to what was done and whether or not x-ray or radium was used. Occupation, including hours of work and type of work. Habits, especially use of alcohol, tobacco, and drugs. Social activities, including recreation, exercise, hours of sleep. Any gain or loss of weight should be noted. History of previous tests or therapy.

MENSTRUAL HISTORY.—Age at onset, skipped periods, delayed periods, scant or profuse periods, date and character of last two periods, vaginal discharge, mental reaction with menses.

MARITAL HISTORY.—Age at marriage and ages at which children were born. Complications with pregnancy or delivery and postpartum course. Miscarriages or abortions with sequelae. Were the children breast fed and, if so, how long? When did the menses return? General health of husband, including height and weight; occupation, with hours of work, exercise, habits.

PRESENT ILLNESS.—How long has involuntary sterility existed, and is it primary or secondary? Is contraception practiced? Why? What form? How long has it been used? Has the patient any idea as to the cause of sterility? Discharge, amount and character.

The sexual history is seldom mentioned by the patient; but, by tactful questioning, she usually welcomes the opportunity of discussing the subject concerning which she had heretofore been reticent. Psychosomatic evaluation.

COITUS.—Method, frequency, pain, vaginismus; does penetration occur? Reaction: satisfaction, disgust, submission. Does semen remain in vagina or is it lost? Masturbation or other habits? Is a douche taken before or after coitus?

ENDOCRINE DISTURBANCES.—Many disturbances in the sexual life of a patient have an endocrine basis. There is much overlapping of symptoms due to the close relationship of all the endocrine glands, and it is not always possible to classify all the symptoms under one organ. A general outline of symptoms, classified under the various incretory glands, is here given.

Ovarian: Regularity of menses, amenorrhea, dysmenorrhea, metrorrhagia, scant or excessive flow, response to coitus, mental outlook, periods of well-being, or sex desire, no desire, excessive desire or nymphomania, climacteric symptoms.

Thyroid: Exophthalmos, tremor, tumor of neck, palpitation, loss of weight, excitability, slightly elevated or depressed temperature, myxedema, periods of depression, obstipation, sleepiness, gain in weight, lassitude, lack of perspiration, scalp dry, prematurely gray, thinning of outer end of eyebrows, brittle hair which falls out easily, nails brittle and striated, loss of sex desire, cold hands and feet. As the function of the thyroid affects the ovarian function, symptoms listed under ovary are usually present.

Pituitary Gland: Gain of weight, increase or decrease of sexual desire, change in menses, bitemporal headache, sleepiness, hypertrichosis, polyuria, visual disturbances.

Adrenal Gland: Asthenia, loss of weight, diarrhea, pigmentation of skin, hypertrichosis, virilism, precocity.

II. General Examination.—In the general examination give special attention to the following points:

GENERAL.—Habitus or type—masculine, feminine, neuter, infantile. Distribution of hair and fat. Development of secondary sex characteristics, bony skeleton, voice, and gait.

ENDOCRINE.—Points to be noted are classified under the different glands.

Ovary: Development of sex characteristics, size of uterus, size of clitoris, general build.

Thyroid: Size and shape of gland, consistency of gland, blood pressure, pulse, lid lag, palpebral fissure, bruit over gland, size and condition of heart, tremor of fingers, condition of skin, edema of myxedema, mental alertness, general muscle tone, texture of hair.

Pituitary: Fat distribution and weight; distribution of hair; size of jaw, hands, feet, and long bones; spacing of teeth; x-ray of sella turcica; carbohydrate test; Fröhlich's syndrome; amount of urine, glycosuria.

Adrenal: Virilism, hair distribution, pigmentation, blood pressure, blood sugar, sugar in urine.

Pelvic Examination.—The special points to be noted in the vaginal examination are: size of opening, size of clitoris, adhesions about clitoris, pain on examination. Distribution of hair (escutcheon), reaction of vaginal and cervical secretion, discharge (type). Position, size, and condition of cervix; size of os. Notice whether the cervical plug is present. Note the usual seven points about the uterus, especially position and size. Usual examination of adnexal areas.

Laboratory Tests.—There may be certain disturbances requiring one or more of the following laboratory procedures:

Complete Blood Test: R.B.C., W.B.C., differential count, Wassermann test, Rh factor.

Urinalysis.

Thyroid Tests: Basal metabolism, blood cholesterol, blood iodine, iodine uptake.

Hormone Tests (urine and blood).

X-ray: Long bones, jaw, and sella turcica where pituitary disturbance is suspected. Gastrointestinal x-ray, gall-bladder function test, or x-ray of teeth when focal infection is suspected.

Sugar Tolerance Test: Important in endocrine disturbances.

III. Simms-Huhner or Postcoital Test.—This time-honored test has, in recent years, been discarded by most workers in the field of sterility because of the admitted impossibility of being sure of the volume or the effect of the vaginal and cervical environment on the sperm. It is certainly not adequate for an accurate estimate of the male fertility, but, if done properly, it does give information on the reaction of the husband's sperm in the specific environment in which they must survive and progress, if the wife is to become pregnant. By the use of this method much has been learned concerning sperm migration and sperm survival at ovulation time. Stein and Cohen found, in studies of postcoital specimens from the cervix at ovulation time, that motile sperm recovered from the cervical mucus one to fifty-eight hours after coitus appear normal when judged by the accepted standards for motility and morphology. Other findings were that stained smears showed that the percentage of abnormal spermatozoa was much lower than for manually obtained specimens, which confirmed a similar study by Simmons also that the motility after one to fifty-eight hours was comparable to that of a freshly ejaculated specimen, and that only the normal forms retain their motility in this cervical mucus. If, in addition, the specimen is stained with the eosin-nigrosin stain, as described by Blom in cattle and Williams and Pollak in the human being, it provides a valuable screening test for the average clinician and gives him a lead as to whether the next step in the investigation should be further tests on the wife or complete evaluation of the husband's semen.

In planning the test the patient should be instructed to have coitus at the expected time of ovulation after five days of abstinence and to stay on her back with the hips elevated for half an hour after coitus. No douche is taken and the patient reports to the office within six hours. Methods of estimating the time of ovulation are discussed later.

EXAMINATION.—A dry speculum is inserted into the vagina and with a sterile long narrow bulb syringe or pipette a drop of mucus from within the cervical canal is placed on a slide

and examined immediately under the microscope (Fig. 983). The presence of over 50 actively motile sperm per high-power field which show no abnormal morphology is, according to Sturgis, evidence that the husband is probably satisfactory. If only 10 to 15 motile sperm are found, it is evidence that there is no mechanical or chemical barrier in the cervix. When fewer than 10 sperm are found, either the husband is at fault or the time selected was wrong, or the cervical mucus is resistant to the passage of the sperm or cervicitis is present. Tests for ovulation are mentioned later, as is the technique of the eosin-nigrosin stain and its interpretation. A stain smear of the cervical mucus showing clumped leukocytes and bacteria usually indicates infection.

A drop of secretion is then obtained from the vaginal vault; if active sperm are present, it shows that the coital technique is satisfactory, and the vaginal secretion is not spermicidal.

If from this Simms-Huhner test the husband's sperm seem to be normal, investigation proceeds with the wife; but, if there is any doubt as to the quality of the semen, then a complete evaluation is indicated as per the following outline which is taken from the Sterility Society article on minimal procedures.

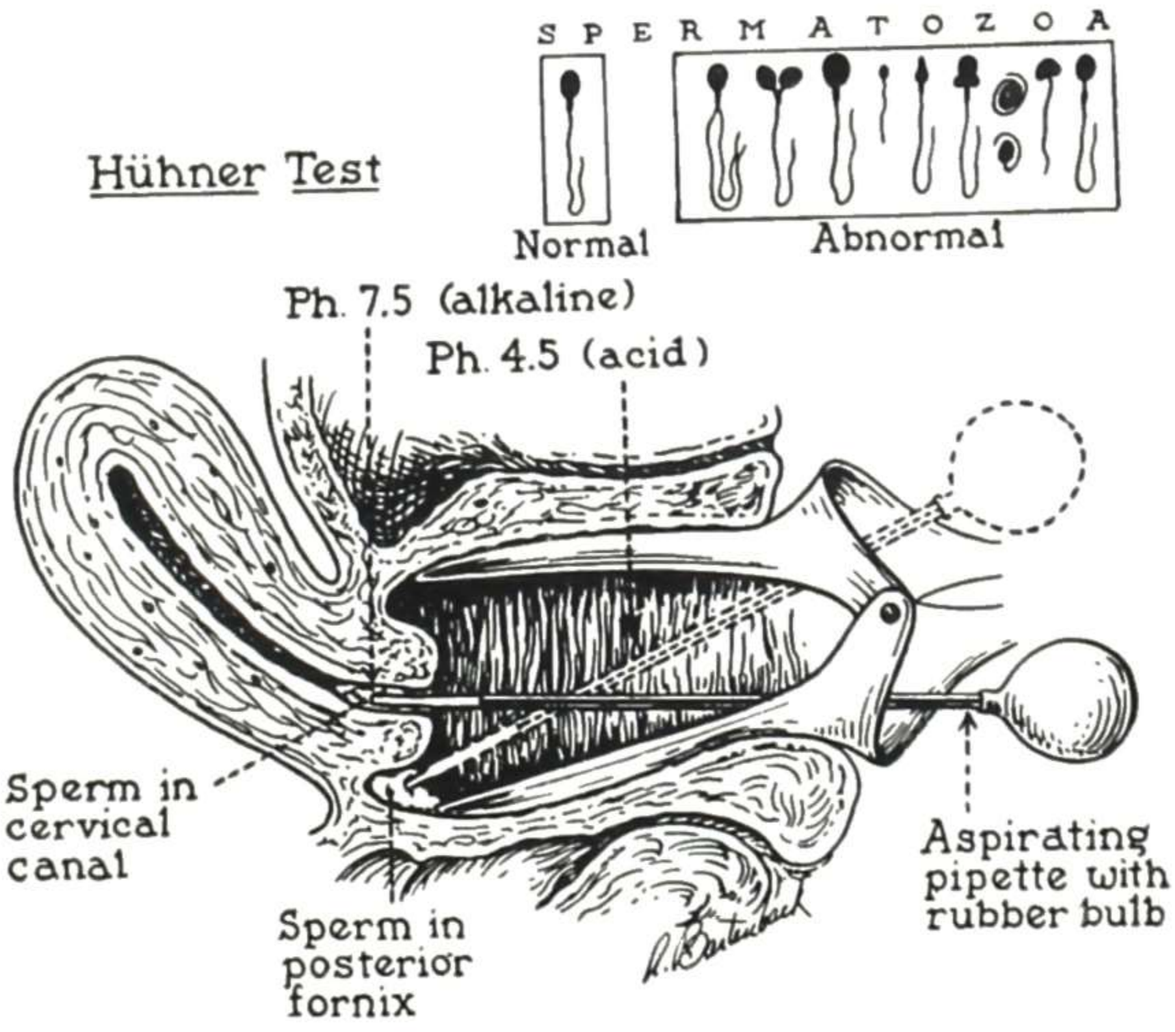

Fig. 983.—Technique of sperm-migration (Simms-Huhner) test. (From Reich: GP, June, 1950.)

IV. Evaluation of Semen.

A. Collection of specimen

I. Ninety-six or more hours since last emission.

II. Collect specimen in dry, clean, preferably sterile, wide-mouth jar by:

1. Masturbation, or if necessary,
2. Coitus interruptus.

III. Keep at room temperature or below until delivered at office within two to four hours after collection.

NOTE: A condom specimen is unreliable because:

1. Powder in which latex is rolled is spermicidal.
2. Volume determination is not accurate.

B. Examination of semen (at least two and preferably three different specimens should be studied).

I. *Liquefaction:* usually complete within 10-30 minutes.

II. *Volume:* usually 2.5-5 cc.

III. *Motility:* average findings at room temperature are:
Two hours—60-70 per cent vigorous, progressive activity;
Six to eight hours—25-40 per cent.

a. Methods of determining motility:

1. Place small drop of thoroughly mixed semen on glass slide, cover with cover slip, and seal with petrolatum. (Drop of semen should be thin enough so that light shines through to make each sperm stand out singly.)
   Estimate motility at two hours after ejaculation per high power field. Average 5-10 fields. At 500× magnification.
   Repeat examination of original semen specimen at 6 to 8 hours and at 24 hours.
2. Draw semen into fine capillary tube for about 6 cm. Seal each end with mineral oil. Examine for motility at 2, at 6-8 and at 24 hours.

IV. *Cell Count:* average normal, 60 million or more per cc., or a total of 150-200 or more million per ejaculate.
Minimal normal standards: 40 million per cc. with a total count of at least 125 million per ejaculate. (Average of counts on 2, or preferably 3 separate specimens.)

NOTE: *These values are not absolute, but only relative to the final evaluation of the couple as a single reproductive unit.*

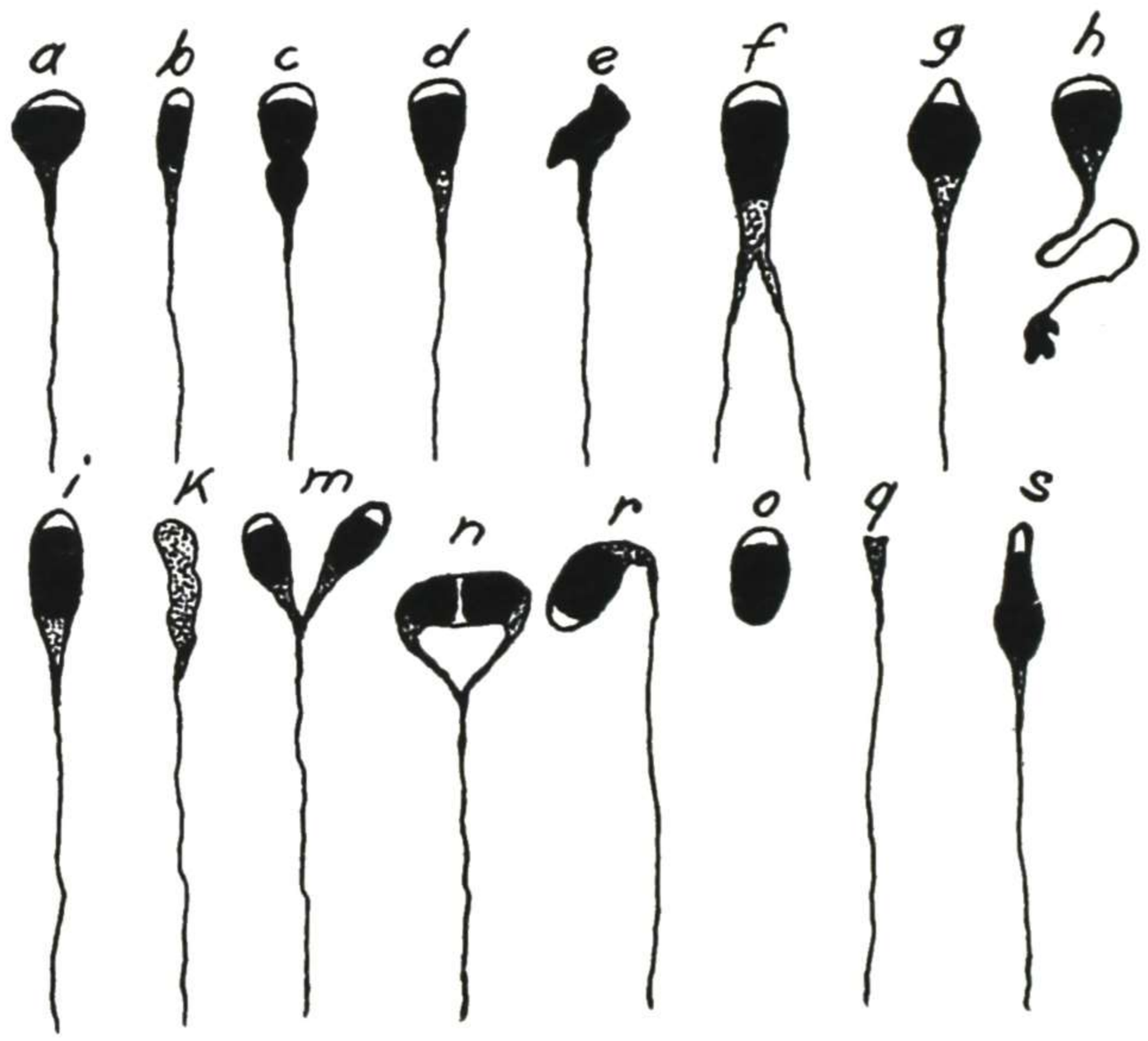

Fig. 984.—Forms of spermatozoa. Tails shown relatively shortened. *i*, Average normal sperm, the head measuring 3 by 5 microns and the tail measuring 55 microns in length; *s*, side view; *a, b, c, d, g,* variations in size of the sperm; *e* and *k,* degenerated forms; *f,* double tail; *m* and *n,* double head; *h,* a shortened tail; *o* and *q,* head broken from the tail. (From Mason: Am. J. Obst. & Gynec.)

METHODS:

a. Use white blood cell diluting pipette (after semen has liquefied and has been mixed thoroughly).

1. Draw semen up to 0.5 mark, giving final dilution of 1:20 (if count is low, draw up to 1.0 mark giving a dilution of 1:10). Carefully wipe off end of pipette with tissue.
2. Dilute with:
   a) tap water, or
   b) saturated sodium bicarbonate solution containing 1 per cent phenol or 1 per cent formalin.
   Shake vigorously for one minute.
3. Gently flood Neubauer counting chamber.

4. Under high dry power, on the center "red-blood cell" field, count sperm heads in 5 smallest blocks (as for red cell count). Since there are 16 squares per block, this makes a total of 80 smallest squares.
5. Total the count for 5 blocks of 16 squares, i.e., the 80 smallest squares. This final amount equals the count in millions per cc. (If 1:10 dilution used, divide total by 2.)
6. Repeat at least 2 or 3 times and average the counts.

b. Bulk dilution: (Often used to confirm method 1.)
1. To 0.5 cc. of semen, add 9.5 cc. of diluent. Mix. (Dilution equals 1:20.)
2. Flood counting chamber.
3. Count as above.

NOTE: *Gross estimation of sperm count at 500× magnification is absolutely inaccurate and unreliable.*

V. *Morphology:* Normal sperm heads [Fig. 984] should constitute 80 per cent of the sperm population. At least 300 sperm heads are counted.

Technic:

1. Preparation of semen smear:
   a) Place drop of semen near end of ordinary glass microscopic slide and with another slide spread the semen from one end of the first slide to the other, as is done in making a blood smear.
   b) Fix with heat.
   c) Cover film with 0.5 per cent solution of chlorozene* for 10 to 30 seconds to remove mucus overlying the spermatozoa. (This step is optional, and should be omitted if very few spermatozoa are present, since it may cause them to become loosened from the slide and lost.)
   d) Wash slide gently with water.
2. Acceptable methods of staining spermatozoa:
   a) Crystal violet-rose bengal* method (Williams)
      1) Cover film with crystal violet solution (0.25 per cent aqueous solution) for 3 to 4 minutes.
      2) Wash with water and then 95 per cent alcohol until unfixed stain has been removed.
      3) Rose Bengal* (1 per cent aqueous solution), 20 to 25 seconds.
      4) Wash with water, dry, and examine under oil immersion lens.
   b) Ziehl-Nielson carbol-fuchsin method (Williams)
      1) Carbol fuchsin, 30-60 seconds.
      2) Wash with water for 30 seconds.
      3) 95 per cent alcohol for 2-3 seconds.
      4) Wash with water.
      5) Dry.
   c) Hematoxylin, Meyer's (Kaufman):
      1) Smear, dry in air.
      2) Fix in 10 per cent formalin for 1 minute.
      3) Rinse in water.
      4) Stain 1-2 minutes with Meyer's hematoxylin.
      5) Dry. Examine under oil immersion.
   d) Other stains:
      1) Hematoxylin-eosin.
      2) Wright's stain.
      3) Wollschwarz-Sulphuric stain.

---

*Source of Reagents:
Chlorozene (Paratoluene-Sulphachloramid)—Abbott Laboratories.
Rose Bengal—National Analin Chemical, Will Corp., Rochester, N. Y.
Crystal Violet—National Analin Chemical, Will Corp., Rochester, N. Y.

VI. Miscellaneous tests—although these are comparatively new, they seem of sufficient clinical value to be included.

a. *Live-dead sperm stain* (Blom, E.: Fertil. & Steril. 1: 166, 1950; Williams and Pollak: Fertil. & Steril. 1: 178, 1950.)

1. Stock solutions:
   a) 5 per cent eosin (bluish) in distilled water.
   b) 10 per cent nigrosin in distilled water.
2. Technic:
   a) Place tiny drop of semen on glass slide.
   b) Place drop of eosin solution (about twice the size of drop of semen) on slide.
   c) Place drop of nigrosin (about twice the size of eosin drop) on slide.
   d) With glass rod, mix semen and eosin for a few seconds.
   e) Then mix this combination with nigrosin drop for a few seconds.
   f) Spread thinly over rest of glass slide with glass rod held flatwise to slide.
   g) Flame dry.
   h) Examine under oil immersion objective within 24-48 hours or stain will fade.
3. Evaluation:
   Dead sperm cells stain red.
   Live sperm cells (at time of mixing) remain uncolored.

b. *Test of motility in Locke's solution* (Farris, E. J.: J. Urol. 61: 1019, 1949).

Technic

a) Using white blood cell pipette draw semen up to 0.5 mark.
b) Dilute with Locke's solution.
c) Flood Neubauer counting chamber.
d) Seal with petrolatum.
e) Count all active sperm in 5 blocks of 16 smallest squares (see routine above for sperm count).
f) Count all dead sperm in same area.
g) Total all active sperm seen in 5 blocks of 16 smallest squares.
h) Total all sperm for same area, dead and alive.
i) Percentage motility $= \frac{\text{Active sperm per cc.}}{\text{Total sperm per cc.}} \times 100.$
j) Actual number of motile sperm per ejaculate = active sperm per cc. × volume.

According to Farris, a total of 80 million moving cells in the entire ejaculate constitutes the minimal normal standard for fertility after 5 days of sexual rest.

Farris has recently timed the speed of the sperm and states that a normal sperm should progress 0.05 mm. in 0.7 to 1.2 seconds.

MacLeod, who has done extensive investigation in this field, found that a count of over 30 million should be considered the lower limit of normal instead of 60 million, the figure usually given. Normal semen contained 40 per cent of active sperm and this was found to be as important as the count. The quality of the activity was also found to be very important; normal sperm have purposeful motions causing progress in a given direction, and this motility lasts for many hours. Abnormal sperm are sluggish, change direction frequently, and swim in wide arcs.

V. Gas Test for Tubal Patency.—This test is completely discussed in Chapter 11, including indications, contraindications, and technique. Recently Rubin wrote a review of the comparison of the Rubin test and opaque media for the diagnosis of tubal patency and concluded that the latter should be reserved for those cases showing tubal obstruction on re-

peated tests. This is the plan we have long used and it is the generally accepted plan of investigation, though recently some have advocated skipping the Rubin test and using hysterosalpingography in all cases.

VI. Uterosalpingography.—When the gas test shows the tubes to be obstructed, the exact location of the block can be determined by hysterosalpingography. The test is fully discussed in Chapter 11.

VII. Endocrine Investigation.—If there is any doubt concerning the adequacy of the husband's sperm, he should be referred for a complete general examination.

The endocrine investigation in the wife is concerned with thyroid function, ovulation, blood and urine hormone levels, and other tests when indicated.

a. *Thyroid:* Basal metabolism tests, at least two, halfway between the periods. Blood cholesterol should be below 240 mg. per 100 c.c. blood. Blood iodine and iodine uptake may be indicated in special cases.

b. *Ovulation:* Premenstrual biopsy is, according to the survey made by Sturgis and Pommerenke, the most reliable method of determining whether ovulation has occurred. It should be remembered that findings apply only to the cycle investigated. Noyes, Hertig, and Rock felt that much could be learned about the quantitative progesterone effect as well as ovulation by a careful study of the endometrium obtained. Most men prefer to take the biopsy on the first day of the menses so as to preclude the possibility of interrupting an unsuspected pregnancy. Albert and Mezzer use the desquamated endometrial tissue which is caught in a rubber cup.

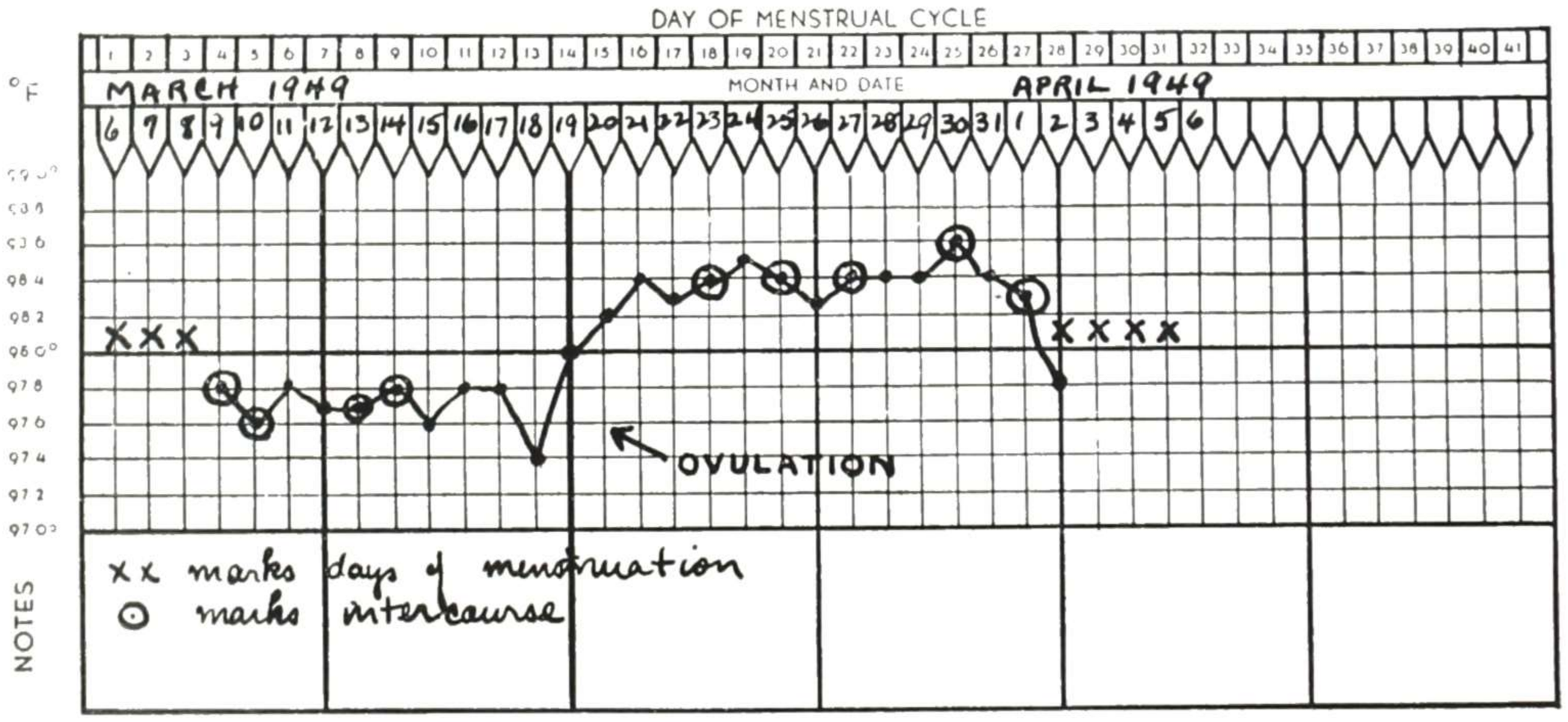

Fig. 985.—Basal temperature chart. Instructions are included with the charts. (Basal temperature graph originated by Pendleton Tompkins, M.D. Distributed by The Artcraft Press, San Francisco, Calif.)

Daily vaginal smears properly stained and examined by someone familiar with their interpretation furnish a very accurate method of determining the exact day of ovulation. These smears also enable one to estimate the degree of estrogen and progesterone stimulation (Fig. 103).

Basal body temperature with its biphasic curve was recommended as an index of ovulation by Zuck and Duncan and later by Rubenstein and since then has been extensively used (Fig. 985). Israel and Schneller felt that the biphasic curve was due to the rhythmic production of estrogen and progesterone and that the progesterone was thermogenic, causing the higher rise in the latter half of the cycle, but Whitelaw after a thorough investigation concluded that the thermal shift could not be adequately explained on the thermogenic properties of progesterone, and hence there was some doubt as to the accuracy of this method. Siegler and Siegler, in an analysis of 1,012 basal body temperature readings in 202 patients, concluded that it was of very limited value. When this curve is pronounced and definite, it is of great value, and ovulation probably occurs while the temperature is falling. Unfortunately many

patients show curves which defy interpretation, and, as Buxton and Engle concluded, the curve is only valuable when one has a clear understanding of its limitations.

Culdoscopy and culdotomy have been used. Decker observed the tuboovarian mechanism of ovum reception by culdoscopy. A similar study with somewhat different conclusions was done through a window in the cul-de-sac by Doyle.

c. Endocrine and urine studies are occasionally helpful. When facilities are available, the urinary pregnanediol determination in the last half of the cycle is an aid in determining ovulation. In some cases estimation of the secretion of the various pituitary hormones is helpful in determining endocrine function.

VIII. Test of Treatment.—In some cases it is not possible to discover the exact etiology of the sterility, and in these general treatment plus thyroid and cyclic therapy with estrogen and progesterone should be employed.

Treatment

The treatment may be divided into the general treatment, which all sterility patients are to be given, and the special treatment for special indications.

General Treatment.—General dietary instructions are given with the purpose of getting the patient back to normal weight. The diet should be well balanced as to proteins, fats, and carbohydrates, and, to ensure the patient getting enough vitamins, minerals, and trace elements, a capsule containing the optimum daily dose of these should be given. If the blood count is low, extra iron is given in the form of ferrous sulfate. If the patient is fat or sedentary, exercise each day is prescribed. If the patient is using up most of her energy working, a rest of an hour each day is advised, with a vacation if possible. A vacation is of decided benefit in cases where social responsibilities, with late hours, etc., are undermining the patient's general health. Tight-fitting shorts, especially if made of nylon or other goods which tend to raise the local temperature, should be avoided in the male as it has been shown that heat has a deleterious effect on sperm production. Alcohol and tobacco should be limited or prohibited, as experimental work has shown them to be definitely detrimental to fertility. This limitation applies to the husband as well as to the wife. Dr. Lyle Phillips of Honolulu, in a personal communication, reports an interesting case of sterility due to excessive cigarette smoking by the husband. The Huhner test showed normal-appearing spermatozoa and in normal number, but there was no motility. The test tube specimen gave similar findings. On discontinuing smoking, the spermatozoa became normal and the wife conceived. The test was carried out several times, and each time that the husband smoked heavily the spermatozoa became immotile, and after a few weeks of abstinence they would regain normal motility.

The sex relations should be discussed and any particular problem that relates to the individual case should be explained. The need for sexual rest with coitus confined to ovulation time should be explained and separate beds should be used if necessary. At this point psychosomatic problems probably will be brought out in the discussion, and advice can be given.

If the semen is not retained, the patient should have several pillows under the hips during coitus, or if a retrodisplacement is present, the knee-chest position after coitus will throw the cervix into the seminal pool. A precoitus alkaline douche of a tablespoon of baking soda to two quarts of water, or the Ringer-glucose douche, as advised by MacLeod and Hotchkiss, should be used; one called "Pro-Ception" (Milex) is a good commercial product.

If general instructions as to the ovulation date are not adequate, the patient is instructed on the use of the temperature chart, as shown in Fig. 985, and vaginal smears should be done so as to determine, if possible, the exact day of ovulation.

Special Treatment.—

ENDOCRINE THERAPY.—When there is a need for thyroid, it is usually given as desiccated thyroid extract. In cases that do not respond to this, Brown and Bradbury noted that the patient who did not respond to 2 to 4 grains of thyroid responded promptly to intravenous thyroxine 0.4 mg. every other day. In these patients they noted an achlorhydria which they felt might be a factor in the poor utilization of the desiccated thyroid. Abarbanel obtained similar results by giving 0.25 to 0.5 mg. thyroxine orally every day, and the clinical response occurred within three months.

The incidence of anovulatory sterility varies from 9 per cent, reported by Rock et al. in an unselected group of sterility cases, to 30 per cent reported by Mazer and Israel in a group of women in whom no apparent cause for the sterility could be found. In a recent investigation by Wong, Engle, and Buxton 52 per cent were continuously anovulatory while under investigation, and the remainder were periodically so. One-third of these patients had a normal menstrual history, and the rest (except for one) had a history of oligomenorrhea or amenorrhea; the one case had menorrhagia.

In nonovulating women there is no treatment which will give consistently good results. Imitating the normal endocrine cycle, using estrogen followed by progesterone plus pregnant mares' serum prior to ovulation and the urinary gonadotrophins has given good results in some series. One drawback to the use of the gonadotrophins from animal sources is the formation of antihormones which not only inactivate the administered hormone but may prevent the activity of the patient's own gonadotrophins. Jungck and Brown have found that the use of specially prepared human pituitary gonadotrophin does not cause such a reaction though its success in causing ovulation has not been proved. Kurland treated a group of 12 women with proved anovulatory cycle with 50 Cartland-Nelson units of Gonadogen intramuscularly on the first, third, and fifth day after the end of the menses. In this group four women conceived and delivered at term. The details of cyclic therapy have been given in detail under Amenorrhea, as well as the treatment of the case with a small uterus. At the 1952 meeting of the American Society for the Study of Sterility, Seegar Jones and her associates reported on the use of cortisone in cases of ovarian follicular defects, with good results in the few cases treated. Fifty milligrams were given daily intramuscularly or 12.5 mg. twice daily, and after a week the dose was halved. She emphasized the dangers with this type of therapy and also that hers was only a preliminary report. Cases with the Stein-Leventhal syndrome and sterility have been discussed under Amenorrhea.

RADIATION.—The use of radiation in amenorrhea and sterility, first suggested by Rubin, is based upon the work of Halberstaedter in 1905, who demonstrated that x-rays have a selective action upon the ovaries. Since 1931

Kaplan has several times reported series of cases so treated, and the following is taken from his most recent report:

"Over the course of 23 years a total of 402 married women have been treated by me for amenorrhea and sterility. Of these 95 were not traced, 64 failed to respond to treatment, and 242 were cured of amenorrhea. Of these 120 became pregnant, 98 went to term (22 more than once). These patients gave birth to 125 normal living children, 58 boys and 67 girls. There was one set of twin girls. . . .

"There were 32 pregnancies following irradiation, without living children. Of these 24 miscarried (several a number of times), and of these 10 subsequently gave birth to normal children. There were 2 ectopic pregnancies. One patient had a stillbirth and 3 had normal births with the children dying a few hours after birth. There was 1 abnormal child and 1 case therapeutically aborted. Two cases were treated with two courses of roentgen therapy and both gave birth to a second child. Two women who did not respond adopted babies and one of these is now pregnant. There are 8 cases at present still pregnant.

"The case which was therapeutically aborted evidently was pregnant as soon as treatment was started and as soon as this fact was noted the 5-week pregnancy was interrupted because I could not assure the parents-to-be of a normal child. In this case of incipient pregnancy I was not sure that even the small dose used for stimulation might not have been sufficient potency to damage this very early embryo, and because of the one case of abnormality previously reported by me in 1932, I deemed it advisable to interrupt the pregnancy."

The technique of radiation therapy and precautions in its use have been given under treatment of amenorrhea. The numerous encouraging results with this therapy certainly recommend its use in the resistant case. An excellent summary of dangers, technique, and results, and a poll of 410 gynecologists are given in an article by Collins.

The importance of emotional and psychosomatic factors in gynecology has been discussed under other conditions in the early part of this section on functional diseases; recently Marsh and Vollmer discussed the psychosomatic aspects of infertility, and Rubenstein in another article evaluated the emotional factor. The results with this form of therapy in certain cases are remarkable and it should certainly receive more consideration by the profession as a whole and gynecologists in particular.

Special Treatment of Lesions.—The special treatment required depends on the particular lesions found.

VAGINISMUS.—In some cases this is due to fear or to some inhibition carried over from childhood experience or teachings. In these cases a frank explanation of the natural instinct for coitus will do much to remove mental obstacles. Any stenosis or other congenital abnormality, such as double vagina or septate vagina, should be corrected. If intercourse is painful with a good-sized opening, free use of a lumbricating jelly should be advised; and, if still painful, the cause of the pain must be determined and corrected. If the condition is due to a small opening or a rigid hymen, this should be stretched gradually; and, if this is unsuccessful, a plastic operation may be done to enlarge the opening.

VAGINITIS.—Usually all that is needed is adjustment of the pH of the vagina with douches of 0.5 per cent lactic acid or a tablespoon of white vinegar to two quarts of water, occasionally supplemented, if necessary, with an acid jelly or vaginal insert. If definite infection is present, sulfonamide or antibiotic therapy locally is needed.

CERVICITIS.—Linear cautery treatment combined with sulfonamide or antibiotic therapy is usually adequate, but in extensive cervicitis conization is indicated. Some workers in this field advise against active treatment such as this, but in over a thousand cases of conization we found this therapy, when indicated, beneficial in relieving sterility. Cases of simple erosion are relieved with estrogenic therapy.

Stenosis of the Internal Os.—If this condition is mild, office dilatations usually suffice. If, however, the condition persists in spite of these treatments, thorough dilatation and insertion of a stem pessary are indicated. If the trouble returns in a short time, the Dudley operation will usually give permanent relief from the obstructive feature.

The beneficial effect of cervix dilatation in sterility cases may be due as much to reflex stimulation of pituitary function as to overcoming stenosis. Birnberg found a positive prolan response in the urine in 23 out of 30 sterile women in thirty hours following gradual dilatation of the cervix. All had had negative response before the dilatation. Those showing prolan response, later conceived. Birnberg feels that the beneficial action of the dilatation is due to stimulation of the pituitary gland by way of the sympathetic nerve pathway.

Endometrial Conditions.—Hyperplasia of the endometrium with excess menstrual flow may be present. Occasionally, chronic cervicitis is accompanied with a chronic metritis. In either case, curettage is beneficial in that it removes the diseased endometrium, giving a chance for a better one to develop under bettered conditions. Curettage is a stimulant to the uterine circulation and nutrition, and for that reason is indicated in sterility cases which resist other measures. Also, if simple dilatation of the cervix causes reflex stimulation of the pituitary function, curettage would probably have a more pronounced effect in that direction. The use of progesterone in hyperplasia has been discussed under anovulatory bleeding, and the dosage schedule is the same. Treatment of tuberculosis of the endometrium has been discussed under this topic.

Displacements of the Uterus.—Anteflexion of the uterus requires the treatment outlined under Stenosis of the Internal Os. Retrodisplacement, though not as important as formerly supposed, if marked, may cause sterility. Pessary treatment should be tried, combined with the knee-chest posture. If this proves unsuccessful and a study of conditions shows operation necessary, care should be taken to select the type of operation best suited to the individual case.

Prolapse during the childbearing period can be effectively corrected either by vaginal or by abdominal operation in such a way that it does not interfere seriously with delivery. Any anomaly of the uterus should be corrected.

Closed Tubes.—If the gas test shows the tubes closed, the sites of closure should be determined by Lipiodol visualization and the conditions carefully studied before resorting to any operative procedure. In the best hands salpingostomy is successful in only 10 per cent of the cases, and in the successful cases there is a high percentage of abortions and ectopic pregnancies.

The therapeutic value of repetitive Lipiodol tubal insufflations has been emphasized by Rutherford, and recently Weir and Weir have felt that the therapeutic value of the procedure outweighs its dangers. Garrett believes that the factor responsible for the good results is the action of the iodides in lowering the viscosity of the mucus and resolving the scar tissue. He gave three patients with occluded tubes syrup of hydriodic acid for several weeks and then repeated the Rubin test with the result that the tubes were easily opened in two of these patients. He cautions against using this in patients who have had tuberculosis.

An interesting report was made by Grant and Markey of Australia at the meeting of The American Society for the Study of Sterility in 1947. They were able to establish patency in 39 of 96 patients with blocked tubes by the following technique: (1) Two CO_2 insufflations were done, raising the pressure to 250 mm. Hg. (2) An injection of iodized oil was then made at pressure 250 to 300 mm. Hg. (3) Pelvic diathermy and estrogens were given as supplementary treatment. Fifteen of the thirty-nine patients who had the tubes opened became pregnant, but two of these were ectopic gestations.

These results, when compared with those of operation, warrant a trial of this method, but I feel that, when using pressure as high as these, the test should be done in the the hospital and one should be prepared for immediate laparotomy in case of a ruptured tube. The method should be helpful in conjunction with laparotomy as a means of locating the block, and possibly the tube could be opened by manipulation with incision, if needed.

Decker advocates culdoscopy under saddle block anesthesia with observation of the tube during insufflation up to 300 mm. Hg pressure; the gas pressure is raised slowly with observa-

tion at different pressure levels so as to determine the location of the block. By manipulating the tube with the hand over the suprapubic area or with the operative culdoscopy, peritubal adhesions are released and the abdominal ostium may be opened. A sterile solution of indigo carmine may be injected to confirm tubal patency.

The operative procedures for occluded tubes is discussed in our book on *Operative Gynecology*. Several excellent articles on the subject have appeared in the recent literature. Carter et al. obtained success in 13.6 per cent of 22 cases in which salpingostomy was done. Variations in technique include use of a cannula by D'Ingianni and Fontenelle (38 per cent of 13 patients became pregnant); linear incision by Israel; polyethylene tubing to bridge gap, or splint tube used in animals by Castallo and in human beings by Hellman; reimplantation of tubes by White. Greenhill, in a national survey of the results of 818 tubal plastic operations, found that 6.6 per cent of the patients became pregnant, but it is hoped that with new methods plus the use of antibiotics the results in the future will improve.

Ovarian Lesions.—Large cysts should be removed. When the outer portion of the ovary is thickened by an old inflammatory process which prevents ovulation, peeling off of the superficial layer so that the follicles can rupture may render the patient fertile. The authors had a striking case of this kind. Treatment of the Stein-Leventhal syndrome has been given under Amenorrhea.

Male Infertility.—Much has been added to our knowledge of the anatomy of the sperm through the use of the electron microscope (Schnall) as well as the physiology of the sperm and its reaction in various environments. Unfortunately the use of gonadotrophins in the treatment of azospermia has not come up to expectations (Tyler; Weisman; Jungck and Brown). A method which does offer real hope was introduced by Heller and his associates. It is the spermatogenic rebound which follows suppression of spermatogenesis by testosterone propionate. More recent reports by Heckel and associates, in 1951 and 1952, confirm the value of this treatment. The following general therapy advised by Simmons is taken from his article:

"*First:* Encourage the individual to go into strict training such as all college athletes are expected to practice: regular sleep, regular exercise, abstinence from tobacco, alcohol, carbonated beverages, caffeine, and sexual excesses.

"*Second:* Maintain adequate nutrition by high protein diet with avoidance of fat-forming materials in excess, and with attention to vitamin assimilation.

"*Third:* The judicious use of thyroid extract in adequate amounts, three grains daily, closely supervised for an adequate time. This may be a year or more.

"*Fourth:* Regular exercise which may consist of at least thirty minutes walking per day exclusive of one's occupation, rain or shine.

"*Fifth:* Adequate vacation with freedom from responsibilities both business and extracurricular (such as time devoted to Societies, Clubs, fund raising drives, and philanthropic committees).

"*Sixth:* The adjustment of the local thermal environment by discarding close fitting clothing and excessive bed coverings, correcting faulty habits, and avoiding occupational or environmental hazards.

"*Seventh:* In a few, a very few, carefully studied and selected cases, the controlled administration of gonadotrophins or testosterone or both—a strictly experimental procedure. We have grown sperm for men who have had none, and we have caused growth of tubular epithelium of proved eunuchoid males with hormones. We have corrected oligospermia by excision of varioceles. I emphasize that these cases are very rare.

"*Eighth:* The surgical correction of infertility is a highly specialized subject of too technical a nature to elaborate upon here.

"If the medical profession will realize that many husbands can be benefited by such detailed attention instead of assuming that 'not much can be done for male sterility anyway,' many problems of infertility can be solved."

Glass and Russell feel that an intensive nutritional-liver regimen renders the germinal epithelium more responsive to endogenous and exogenous testosterone. A preliminary report by Abarbanel on the use of pregnenolone in seminal inadequacy is encouraging.

The operative correction of sterility is left for books on urology; an excellent summary can be found in an article by Michelson (see References).

Artificial Insemination

In a case where the healthy spermatozoa fail to reach the uterine cavity in spite of the various treatment measures, artificial insemination may be employed. Careful precautions must be taken to avoid contamination of the semen that might lead to infection inside the uterus. Also, care must be exercised to avoid interfering with the vitality of the implanted spermatozoa.

The usual method of insemination is to lavage the vaginal tract with alkaline solution similar to that advised for precoital douche. Of the available means of selecting the day

Fig. 986.—The cervical cap properly fitted to the cervix. (From Grody, Robinson, and Masters: J. A. M. A., May 31, 1952.)

of ovulation the vaginal smear is the most accurate. The ejaculate, after five days of continence, is obtained by manual expression into a sterile container. A drop of this semen is placed just within the cervix and the remainder in the vaginal vault and the patient is left in the modified Trendelenburg position for thirty minutes. Some physicians sound the cervix prior to instillation both to ensure a patent canal and in the hope of initiating ovulation.

When the husband's sperm count is low, the sperm are concentrated after the method of Hanson and Rock or by the plastic cervical cap method of Whitelaw. The method described by the former is as follows:

"The ejaculate was pipetted into a centrifuge tube and the volume brought to 10 cc. with sterile Locke's solution. After being mixed, the suspension was centrifuged for fifteen minutes at 3500 r.p.m. The supernatant fluid was then decanted, and to the firm white sediment was added Locke's solution, again to a volume of 10 cc. The sediment was diffused in the medium by gently drawing the former in and out of a pipette. Centrifugation and decantation were repeated, and then to the washed sediment was added Locke's solution to a volume of 1 cc. Usually a hanging drop was then examined."

Whitelaw's method, as shown in Fig. 986, consists in placing the ejaculate in the cap and then placing the cap over the cervix with a rotary motion so that it stays in place by suction; or the cap may be placed first, then filled with ejaculate by means of a syringe and needle. The cap is left in place for six to twenty-four hours. A recent report by Grody et al. confirms the value of this procedure. In cattle Easterbrooks found that mixing the semen with dihydrostreptomycin sulfate enhanced its efficiency.

In cases in which azoospermia was due to obstruction, Adler and Makris inseminated the wife successfully with macerated testicular tissue from the husband.

In cases where the husband has no sperm and treatment is of no avail, the question of artificial insemination with selected semen arises. In some cases the partners of the sterile union are anxious to have the child at least partly theirs rather than adopting one of doubtful parentage. The donor is selected by the physician after a most careful history and physical tests, including, of course, blood tests. It is well to use two donors, so that no one can possibly know who is the father of the child. The actual procedure must be done at the supposed time of ovulation and under rigid aseptic technique.

Guttmacher et al. made a survey of the current practice of artificial insemination in 1950. The sociological and psychological aspects are discussed in articles by Lamson et al. and by Jørgen Løvset, and the procedure as it relates to the female is discussed by Shields. The medicolegal aspects of artificial insemination are completely reviewed in an article given under the auspices of the Bureau of Legal Medicine and Legislation of the American Medical Association.

In 1941 Seymor and Koerner, in a survey of cases treated by artificial insemination, found that, of the 10,604 cases, 9,000 attained motherhood by this method. Of the 10,000 pregnancies obtained, two-thirds were through the use of the husband's semen alone. Guttmacher found in his survey that the likelihood of pregnancy resulting from donor insemination was in the order of 50 to 60 per cent and that the average successful case required three to six treatments over a period of two to four months. The need of standardization of donors is emphasized in an article by Russell.

When all means of correcting the sterility fail, adoption is suggested, and, as mentioned, this will occasionally result in pregnancy through some as yet little understood psychosomatic effect on the barren couple.

CONTRACEPTION

In cases needing contraceptive advice, the question arises as to what method to advise. In the extensive experience of the large clinics of the country the contraceptive diaphragm and the contraceptive jelly have given the best results, from both the standpoint of safety and of satisfactory response.

The size of diaphragm to be used is determined by trying the various sizes of measuring rings. The largest one that fits snugly when the posterior

rim is in the posterior fornix is the one to use. The patient should be instructed in the use of the diaphragm, and it is best to have her insert it and remove it, so that there is no doubt as to her knowledge of its use, because to be successful the method must be correctly used. Council accepted products are found in New and Nonofficial Remedies.

In cases of retrodisplacement, an inserter is sometimes needed to enable the patient to get the inner end of the diaphragm across and behind the cervix. In cases of cystocele, the matrisalus type of diaphragm must be used.

The patient is instructed to use the contraceptive jelly around the rim of the diaphragm, and also to place some on the cervical surface of the diaphragm.

A condom used by the husband in combination with a contraceptive jelly used by the wife is also very successful but not quite as convenient as the diaphragm method.

Catholic patients who do not wish the diaphragm or condom method may be instructed in the use of the "safe period," but it should be explained that this method is only relatively safe. Ogino and Knaus have shown that eight days after the onset of the period and eight days before the onset of the next period are relatively safe in women with regular twenty-eight day cycles.

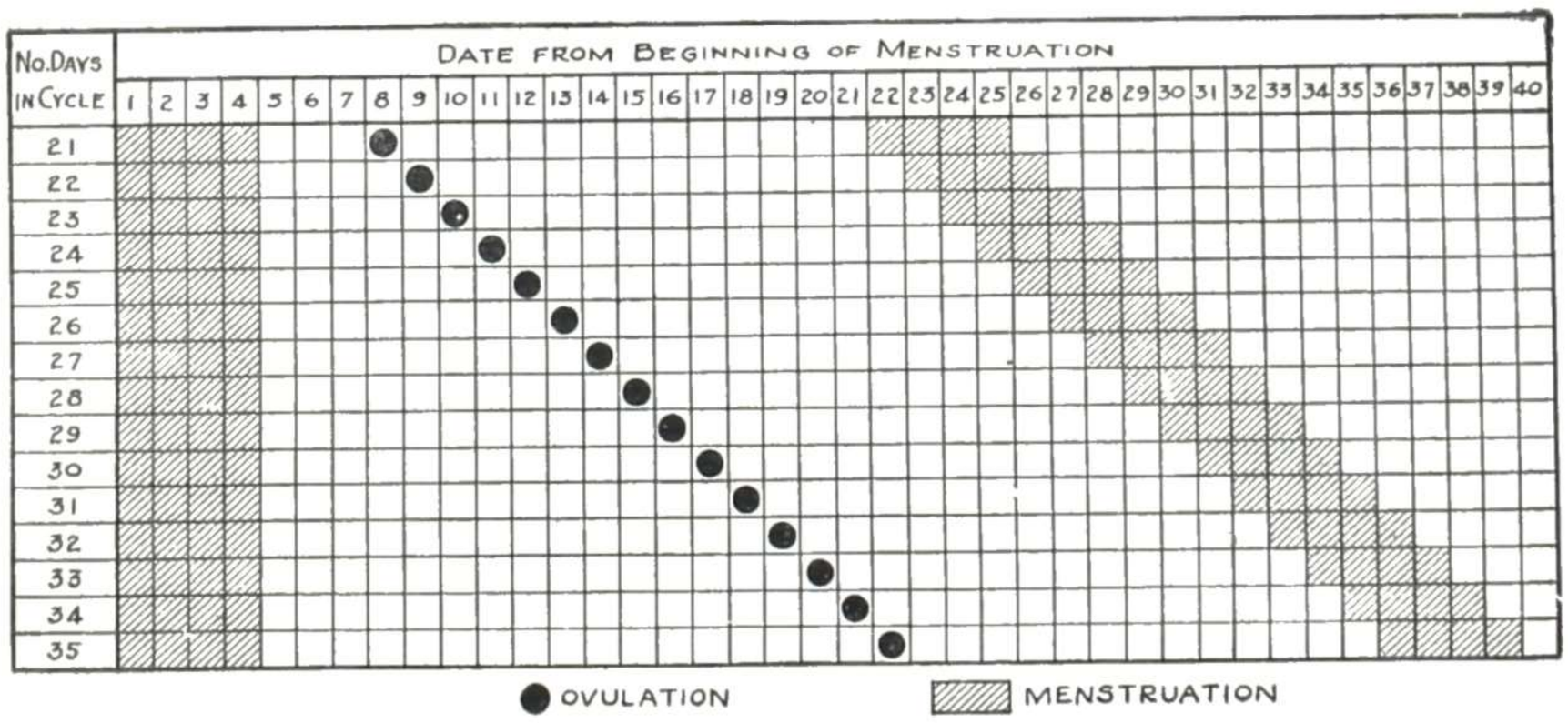

Fig. 987.—Ovulation date for various cycles. (From Miller: Surg., Gynec. & Obst. *56*: 723, 1938.)

The "safe period" varies with the type of the menstrual cycle. The details of these variations in relation to sterility and contraception are helpfully discussed by A. G. Miller and are shown in Fig. 987.

Tietze et al., in an article on the effectiveness of the rhythm method, concluded that it is satisfactory as a method, but only if rigidly followed. Rubin in 1946 called attention to the fact that contraceptives used for varying lengths of time after marriage may mask sterility and infertility. Tietze et al. tabulated the time required for conception in 1,727 planned pregnancies and found that 30 per cent conceived within one month after discontinuing contraceptives and 90 per cent conceived within one year.

STERILIZATION

In certain cases there are serious medical conditions which contraindicate pregnancy. In these, sterilization may be indicated. The first question to be decided in these cases is which of the partners should be sterilized. The operation in the male (ligation of the vas deferens) can be done under local

anesthesia with little risk to the patient. The effective methods in the woman require either an abdominal operation or extensive vaginal work with entrance to the abdominal cavity, and either of these procedures carries considerable risk, to say nothing of the discomfort and disability they cause. These questions and the problems of future events should all be discussed with the patient and her husband, and the method which applies best in the particular case should be selected.

A complete review of the entire subject, *Human Sterilization,* is presented in a pamphlet by Dickinson and Gamble (Waverly Press, Inc.) and it may be obtained through the Planned Parenthood Federation of America. Pearse and Ott, in a review of the subject, conclude that sterilization and therapeutic abortion should be under hospital control. Gamble gives a review by States of the incidence of eugenic sterilization for 1950.

DYSPAREUNIA

The two principal disturbances of sexual intercourse are dyspareunia (difficulty in coitus) and sexual impotence (absence of sexual orgasm in coitus).

Difficulty in coitus (dyspareunia) varies from a slight discomfort, hardly noticeable, to pain so severe as to make coitus unbearable.

Causes

The more common causes of dyspareunia are as follows:

1. Some Obstructions to Normal Coitus.—A. Imperforate Hymen.—In such a case there would be present the history of amenorrhea and also the disturbances that come from retained menstrual blood. You may think there would be a history of no coitus, and such is usually the case, but in some cases coitus has taken place through some adjacent opening—for example, through a dilated urethra.

B. Organic Stenosis of Vaginal Orifice.—The opening is large enough to permit the regular escape of menstrual blood, but it is not large enough to permit coitus. The obstructing tissue is so firm that it does not rupture as ordinarily on attempted coitus. This obstruction may be due to a very strong, firm hymen, or to some distinct malformation, such as a vaginal septum from double vagina. Usually with double vagina, each vagina is large enough for coitus or the septum is placed so far to one side that it does not interfere. But it may be so placed as to interfere decidedly with coitus and to require division. Again, an organic stenosis here may be due to scar tissue from severe burn or other injury, or from laceration in labor, with extensive scar tissue formation, or from vaginitis in childbirth.

C. Spasmodic Stenosis at Vaginal Orifice.—In some cases there is marked hyperesthesia about the vaginal orifice, and every attempt at coitus causes unbearable pain or causes spasmodic contraction of adjacent muscles to such spasm, but just pain, so severe that coitus is impossible. This may be due to inflammation, such as vulvitis or vaginitis, or it may be due to sensitive abrasions about the vaginal entrance. In other cases it is due to that peculiar condition known as "vaginismus," a reflex contraction of the levator ani and

adjacent muscles without apparent cause. In exceptional cases this is so severe and persistent as to prevent coitus altogether.

D. Severe Pain on Attempted Intercourse.—There is no stenosis or spasm, but just pain, so severe that coitus is impossible. This may be due to inflammation about the external genitals or inflammation within the pelvis.

2. Simple Inflamed Abrasions About the Vulva.—Abrasions are a not infrequent cause of much suffering immediately after marriage. The small abrasions that naturally accompany rupture of the hymen at the first intercourse may become inflamed after a day or two, making subsequent coitus painful. This sometimes causes much alarm to the patient and her husband, who fear some serious trouble. The treatment is abstinence from coitus for a few days, with the frequent use of some mild antiseptic wash, followed by drying with absorbent cotton and the use of a soothing ointment, such as white petrolatum. It is well to keep the parts covered with a pad of absorbent cotton, to keep the clothing from contact with the painful areas and also to protect the abrasions from infection.

3. Venereal Sores (Chancroid, Syphilitic).—These ulcers also may be found soon after marriage or at any other time. Care should always be taken not to give a positive prognosis in a case of abrasion or sore which has not yet had time to develop its characteristics.

4. Gonorrheal Inflammation.—This is an altogether too common cause of painful coitus in the first few weeks following marriage. The pain may be due to the vulvar inflammation, or to the urethritis or to the vaginitis, or to painful abrasions or to the inflammation of the vulvovaginal gland of one or both sides.

5. Other Forms of Inflammation of vulva or vagina, or vulvovaginal glands.

6. Inflammatory Lesions Around the Uterus.—In these cases pain is caused by the impact of the male organ or by the sexual congestion. When the ovary is prolapsed into the cul-de-sac and bound there by adhesions, sexual intercourse may cause much pain. Dr. H. S. Crossen recalled one patient in whom it was finally necessary to open the abdomen, break up the adhesions, and fasten up the prolapsed ovary in order to relieve the suffering in coitus. In the more serious pelvic inflammatory conditions, dyspareunia is frequently a prominent symptom.

7. Retrodisplacement of the Uterus, With Inflammation.—It is surprising how much displacement of the uterus, with forward projection of the cervix and apparent blocking of the vagina, can take place without occasioning any particular disturbance in coitus. But if inflammation appears, then dyspareunia is often marked—much more so than from the same amount of inflammation without displacement.

8. Bladder or Rectal Diseases.—These diseases occasionally cause painful coitus, particularly inflammatory diseases. Condom urethritis is a common cause of dyspareunia and it is caused by irritation from powder from the condom being worked into the meatus during coitus.

9. Psychosomatic Causes.—The psychosomatic causes of dyspareunia are many and varied and, as has been mentioned frequently in these chapters on

functional diseases in gynecology, investigation of this phase of the patient's life is vitally important. The training of the child in her early life and emotional or psychic shocks sustained during her life are all important. For complete discussion of this and related subjects, the reader is referred to an article by Knight and one by Kroger (see References).

Treatment

The treatment of dyspareunia is indicated by the **particular condition present,** as determined by a careful examination.

1. If there is some **malformation** about the vaginal orifice (imperforate hymen, thick hymen, septum in vagina, organic stenosis of vagina), the obstruction must be removed by the necessary operative measures.

2. If coitus is interfered with by **tender areas** about the vaginal entrance, or by ulcers or by hyperesthesia, the following measures may be employed:

a. Abstinence from sexual intercourse for from one to three weeks.

b. Hot vaginal douches once or twice daily—medicated or unmedicated, depending upon the presence of discharge.

c. Laxatives as needed. Chronic constipation increases the congestion and irritability of the structures.

d. Some sedative ointment—for example, Surfacaine, Diothane, or Nupercaine ointment—applied two or three times daily.

e. Barbiturates, if there is much nervous irritability or apparent hyperesthesia of reflex centers.

f. The patient should stretch the vaginal orifice gradually herself, using graduated dilators. When she is able to introduce a No. 3 rectal dilator without causing pain, she can usually resume coitus.

g. When intercourse is again attempted, the patient should coat all the sensitive surfaces with a sedative ointment. The ointments above mentioned may be used or simply plain lubricating jelly such as K-Y jelly.

3. If the vaginal opening is too small or there is the spasmodic condition known as **vaginismus,** stretching of the opening is to be employed in addition to the other measures just detailed. In some cases the tendency to spasm may be overcome by gradual stretching with a speculum every few days. Also have the patient continue the stretching at home with graduated rectal dilators, as mentioned above.

In cases of organic narrowing or a serious grade of vaginismus that does not yield to minor measures, it is advisable to operate under anesthesia. The operation consists in incising the perineum and pelvic floor so as to enlarge the opening, and then undermining the flaps and suturing them over so as to cover the divided surfaces.

4. A sympathetic psychosomatic evaluation of the patient and her problem may be all that is needed to alleviate her fears, misconceptions, and ignorance concerning coitus. In difficult cases where no other factors can be found, psychiatric consultation should be sought.

SEXUAL FRIGIDITY

The absence of strong sexual feeling in the woman during coitus does not assume the serious aspect it does in the man, with whom erection is necessary to insemination leading to pregnancy. The strong sexual feeling, with its consequent orgasm, in the woman is not at all necessary to impregnation, though it increases the probability of impregnation. From the history of cases of sexual disturbance it is evident that many otherwise normal women have little or no sexual feeling until some months or years after marriage—sometimes not until after one or more children are born. The response to sexual excitement apparently grows with the proper exercise of the sexual functions. This fact is important and may be used to prevent discord and disruption in families where either the husband or the wife is becoming dissatisfied and despondent because it is felt that there is not the proper sexual response.

Again, there are cases in which the wife is not in physical condition to respond. She has some chronic trouble which so saps her strength that she has not the vitality for this function. This loss of strength may be due either to some general condition or to some local condition, or to both. It is hardly necessary to name the various conditions. They comprise the whole list of debilitating conditions, both general and local.

Some patients, because of parental ignorance, have been given an erroneous conception of the part which sexual intercourse plays in married life. These patients need instructions in sexual matters and the physician's advice should be supplemented by a good book on the subject. There are many helpful books on this subject, one of the best being *Married Love* by Marie Stopes. In Chapter 11 the importance and details of premarital examination and advice are outlined. The whole problem of frigidity is so intimately related to the psyche of the individual that the physician must delve into the life of the patient in all its facets in order to discover the underlying factors concerned in the problem, and, as mentioned under Dyspareunia, a psychiatrist's help should be sought in difficult cases.

Treatment of frigidity is directed toward removing any local disease, and attention is given to general hygiene, exercise, diet with vitamins, iron, etc., relaxation with vacations, and other interests. Advice should be given on sexual life, with methods, frequency of coitus, love play and types of response. Physical structure of the copulatory organs should be explained, with illustrations if necessary.

These sexual disturbances can usually be avoided by proper sex education of the child and by an understanding attitude on the part of the parents while the child is growing up.

Knight divides frigidity into three general types: (1) Constitutional, due to organic lesion, which is rare. (2) Pseudo-frigidity, due to ignorance of technique of either or both partners. In this type, re-education of both partners with sympathetic encouragement is usually all that is needed. (3) True frigidity, which is due to some deep-seated emotional factors usually requiring psychoanalysis and expert psychotherapy. Berry has recently given an excellent summary on the recognition and management of sexual maladjustment.

In some cases, endocrine disturbances may be important. Hypothyroidism, when corrected, frequently results in improvement. Of the sex hormones, testosterone or combined testosterone and estrogen are the most effective in stimulating the libido.

SEXUAL HYPERESTHESIA

The increase of libido to a serious extent is rare, but occasionally there is a patient presenting this difficult problem. The first step in treatment is to remove causes of special congestion and irritation inside the pelvis (tumor, inflammation) or outside (vulvitis, pruritus, etc.). If that is not sufficient, then antiestrogenic measures should be employed, along with ordinary sedatives as necessary. Greenblatt et al. found that pure progesterone in large dosage tended to depress libido and, hence, was useful in these cases.

Closely connected with this problem is that of masturbation. In the child and unmarried woman this habit is much more common than was formerly recognized. In the married adult female, this habit is continued, especially if coitus is unpleasant, painful, or does not bring the sexual gratification anticipated by the bride. For a complete discussion of this important subject, the reader is referred to an article by Max Huhner (see References).

References

Abarbanel, A. R.: J. Endocrinol. **10**: 837, 840, 1950.
Adler, Ludwig, and Makris, Athanasu: Fertil. & Steril. **2**: 459, 1951.
Albert, Louis, and Mezzer, Jacob: Fertil. & Steril. **1**: 460, 1950.
Asdell, S. A.: Fertil. & Steril. **2**: 312, 1951.
Berry, A. N.: Am. J. Obst. & Gynec. **64**: 581, 1952.
Birnberg, C. H.: Endocrinology **21**: 294, 1937.
Blom, Erik: Fertil. & Steril. **1**: 176, 1950.
Breckenridge, M. A. B., and Pommerenke, W. T.: Fertil. & Steril. **2**: 29, 1951.
Brown, W. E., and Bradbury, J. T.: Fertil. & Steril. **1**: 87, 1950.
Bureau of Legal Medicine and Legislation, J. A. M. A. **147**: 250, 1951.
Buxton, C. L., and Engle, E. T.: Am. J. Obst. & Gynec. **60**: 539, 1950.
Buxton, C. L., and Wong, A. S. H.: Am. J. Obst. & Gynec. **64**: 628, 1952.
Cameron, J. A.: Fertil. & Steril. **2**: 538, 1951.
Carter, Bayard, Turner, V. H.: Davis, C. D., and Hamblen, E. C.: J. A. M. A. **148**: 995, 1952.
Castallo, M. A.: Fertil. & Steril. **1**: 435, 1950.
Collings, C. K.: Fertil. & Steril. **2**: 534, 1951.
Collins, C. J.: South. M. J. **43**: 527, 1950.
Crossen, R. J.: Northwest. Med. **49**: 521, 1950.
Decker, Albert: Fertil. & Steril. **2**: 253, 1951.
D'Ingianni, Vincente, and Fontenelle, I. L.: South. M. J. **44**: 1139, 1951.
Doyle, J. B.: Fertil. & Steril. **2**: 475, 1951.
Easterbrooks, H. L.: Fertil. & Steril. **2**: 430, 1951.
Eisaman, J. R.: Am. J. Obst. & Gynec. **47**: 559, 1944.
Farris, E. J.: Fertil. & Steril. **1**: 239, 1950.
Gamble, C. J.: J. A. M. A. **147**: 1595, 1951.
Garrett, S. S.: Am. J. Surg. **80**: 131, 1950.
Glass, S. J., and Russell, Murray: Fertil. & Steril. **3**: 167, 1952.
Grant, Alan, and Markey, Robert: M. J. Australia **2**: 199, 1948.
Greenblatt, R. B., Mortara, F., and Torpin, R.: Am. J. Obst. & Gynec. **44**: 658, 1942.
Greenhill, J. P.: Am. J. Obst. & Gynec. **33**: 39, 1937.
Grody, M. H.: Robinson, D. W., and Masters, W. M.: J. A. M. A. **149**: 427, 1952.
Guttmacher, A. F.: J. Contraception **3**: 75, 1938.
Guttmacher, A. F., Haman, J. O., and MacLeod, John: Fertil. & Steril. **1**: 264, 1950.
Halberstaedter, L.: Klin. Wchnschr. **42**: 64, 1905.
Halbrecht, I.: Fertil. & Steril. **2**: 267, 1951.
Hanson, F. M., and Rock, John: Fertil. & Steril. **2**: 162, 1951.
Heckel, N. J., and McDonald, J. H.: Fertil. & Steril. **3**: 49, 1952.
Heckel, N. J., Rosso, W. A., and Kestel, L.: J. Clin. Endocrinol. **2**: 235, 1951.

Heller, C. G., Nelson, W. O., Hill, I. C., Henderson, E., Maddock, W. O., and Jungck, E. C.: J. Clin. Endocrinol. **10:** 816, 1950.
Hellman, L. M.: Fertil. & Steril. **2:** 498, 1951.
Huhner, Max: M. Times, New York **72:** 220, 1944.
Hulme, H. B.: Fertil. & Steril. **2:** 319, 1951.
Israel, S. L.: Fertil. & Steril. **2:** 505, 1951.
Israel, S. L., and Schneller, Oscar: Fertil. & Steril. **1:** 53, 1950.
Jones, Seegar E.: J. A. M. A. **141:** 1123, 1949.
Jungck, E. C., and Brown, W. E.: Fertil. & Steril. **3:** 224, 1952.
Kaplan, I. I.: Fertil. & Steril. **1:** 123, 1950.
Knight, R. P.: Bull. Med. Clin. **7:** 25, 1943.
Kroger, W. S.: J. Personality **1:** 362, 1951.
Kroger, W. S., and Freed, S. C.: Am. J. Obst. & Gynec. **59:** 867, 1950.
Kurland, I. I.: Fertil. & Steril. **2:** 61, 1951.
Lamson, H. D., Pinard, W. J., and Meaker, S. R.: J. A. M. A. **145:** 1062, 1951.
Løvset, Jørgen: Fertil. & Steril. **2:** 415, 1951.
MacLeod, John: Fertil. & Steril. **2:** 115, 1951.
MacLeod, John, and Hotchkiss, R. S.: J. Urol. **48:** 225, 1942.
MacLeod, John, and Hotchkiss, R. S.: Am. J. Obst. & Gynec. **46:** 424, 1943.
Marsh, E. M., and Vollmer, A. M.: Fertil. & Steril. **2:** 70, 1951.
Matthews, C. S., and Buxton, C. L.: Fertil. & Steril. **2:** 45, 1951.
Mazer, C., and Israel, S. L.: Menstrual Disorders and Sterility, New York, 1946, Paul B. Hoeber, Inc.
Michelson, L.: Proc. Third Am. Congress Obst. & Gynec., p. **42,** 1948.
Miller, A. G.: Surg., Gynec. & Obst. **66:** 723, 1938.
Noyes, R. W., Hertig, A. T., and Rock, J.: Fertil. & Steril. **1:** 3, 1950.
Pearse, H. A., and Ott, H. A.: Am. J. Obst. & Gynec. **60:** 285, 1950.
Phillips, Lyle: Personal communication.
Pommerenke, W. T.: Am. J. Obst. & Gynec. **52:** 1023, 1946.
Rock, J., Bartlett, M. K., and Matson, D. D.: Am. J. Obst. & Gynec. **37:** 3, 1939.
Roland, Maxwell: Am. J. Obst. & Gynec. **63:** 81, 1952.
Rubenstein, B. B.: Endocrinology **27:** 843, 1940.
Rubin, I. C.: Fertil. & Steril. **1:** 389, 1950; **3:** 179, 1952.
Russell, Murray: J. A. M. A. **144:** 461, 1950.
Rutherford, R. N.: West. J. Surg. **56:** 145, 1948.
Schnall, M. D.: Fertil. & Steril. **3:** 62, 1952.
Schockaert, J. A., and Ferrin, J.: Bruxelles-méd. **44:** 152, 1942.
Seymor, F. L., and Koerner, A.: J. A. M. A. **116:** 2747, 1941.
Sharman, Albert: Fertil. & Steril. **3:** 144, 1952.
Sharman, Albert: Glasgow M. J. **31:** 455, 1950.
Shettles, L. B.: Fertil. & Steril. **2:** 361, 1951.
Shields, F. E.: Fertil. & Steril. **1:** 271, 1950.
Shumacher, H. E., Jr.: Arch. Surg. **37:** 586, 1938.
Siegler, S. L., and Siegler, A. M.: Fertil. & Steril. **2:** 287, 1951.
Simmons, F. A.: Fertil. & Steril. **1:** 193, 1950.
Stein, I. D., and Cohen, M. R.: Fertil. & Steril. **1:** 169, 1950.
Stern, Curt: Fertil. & Steril. **1:** 407, 1950.
Sturgis, S. H.: Am. Pract. & Digest. Treat. **1:** 180, 1950.
Sturgis, S. H., and Pommerenke, W. T.: Fertil. & Steril. **1:** 113, 1950.
Taylor, H. C., Jr.: Am. J. Obst. & Gynec. **57:** 211, 1949.
Tietze, Christopher, Guttmacher, A. F., and Rubin, Samuel: Fertil. & Steril. **2:** 444, 1951.
Tietze, Christopher, Poliakoff, S. R., and Rock, John: Fertil. & Steril. **2:** 444, 1951.
Tyler, E. T.: J. A. M. A. **139:** 560, 1949.
Weir, W. C., and Weir, D. R.: Fertil. & Steril. **2:** 514, 1951.
Weisman, A. I.: Fertil. & Steril. **1:** 216, 1950.
White, M. M.: J. Obst. & Gynaec. Brit. Emp. **58:** 381, 1951.
Whitelaw, M. J.: Fertil. & Steril. **1:** 33, 1950; **3:** 230, 1952.
Williams, W. W., and Pollak, O. J.: Fertil. & Steril. **1:** 178, 1950.
Wong, A. S. H., Engle, E. T., and Buxton, C. L.: Am. J. Obst. & Gynec. **60:** 790, 1950.
Zuck, T. T., and Duncan, D. R. L.: Am. J. Obst. & Gynec. **38:** 310, 1939.

Chapter 15
MISCELLANEOUS DISTURBANCES

In this chapter we consider disturbances associated with the cessation of ovarian function (climacteric and menopause), allergic manifestations in the genital tract, and breast disturbances closely connected with gynecologic work.

CLIMACTERIC DISTURBANCES

The term "climacteric" is used to designate the period of normal cessation of ovarian function, and "climacteric disturbances" are the general nervous and endocrine symptoms frequently occurring during that time. The term "menopause" is used to designate the definite cessation of menstruation which occurs normally at a certain stage of diminishing ovarian function.

It has long been recognized by workers in this field that there should be a definite unambiguous term for each of these two concepts. Maranon, in his excellent work, states the problem clearly and furnishes a practical solution. He proposes that the long period of gradual cessation of ovarian function be designated as the "climacteric," and that the term "menopause" be used to designate the cessation of the menstrual flow. We agree thoroughly with this proposition. Intelligent technical discussion requires the adoption of exact terms, and the ones selected are practical and satisfactory. Hence they are adopted in this connection. If at times we drop into the old ambiguous use of the terms, it only demonstrates the force of habit.

It is interesting to note that developments in the cancer field bring additional necessity for exact limitation of the meaning of these terms. Investigations concerning cancer of the corpus uteri indicate that delayed menopause (late cessation of the flow) has a signification in regard to the development of endometrial carcinoma. The necessity in such investigations and discussions for a term to express exactly the cessation of the flow, and nothing more, is apparent, and the term "menopause" is well suited for that purpose.

Before taking up the details of symptoms and treatment, it is well to understand in general the many changes occurring in this period of life. In addition to the normal changes associated with age and natural ovarian involution, there are changes caused by the autonomic nervous systems and by the psychic reactions of the woman. The symptoms attributed to it run the gamut from those suggested by neighbors and so-called friends and advertising media, to those which are actually related to the physical and psychic changes occurring during this period of life.

Incidence.—According to the findings of many articles on the climacteric, 85 per cent of women go through this period of life with no interruption of their daily routine, and this, I believe, confirms the contention that this transition is a normal physiologic process. The British Council of Medical Women, in a study of 1,197 normal women, found that 10.9 per cent of married women

and 9.1 per cent of single women were absent from work one or more times because of disabling climacteric symptoms. It is this small group of 10 to 15 per cent who require medical advice and, if necessary, treatment.

ENDOCRINE CHANGES

The chief characteristic of the climacteric is the gradual cessation of ovulation and ovarian function. The ovary as it reaches the end of its functioning period becomes refractory to the action of the pituitary secretion, even though the pituitary continues to furnish the gonadotrophic hormone. The excess of this latter hormone, chiefly pituitary A, is excreted in the urine, causing an increase of the urinary pituitary-like hormones over the former output. On the other hand, estrogens usually disappear from the urine. In some women in whom the ovaries have been removed, estrogen has been found in the urine. The explanation for this is not clear, but it is believed that some other endocrine gland, probably the adrenal cortex, plays a part in the production of estrogen after the climacteric.

Associated with these changes are changes in the thyroid and adrenal functions. These endocrine changes manifest themselves in part through their action on the autonomic nervous system and the higher centers.

Etiologic Factors Causing Symptoms

Endogenous.—

OVARIAN.—(1) Menstrual irregularities such as menorrhagia, metrorrhagia, and oligomenorrhea may precede the actual cessation of menses due to a period of interspersed anovulatory cycles as the ability of the ovary to respond to the pituitary stimulation gradually ceases. In some cases there is an abrupt cessation of menses. (2) Hot flashes are one of the most reliable indications of ovarian depletion. These are, according to Kuntz, mediated through the autonomic nervous system; he states: "The sudden hot flashes, so common during this period, probably are the result of the shifting of large volumes of blood from the splanchnic area toward the periphery due to the sympathetic stimulation. This at once explains the flushing of the skin as well as the feeling of warmth." (3) Other symptoms, according to Harris, caused by autonomic nervous system stimulation are chill, dizzy spells, cold, moist or numb extremities, tachycardia, palpitations, dyspnea, headaches, and sweating. (4) Change in libido is due partly to a decrease in the ovarian hormone and partly to natural aging and psychic changes associated with it.

PITUITARY.—The changes associated with the excessive pituitary secretion are acromegalic changes in facial features, possible hair growth on the upper lip, and excessive fat deposits over the girdle area.

THYROID.—As a rule, there is a mild hypothyroid function at this time of life, but in some cases hyperthyroidism occurs, as reported by Wohl and Pastor. Many of the emotional and metabolic changes are due to a decrease in thyroid function.

ADRENAL.—Due to sporadic increases in the secretion of adrenalin during the climacteric period, the entire nervous system is made hypersensitive to stimuli. In a clinical study of many menopausal women, Maranon found that

many of the indefinite symptoms complained of could be traced to hypersecretion of the adrenal gland and more recent experimental work has confirmed his clinical observations. When a normal person is given adrenalin there is an increase in the pulse rate and a tremor of the body, especially the fingers. The individual notices a dryness of the mouth and an oppressiveness of the chest. It was noted that situations which normally caused no emotional response, such as a sad story, when retold after the administration of adrenalin caused a marked emotional response with sobbing and crying. Another symptom was a feeling of fear with no external reason for such reaction. This is the reverse of the mechanism seen in animals, where situations causing fear cause a secretion of adrenalin preparing the animal for flight or fight.

Exogenous Factors.—

1. The usual changes occurring with age in the various systems of the body affect the vision, hearing, teeth, and physical activity. We have fatigue, myalgias, certain types of arthritis. The hair becomes gray, the skin loses its subcutaneous fat and develops a sag under the chin and over the face, and at the same time fat deposits occur where least desired.

2. All of the above conditions are factors in causing the psychologic changes. The patient feels that she is now at the end of the road and many vainly wage a losing battle to maintain that buoyant beauty of youth aided by make-up, dyed hair with a "poodle cut," and a "two-way stretch." Fortunately most women are relieved now that the danger of childbearing is over and they look forward to growing old gracefully, developing that inner beauty and serenity which are far deeper than that of youth. When the children have grown up, first leaving the home for college and later marrying and leaving the home entirely, the stretching and breaking of the home ties naturally cause the emotions to be stirred. If children have represented the woman's main interest in life, her loss of this bond of "mother love" or, perhaps, "possessiveness" leaves her without a substitute. In by far the majority of women this change is made without a pronounced emotional upset, but a few become very introspective, and minor symptoms normally disregarded are elaborated and emphasized. At this period of life there are usually many extra duties added to the woman's life, such as social activities and the demands of civic and religious organizations; the parents are frequently old and tend to become sick or disabled, adding not only to the emotional strain but in some cases causing an almost unbearable physical strain.

The decreasing desire and frequency of coitus cause some to feel that they are losing their physical attractiveness, and the exaggerated stories of "the terrible change," frequently the favorite gossip at the bridge table, do nothing to allay their fears. In some cases the menopausal sexual partner gives cause for real worry when he seeks to renew his "lost youth" by extramarital relations. The addition of such deceitful behavior on the part of the one person upon whom the life has always depended for help and understanding may cause her depressive moods to reach the psychotic level.

A practical plan for marriage counseling is given in a recent article by Popenoe. Every physician should at least be conversant with rules for suc-

cessful counseling when serious family problems arise, so that, if he finds himself inadequate to handle the situation, he can advise the couple on how to obtain expert consultation.

Treatment

As Sevringhaus so aptly put it, "The menopause does not require any therapy, but the menopausal syndrome may be well worth treating." All too frequently the patient seeking advice at this time of life is put off with a shot of the hormone most recently recommended by some detail man as being a sure cure. In many cases an ampule is selected from a stack of samples and administered by the office nurse at regular intervals without further supervision by the physician.

Climacteric patients deserve better care and understanding. The first step should be an unhurried interview in which the patient is given ample time to ask questions and explain her complaints. The physician should listen sympathetically and then give the patient the reassurance which she needs. Explain in a simple logical way the cause of the symptoms giving her anxiety. When the patient understands that there are normal physical changes responsible for the hot flashes, unaccounted-for feelings of fear, and other symptoms, and that these symptoms in themselves are not harmful nor are they apt to result in serious physical or mental derangement, her curative therapy is well started.

Take time to inquire of her what she expects of the climacteric and correct any misconceptions she may have. Many women come in for shots to avoid the menopause, and when quizzed one finds that they have had no symptoms. All that these patients need is education. The shifting aims of life during this period should be explained, emphasizing that one should not try to deny her age and seek eternal youth by artificial means and alcoholic stimulants but should concentrate her energies into new avenues of service. The separation of children or suppressed jealousy of a son-in-law or daughter-in-law can easily be replaced by love of the grandchildren. Time which is no longer required for family duties can be utilized in other worth-while family, civic, or social projects. The importance of nutrition is well known, and a diet high in protein, vitamins, minerals, and trace elements, with low or high caloric content as indicated, is advised. Coffee, tobacco, and alcohol in excess should be discouraged. The need for exercise in moderation and physical and mental recreation is explained.

If the patient has symptoms referable to organic lesions, these must be ruled out by proper examination. If no lesion is found, this knowledge benefits the patient in eliminating worries or fears; if a lesion is found, it can be promptly corrected.

Engle found in his large menopausal clinic in New York that the symptoms of most of the patients could be controlled by thyroid if needed and small doses of phenobarbital periodically, during periods of extra emotional stress. Drugs which block stimuli from the overactivity of the sympathetic and parasympathetic nervous systems, such as belladonna, phenobarbital, and ergot, were found to be helpful by Harris who used a preparation containing a combination of these three called Bellergal. A tablet is given three times daily

before meals for three weeks out of the month until readjustment of the symptoms referable to the autonomic nervous system occurs; then the dose is gradually decreased as normal balance is established. It is usually possible to stop treatment within a period of six months.

For depression, small doses of some preparation of amphetamine or Dexedrine or Benzedrine may be needed as a temporary measure while other specific therapy is being planned.

In cases where hot flashes are disturbing enough to require treatment, estrogens in small doses will usually give prompt relief. Oral therapy is preferred, and doses of 0.25 to 0.50 mg. at bedtime are usually adequate. If the patient is not relieved or cannot take stilbestrol or hexestrol, Premarin, 0.3 mg. or small doses of some other estrogen product may be used. The patient should be told that this is to tide her over her adjustment period, and when the flashes decrease the medicine should also be gradually decreased and eventually stopped. Sudden stopping of the estrogenic therapy or overdosage may result in recurrence of bleeding after the menopause and although many men disregard this, the possibility of endometrial carcinoma must always be considered. More recently, a combination of estrogen and androgens is being used and the reports are favorable. The advantage of the combination is that the testosterone inhibits the endometrial growth-stimulating effect of the estrogen and hence the tendency to cause bleeding. Several of these preparations are on the market; the one used by Greenblatt et al. was Tylosterone, but there are many other tablets with the combination on the market. Glass and Shapiro, and Greenblatt and his associates tried out this combination, together with a placebo, an estrogen, and an androgen in order to see which therapy was most effective. Glass and Shapiro found that 70 per cent of the patients preferred the combination, and similar results were found by Greenblatt. The dose was two tablets daily until relieved, then a maintenance dose of one tablet, gradually decreasing with improvement.

The method of administration of the hormones varies, some men implant pellets of the hormone under the skin so that it can be absorbed slowly, this is done at operation where the ovaries are removed (Delaplaine et al.); others prefer hypodermic or intramuscular administration for its psychic effect; most men use the oral or buccal route as it offers the best control over therapy.

Heckel suggested that some of the symptoms of the climacteric were due to endogenous allergy to the steroid substances. He suggested the use of the steroid pregnanediol, which is the excretion product of progesterone and is without known biologic activity. Since most of the women having ovarian disorders who were skin tested by Heckel showed sensitization to this steroid, he hyposensitized them, using a microcrystalline suspension of pregnanediol. The subcutaneous dose was 0.1 mg. or less, and the oral doses ranged from 0.1 to 1.0 mg. Ninety-two of the 132 menopausal patients were improved, although 22 of these were initially made worse.

Vitamin E was first found effective in treating the menopause syndrome by Christy, and since that time reports have appeared by Finkler, Ferguson, and the most recent one by Sikkema, which is a review of 365 cases treated with alpha tocopherol collected from the literature. He found that two-thirds

of the patients were relieved. Levin, Burns, and Collins demonstrated that fresh wheat germ oil contained 9 I.U. of estrone per cubic centimeter. Androgenic and gonadotrophic activity was also demonstrated. No hormonic effects could be demonstrated in the rancid oil.

The use of vaginal smears and the variations in secretion of the urinary gonadotrophins were formerly thought to be important in diagnosis and in following the response of the patient to treatment, but in a recent discussion of the menopause Willard Allen states that there are no laboratory tests which are of much value in appraising the need for therapy. The vaginal smear may be atrophic in a patient without symptoms, and the level of the follicle-stimulating hormone may remain high for years after the symptoms have ceased. He feels that the decision for treatment is best made by a careful appraisal of the patient's symptoms. Traut added a new sign of the climacteric in a study of 205 women, 88 of whom had gone through the menopause; he found that 77 per cent of the menopausal women had tenderness on pressure over the anterior lower third of the tibia. This sign was present only in the menopausal group.

OTHER DISTURBANCES ASSOCIATED WITH THE CLIMACTERIC

Atrophic Vaginitis.—This is often troublesome and refractory to treatment in the latter part of the climacteric and in the postclimacteric (senile) periods. The administration of estrogen in the form of vaginal suppositories helps greatly in clearing up these cases.

Simpson and Mason, and Swift obtained subjective relief in cases of senile vaginitis by administration of cod-liver oil or haliver oil and attributed the results to the vitamin A in the oil. Recently Freedman studied the vaginal smears and mucus in 27 women receiving 50,000 units of vitamin D three times daily for 15 to 17 days. They found an estrogenic response of the vaginal epithelium and an increase in the mucoid discharge, and the majority of the women obtained benefit from the treatment.

Pruritus Vulvae.—Pruritus vulvae, vaginal burning, and other paresthesias of the climacteric and senile periods are sometimes definitely benefited by estrogenic medication. In these cases it is well to employ the vaginal suppository method of administration, to be supplemented, if necessary, by oral or hypodermic methods.

There are other disturbances which in some cases seem to be influenced by the more remote effects of endocrine medication.

Emotional Disturbances.—These problems have already been discussed but it might be well to mention an interesting study by Donovan. He made a careful study of case histories of 110 cases having the menopausal syndrome. Among other conclusions he found that most women who seek help during the climacteric have done so at other times during their lives for symptoms that were equally ill-defined in respect to type and etiology. He also felt that there was no clear relation to the relief of symptoms and the use of estrogens. Greenhill emphasizes the fact that in women who have psychoneurotic tendencies these are apt to be aggravated in the climacteric. The need for cooperation between the gynecologist and the psychiatrist in the severely men-

tally depressed patients and the psychotic patients is emphasized by Chamberlin. Masters and Allen found estrogens beneficial in aged women.

Arthritis.—Certain cases of arthritis in the climacteric are benefited by ovarian endocrine medication. Greenblatt and Kupperman obtained relief of symptoms of arthritis and arthralgia in some cases, using 2,000 to 10,000 R.U. every seven to ten days for several months. A more extensive plan including diet, hydrotherapy, hormones, fever therapy, and splinting is outlined by Ishmael. Grorud treated 100 women between the ages of nineteen and seventy years with symptoms of osteoarthritis, using 0.5 mg. of diethylstilbestrol twice daily for three weeks. Of these, 46 obtained complete temporary remission, 35 had partial relief, and 19 had no relief.

Postmenopausal osteoporosis is now an established entity. Albright et al. described its clinical features and have emphasized that it is not a disorder of calcium metabolism but rather an atrophy of the bone matrix. In the type associated with the menopause the spine and pelvis are usually involved, the long bones are less likely to be involved, and the skull is rarely involved. They feel that the beneficial effects of estrogens are due to their effect on calcium retention.

Hypertension.—Page and Ogden in a study of blood pressure in rats found that endocrine influences did not materially affect the level. Taylor et al. made a critical study of menopausal hypertension in a group of 200 menopausal women and concluded that the incidence of hypertension in this group was no more common than it was in the general population.

MENOPAUSE DISTURBANCES

The menopause bears the same relationship to the fifth decade of life that the menarche does to the second decade, that is, it is the outward sign of important physiological changes in the ovaries and the uterus. At puberty, these internal changes are developmental toward establishment of function, and when ovarian function has developed to a certain extent, menstruation appears (menarche). At the climacteric, the changes are regressive toward cessation of function, and when it has regressed to a certain extent menstruation disappears (menopause).

The menopause then is the climacteric cessation of menstruation. It is not the gradual approach to it represented by occasional amenorrhea of climacteric origin, but the complete and permanent disappearance of the menstrual flow.

Problems of the Menopause

The definite disturbances of the menopause are two—premature menopause and delayed menopause. In this connection it may be well to refer also to certain premenopausal disturbances, namely, amenorrhea, hypomenorrhea, menorrhagia, and metrorrhagia. These various menopausal and premenopausal disorders will be taken up under three headings: premature menopause, premenopausal disturbances, and delayed menopause.

Premature Menopause.—Premature permanent cessation of menstruation may be due to some local lesion or some general condition or some endocrine disorder. As in the case of serious amenorrhea of an earlier age, the local

lesions causing premature menopause are those affecting the integrity of the endometrium or of the ovarian functioning tissue.

In the former class come hysterectomy and hyperinvolution of the uterus. In the latter class come double oophorectomy and tumors or other disease causing destruction of the ovaries. An incurable blood dyscrasia or some disease of the respiratory, gastrointestinal, urinary or cardiovascular systems may so weaken the patient as to cause permanent cessation of menstruation, and the same may be said of certain incurable disorders of the endocrine glands.

In conditions which do not necessarily preclude further menstruation, an attempt at restoration may be made along the lines of treatment already advised for severe amenorrhea.

Premenopausal Disturbances.—In premenopausal menorrhagia and metrorrhagia, the same treatment is to be employed for the different types of cases as advised for similar disturbances at an earlier age. A larger proportion of the bleeding cases of this late age period have carcinoma of the endometrium, and hence diagnostic and therapeutic curettage becomes urgent earlier in the disturbances.

In premenopausal amenorrhea and hypomenorrhea, the same etiological factors are to be looked for as in similar disturbances at an earlier age, and similar treatment is to be employed for the various types of cases.

Delayed Menopause.—Delayed menopause and late menopause are terms used synonymously to designate that condition in which the permanent cessation of menstruation is delayed beyond the normal time. In the clinical consideration of this group we include all cases of late uterine bleeding, whether or not presenting the rhythmic character of menstruation. In giving the history, patients usually regard any recurring bleeding as menstrual flow and an appearance of blood after cessation as a return of menstruation.

Accepting this composite group for investigation, pelvic examination will show the cases in which the late bleeding is due to a demonstrable local lesion, such as carcinoma of the cervix or corpus, uterine myoma, ovarian tumor, or a tumor or inflammation of some adjacent structure. Further investigation will identify the cases presenting some extrapelvic disease which may be the cause of the bleeding, such as blood dyscrasia or cardiovascular-renal hypertension or thyroid disorder.

There remains a small group of cases presenting no evident genital lesion nor extragenital disease to account for the bleeding, and in which the bleeding simulates more or less the menstrual rhythm. This is a most interesting group, presenting unsolved problems in pelvic physiology and pathology. The patients are past the usual age for normal ovarian functioning and yet they present evidence of endometrial activity dependent on ovarian activity.

Are these cases simply examples of unusual disparity between the age in years and the age in physical changes, and consequently due to run a normal course to a later menopause? Are they, on the other hand, cases representing an irregularity of functional decline which may impose a pathological influence on the cell activity of the involuting endometrium? We have given considerable thought to this interesting problem and its practical bearings, and some features were presented in a previous article. The ramifications of

the subject are extensive and space consuming, but the practical conclusions from our study may be stated as follows:

1. Delayed menopause, especially when delayed to the age of fifty years, means some pathological condition, either in structural change or in cell activity. The influence of persisting irregular ovarian activity on the cells of the involving endometrium tend to erratic cell activity thereby favoring cancer development. In our series of 89 cases of cancer of the corpus uteri, there were 30 in which there was a definite interval between the menopause and the clinical appearance of the endometrial carcinoma. In these 30 cases the menopause occurred at the age of fifty years or later in 22, or 70 per cent, and at the age of forty-eight years in 3 other cases.

2. Endometrial hyperplasia in the endometrium of involutionary age seems to represent a step in the pathological progress from normal endometrium to carcinoma. Hyperplasia is a very frequent finding at curettage for bleeding in this age period when carcinoma is most common. In our series of cases of endometrial carcinoma a few of the patients had been curetted, in their home town or elsewhere, one or two years previously. In 3 such cases the slides of the previous curettings were available for study and each of them showed definite hyperplasia at that time. Here, in this one series of cases, there were 3 instances in which curetting showed benign hyperplasia and another curetting one to two years later showed endometrial carcinoma. There was also an interesting specimen of a double uterus in which one horn showed endometrial hyperplasia and the other horn endometrial carcinoma.

The frequent association of granulosa-cell tumor with endometrial hyperplasia and endometrial carcinoma points to endogenous estrogenic stimulation as an etiologic factor.

3. Experimental work in mice (Crossen and Loeb) (Figs. 694 and 695) and in aged monkey (Crossen and Suntzeff) (Figs. 696 and 697) indicate that exogenous estrogenic stimulation may be a factor.

4. Delayed menopause, especially when delayed to the age of fifty years, is an indication of aberrant endometrial activity and a warning of a tendency to endometrial malignancy. Consequently, appropriate treatment should be employed to stop the aberrant endometrial activity. In most cases a diagnostic curettage and radium treatment are satisfactory; in others, operation is indicated.

5. Appropriate treatment consists usually of curettage (to stop the bleeding temporarily and to furnish tissue for microscopic study), conization of the cervix if needed for chronic cervicitis, and radium treatment to stop the erratic endometrial and ovarian activity. If there is no malignancy in the curettings or in the cervical tissue, the treatment outlined is usually sufficient to prevent further trouble. If the microscopic investigation of the curettings shows that endometrial carcinoma has already developed, then radical measures for that must be employed. The question of adenocarcinoma of the endometrium following radiation therapy has been discussed under Radiation Therapy of Uterine Myoma.

ALLERGIC DISTURBANCES

The fact that allergic patients may have pelvic symptoms directly referable to the allergic constitution has been shown by Duke, Rowe, D. R. Smith, and others. According to Rowe, allergy may be a factor in painful periods with or without vomiting, in excessive or scanty periods, in prolonged periods, in leukorrhea, and in eczema of the vulva. In a series of patients with allergic dysmenorrhea, Smith was able to give relief by proper dietary investigation and advice. As remarked in the chapter on Menstrual Disturbances, it is rather strange that this connection between allergy and dysmenorrhea (painful uterine contractions) was not appreciated long ago, since the test material of antigens is the uterus of an experimental animal. An excellent review of the literature on this subject was made by Ehrenfest. Vaughan and Fowlkes reported on allergic reactions associated with cohabitation.

Relief in scanty, excessive, and prolonged menstruation has been reported by Rowe, who recommends his elimination diets in testing suspected allergic cases. The mechanism by which the control of the flow results in such cases is not clear, but it is supposed to be due to improved ovulation.

In allergic persons, this factor may enter into the cause of leukorrhea. Mucous discharge from the gastrointestinal tract and from the bronchial and nasal membranes has long been recognized as due in certain cases to allergy. In women and girls with excessive vaginal discharge, in whom there is no infection and in whom the vaginal smear shows a predominance of epithelial cells, the question of allergy should be investigated.

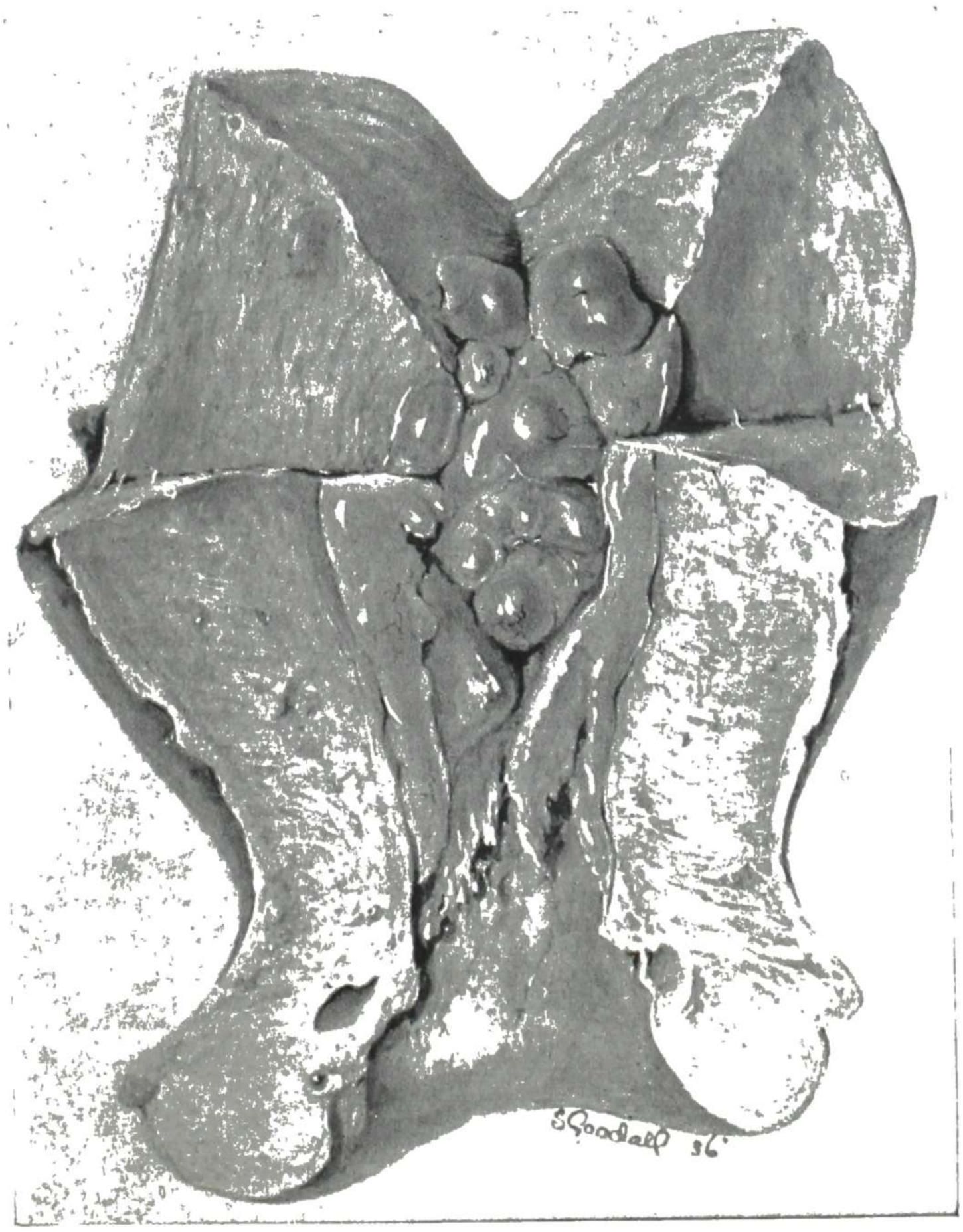

Fig. 988.—A uterus removed from a markedly allergic patient and showing great swelling and edema of the mucosa and muscularis with nothing to account for the condition except allergy. The details of this and other cases, given in the articles, furnish food for thought from the pathologic, diagnostic, and therapeutic standpoints. (From Goodall and Power: Am. J. Obst. & Gynec.)

Eczema of the vulva is a condition recognized as sometimes due to allergy, and any case persisting despite ordinary treatment merits attention in that direction.

There have been cases reported of menstrual asthma in which the patient was found to be sensitive to some allergen present in her own blood at the menstrual time. A sample of blood taken at the menstrual time was preserved,

injected in the interval period, and it caused an asthmatic attack. The patient was cured by gradual desensitization to her own menstrual allergen.

Goodall and Powder, in a thought-provoking article on this subject, present Fig. 988 as an example of allergic edema of the uterine mucosa and muscularis.

"Fulminating pelvic edema" is the term applied to an intense and widespread edema of the pelvic interior, that comes on suddenly without apparent adequate cause. It is accompanied by serious symptoms and usually extreme prostration. In fact, the sudden onset, the severity of the symptoms, and the marked collapse suggest ruptured tubal pregnancy, and this mistaken diagnosis has been made in some of the cases. It is a rare condition and presents a puzzling problem in etiology and in diagnosis. Most of the cases have been associated with chronic inflammatory lesions in the pelvis, but why the sudden edema and serious symptoms should develop without apparent cause has not been satisfactorily explained.

Possibly allergy is a factor in this intense edema localizing in the pelvis. The cause of the localization in the pelvis may be sensitization of the tissues to the products of old inflammation or of some other local condition. The salient features of the symptomatology and pathology of this bizarre disorder can best be presented by detailing a personal experience with it. Several other cases were found reported in the literature.

Fulminating Pelvic Edema.—Dr. H. S. Crossen was called in consultation to see a patient with pelvic disturbance. It was Sunday; the patient had attended church in the morning feeling fairly well, but while there became very sick and could scarcely get home. She had a chill, followed by severe headache and general aching, but no localizing symptoms. There was no apparent local trouble in any part of the body to account for the fever, which rose to 105.5° F. By evening there was evidence that the pelvis was the seat of the disturbance and it was then that Dr. Crossen was asked to see the patient, about 10 P.M.

EXAMINATION.—The temperature had been reduced to 104° F. The pulse was rapid, but of fair volume. The pelvis was filled with a tender mass which surrounded the uterus and fixed it firmly. There seemed to be acute pelvic inflammation with extensive exudate, but there was no apparent cause, either recent or remote. The patient had always been rather nervous and this nervousness had been somewhat worse of late, but there had been no symptoms indicating pelvic disease of any kind. The next day the temperature was 104.2° F., pulse 120, respirations 28, and there was much peritoneal irritation. Operation was indicated to check the rapidly progressing inflammation if possible, and accordingly the patient was taken to the hospital.

OPERATION.—When the abdomen was opened the pelvis was found filled with small encysted collections of fluid involving the tubes, ovaries, broad ligament, and uterus. The cysts or pseudocysts were of various sizes, were filled with clear serum and seemed to extend deeply into the substance of the organs involved. From the appearance, hydatid disease was suspected. All the cysts that it was feasible to remove were removed, and the pelvis drained through the abdominal incision.

The temperature dropped within a few hours to 98° F., and it did not again go high. During the first part of the period of convalescence it ranged from 99° to 100.2° F., and later dropped to normal, where it remained. The wound and drainage tract healed rapidly and the patient had a smooth convalescence. Laboratory examination of the tissues removed showed no bacteria of any kind, no evidence of hydatid disease, and no specific pathologic process that would adequately account for the alarming symptoms and the marked tissue change.

BREAST CONSIDERATIONS

The functioning of the breasts runs parallel with that of the ovaries and the uterus. The connection of the breasts with the nourishment of the newborn brings them to that extent into intimate relation with obstetric practice. The radical treatment of cancer of the breasts brings them within the province of general surgery in its application of extensive dissection to the chest wall and adjacent lymphatic areas. Along with the treatment of breast cancer goes, of course, the diagnosis of that disease, and also the recognition and diagnostic observation and treatment of the various other conditions that may simulate cancer or require surgical care.

There are, however, certain points of contact with gynecologic practice, including breasts painful at menstrual time, hypertrophy of the breasts, and discharge from the nipples.

Painful Breasts; Hypertrophied Breasts; Abnormal Discharge

Taylor made an extensive study of chronic mastitis in relation to ovarian and pituitary hormones and to gynecologic lesions. The paper was based on the clinical and laboratory study of 261 patients with nonmalignant breast disturbance handled in the Memorial Hospital in the preceding two and a half years. It was divided into two parts: (a) a general and histological study, and (b) a clinical study of the patients. His conclusions and comments were as follows:

The general conclusion of this study is that a certain minimum activity of the ovary is necessary for the development of chronic mastitis but that no specific hyperfunction or hypofunction of the ovary is at present demonstrable. This result is contrary to hopes entertained at the beginning of the work and contrary to what might have been expected from the known proliferative effects of the ovarian hormone on the breast tissue.

Certain exceptions and reservations must be made. In one small group of cases in which swelling of the breast, sometimes with secretion, develops in the presence of a persistent follicle or corpus luteum cyst, a hormone cause is probable, but the clinical aspects of this condition are different from that of the common type of chronic mastitis with painful outer quadrant induration. It is not unlikely that other unrecognized reactions of the breast to certain hormone states may exist.

Even for the common type of mastitis, however, it must be conceded that the present method of study has not exhausted the possibilities of a hormone cause. Present technical methods for the clinical determinations of estrin and prolan are far from perfect and no satisfactory test exists for the quantitative study of the corpus luteum hormone in body fluids. A very slight disturbance of gland function might cause hyperplasia in the breast when active over a considerable number of years and yet not be obvious when studied by relatively crude laboratory methods over a month's time. Irregularities in the peaks of production or excretion of estrin may furthermore have a significance quite aside from the total quantities chiefly discussed in this paper.

Finally, it is possible that the abnormal estrin effects on the breasts may be the result of local conditions such as an increased responsiveness to normal quantities of hormone, possibly as the result of local hyperemia, or a tissue concentration of the gland substances, bearing no relation either to the actual activity of the ovary or to the amount of hormone in the blood stream.

With these reservations, the following summary is offered of the present knowledge of the conditions under which chronic mastitis is found to develop.

A. The Painful Nodular Breast

1. *An active ovary producing estrin must be present.*—(a) The painful breast is limited to women before the menopause and after puberty. (b) The pain and nodularity improve with x-ray and surgical castration, such improvement paralleling the fall in estrin excretion in the urine.

2. *There is no indication of an extensive ovarian activity.*—(a) The histological structure of the painful breast does not show the uniform epithelial proliferation of a hormone-produced hyperplasia. (b) The 7 cases studied did not contain any excess of estrin in the urine or blood and in several cases the estrin excretion was quite low. (c) The endometrium in cases of the painful breast does not show the hyperplasia to be expected with hyperactivity of the ovarian follicle. (d) Administration of considerable quantities of ovarian hormone to patients with the painful breast does not increase the severity of the symptoms.

3. *There is no indication of an underfunction of the ovary.*—(a) The average excretion of estrin in 7 cases which were studied was within normal limits and in several of these cases rather high values were found. (b) The scant menstruation noted in 16.9 per cent of the women with the painful breast was the chief evidence for the underfunction theory, but the estimation of the estrin excretion in such cases gave normal values. (c) Consistent results have not been obtained in this clinic by the treatment of the painful breast with estrin or the ovary-stimulating hormone of the anterior pituitary.

4. *A "dysfunction" of the ovary remains a possibility which cannot be entirely excluded.*—(a) Delayed or irregular menstruation, which must be accepted as a sign of a disturbed ovarian function, was present in 13.7 per cent of the cases. (b) Irregularities in the curves of estrin excretion or of blood concentration may eventually be shown to have some significance, but knowledge for their interpretation is at present lacking. (c) The multicystic ovaries observed in so many cases also may be taken as evidence of a disturbed ovarian function but they may be looked upon as well as the result of vascular congestion in the pelvis.

5. *A corpus luteum disorder cannot be excluded since tests do not exist for studying the blood and urinary levels of this hormone.*—(a) The frequency of normal menstrual rhythm, the histological evidence of a regular endometrial cycle, and the rarity of evident disease of the corpus luteum in patients operated upon are evidence against this factor.

6. *There is no indication of a hyperactivity of the anterior pituitary.*—(a) Prolan appears in the urine only in cases of pronounced underfunction of the ovary, which is never found with the painful breast. (b) An increase in prolan in the urine comparable with that taking place in the menopause has been excluded by the present series of studies. (c) The appearance of prolan in the urine after x-ray of the ovaries occurs at the time of improvement of breast symptoms.

7. *The painful breast has from the clinical viewpoint a large nervous element.*—(a) The pain and tenderness are more marked than are to be expected in an endocrine-produced glandular hypertrophy. (b) The pain radiates to the arm, neck, axilla and lateral body wall and may be associated with hyperesthesia of the skin of the whole thorax. (c) The pain and swelling in certain cases are produced or become worse during periods of nervous tension and may even develop abruptly within a few minutes after a nervous shock at any time in the monthly cycle. (d) Various associated nervous complaints are described by the patient including insomnia, anxiety, palpitation, blurring of the vision, mucous colitis, and headaches. (e) One case report exists in the literature of the disappearance of the premenstrual breast symptoms in one breast after the destruction of the thoracic sympathetic of that side.

8. *A local state of vascular congestion is a prominent feature of the painful breast.*—(a) The gross appearance of the painful breast before menstruation with its hyperemia of the areola, venous dilatation, and increased weight alone suggests hyperemia. (b) The histological signs of this vascularity may be demonstrated in the "edema" of the lobule. (c) The relief afforded by the onset of menstruation is usually too rapid to be explained as the result of epithelial regression. (d) The sudden appearance of pain and swelling in the middle of the cycle in certain cases cannot be ascribed to epithelial proliferation. (e) Simple support of the breast often causes considerable amelioration of symptoms. (f) In

one case described with pain and hypertrophy, petechial hemorrhages occurred regularly before menstruation in the skin about the areola.

9. *The coincident gynecological lesions and menstrual disturbances have a possible significance as evidence of an associated vascular congestion and tissue edema in the pelvis.*—(a) The common pelvic lesions are classifiable as adnexal inflammation, parametritis, retroversion, and cervical infection. (b) The onset of pelvic symptoms and breast pain after marriage, abortion, or pelvic infections is significant of parametrial congestion or inflammation. (c) The scant menstruation may be regarded as the effect of the secondary fibrosis in the pelvis described by many writers as the end-result of chronic pelvic congestion. (d) The edematous, cystic, and fibrotic ovaries may have a similar cause.

One may offer the following provisional conclusions on the cause and nature of the painful, diffusely nodular type of mastitis as follows:

1. The ovarian hormone is certainly a necessary factor, but it has not been possible by present laboratory methods to demonstrate any specific abnormality of ovarian or anterior pituitary function. It is, however, possible that refinements in technical methods may eventually reveal a definite endocrine disturbance.

2. The conception of the disease as primarily a vascular disturbance with changes occurring in the interstitial tissues of the breast based on abnormal nervous stimuli explains many of the clinical aspects of the disease. Such a view can only be accepted with caution, however, because it requires the assumption of a physiologic mechanism yet largely undemonstrated.

[The more recent work of Greenhill and Freed, Bickers and others, previously mentioned, have proved the disturbance of water balance as a factor causing premenstrual congestion of the breasts. Withdrawal of salt and soda or other products containing sodium in the premenstrual period and administration of some medication which promotes sodium secretion will relieve most of these cases.]

B. Breast Hypertrophy Occurs in at Least Two Forms

1. In one group in which there is a simple painless enlargement of the breasts of relatively uniform consistence an endocrine factor is clearly prominent. This includes the hypertrophy developing in childhood and in old women in the presence of the specific ovarian neoplasms, such as the granulosa cell tumors and teratomas. Breast swelling has also been observed in the presence of persistent corpus luteum and follicle cysts and ascribed to a polyhormonal amenorrhea. Breast hypertrophy after hysterectomy may, in some cases, have a similar basis.

2. The painful hypertrophies of this study were not of this type and resembled closely the tender nodular breasts, both in regard to their physical characteristics and the conditions under which they occurred. Hormone studies of a series of these cases gave normal blood estrin values, rates of monthly excretion of estrin a little higher than in the cases of the painful breast, but still probably within normal limits, and no increase in prolan excretion. X-ray of the ovaries led to a disappearance of the pain and to a reduction in the size of the breasts but the use of ovarian hormone by mouth or hypodermic was ineffectual. The coincident pelvic lesions and the incidents associated with the onset of the breast enlargement were in general the same as those found for the painful breast.

The conclusions in regard to the causes of this type of hypertrophy must be similar to those for the painful, nodular breast.

C. Abnormal Secretion From the Nipple

The local physical characteristics as well as the conditions under which abnormal nipple secretion occurs seem to distinguish it somewhat from the two preceding groups: the average age of these patients was higher; the proportion of women with preceding pregnancies was much greater; menstrual disturbances were more frequent, particularly in the form of delayed menstruation; the average daily excretion of estrin was lower; the secretion did not disappear at once after x-ray of the ovaries.

In many cases, however, the characteristics of the painful breast were present, notably the cyclical pain and swelling, the diffuse nodularity and certain coincident pelvic lesions.

It is concluded that the cases with abnormal secretion are a heterogeneous group, the following representing a possible classification of these.

1. Cases with a non-specific discharge, serous, sanguineous or purulent, from local disease of the larger ducts.

2. Cases reported in the literature with a definite nervous factor either in the form of direct stimulation of the nipple, or a central nervous system disease, such as tabes dorsalis or syringomyelia.

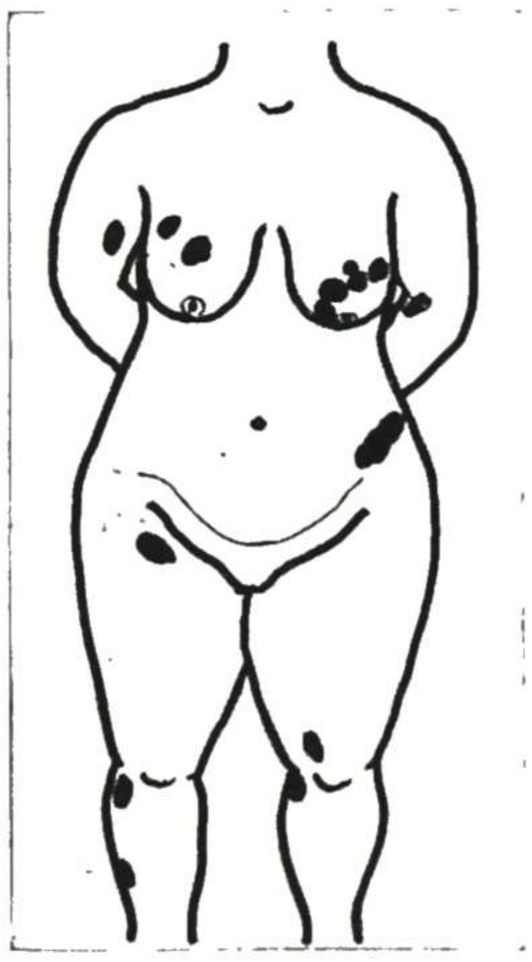

Fig. 989.

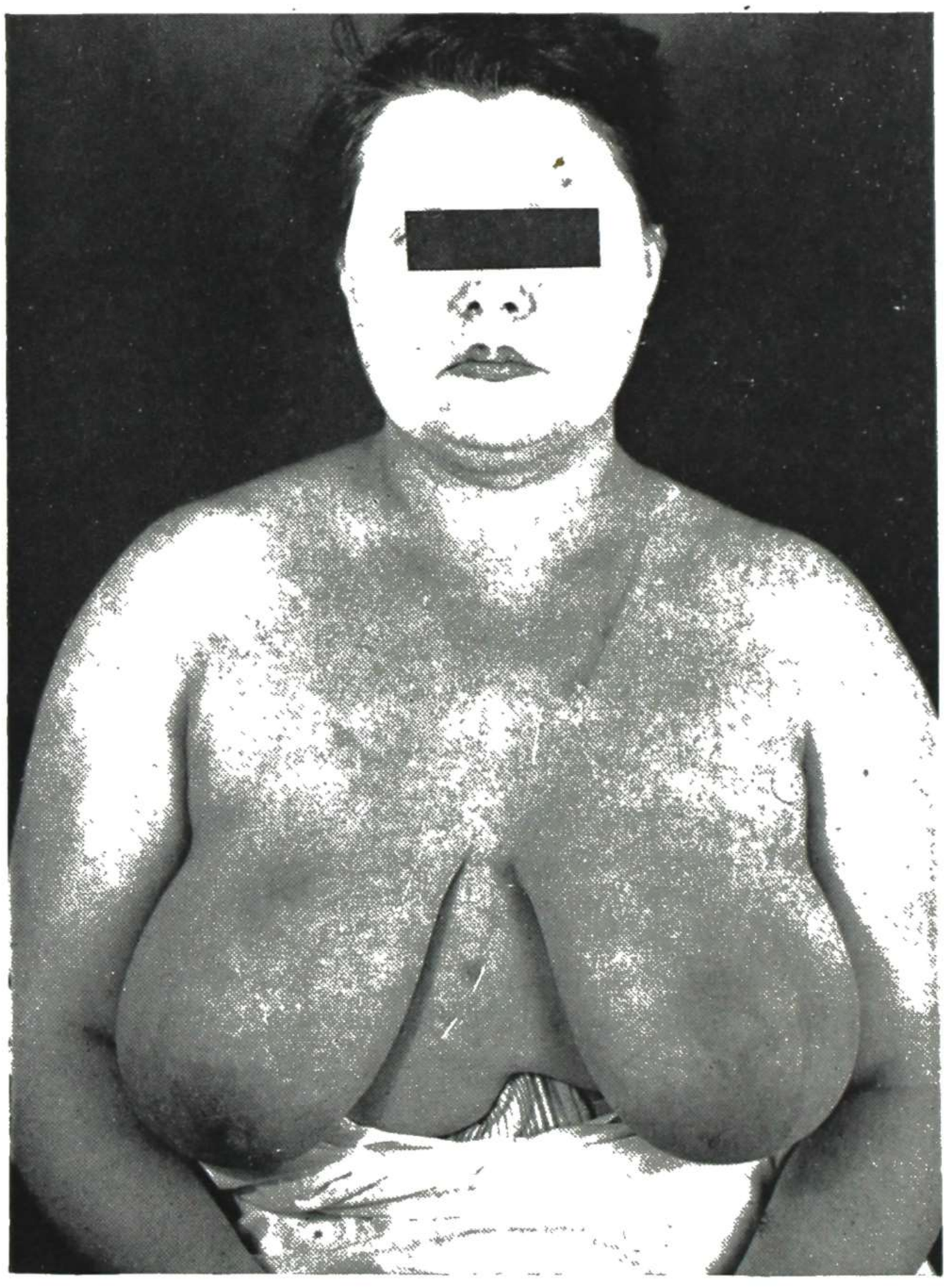

Fig. 990.

Fig. 989.—Relapsing febrile nodular nonsuppurative panniculitis, showing the distribution of the lesions and the degree of involvement of the breasts.

Fig. 990.—Appearance of patient on admission, showing multiple areas of nodular nonsuppurative panniculitis of the breasts.

(From Binkley: J. A. M. A. **113**: 113, 1939.)

3. Cases reported in the literature with definite evidence of endocrine disease, such as the instances of amenorrhea with follicle or corpus luteum cysts. To this group may belong the cases of temporary secretion in the early menopause, theoretically ascribable to the sudden decrease in ovarian activity or the increased function of the anterior pituitary.

4. In a large group of cases one is forced to maintain the alternative theories noted for the other two types of breast disease, namely an as yet undetermined variety of endocrine disturbance or a little known form of neurovascular disorder.

While nonmalignant tenderness of the breasts is usually due to endocrine disturbance affecting the secreting apparatus, it may occasionally be caused

by *nonsuppurative panniculitis,* pictured in Figs. 989 and 990. A case of this disease was reported in detail and the literature reviewed by Binkley, from whose article came these illustrations.

References

Albright, Fulier, Smith, P. G., and Richardson, A. M.: J. A. M. A. **116:** 2465, 1941.
Allen, Willard: Second Symposium on Clinical Problems of Advancing Years, p. 27, Philadelphia, 1951.
Bickers, Wm., and Woods, Maribelle: New England J. Med. **245:** 453, 1951.
Binkley, J. S.: J. A. M. A. **113:** 113, 1939.
British Council of Medical Women's Federation: Lancet **7:** 106, 1933.
Chamberlin, H. E.: Am. J. Obst. & Gynec. **54:** 301, 1947.
Christy, C. J.: Am. J. Obst. & Gynec. **50:** 84, 1945.
Crossen, R. J., and Loeb, Leo: Arch. Path. **37:** 202, 1944.
Crossen, R. J., and Suntzeff, Valentina: Arch. Path. **50:** 721, 1950.
Delaplaine, R. W., Bottomy, J. R., Blatt, Meyer, Wiesbader, Hans, and Kupperman, H. S.: Surg., Gynec. & Obst. **94:** 323, 1952.
Donovan, J. C.: Am. J. Obst. & Gynec. **62:** 1281, 1951.
Duke, W. W.: Asthma, Hay Fever, Urticaria and Allied Manifestations of Allergy, St. Louis, 1926, The C. V. Mosby Co.
Ehrenfest, Hugo: Am. J. Obst. & Gynec. **34:** 715, 1937.
Ferguson, H. E.: Virginia M. Monthly **75:** 447, 1948.
Finkler, Rita S.: J. Clin. Endocrinol. **9:** 89, 1949.
Freedman, Nathan: Am. J. Obst. & Gynec. **62:** 1273, 1951.
Glass, S. J., and Shapiro, M. R.: GP **3:** 39, 1951.
Goodall, J. R., and Power, R. M. H.: Am. J. Obst. & Gynec. **36:** 372, 1938.
Greenblatt, R. B., and Kupperman, H. S.: M. Clin. North America **30:** 576, 1946.
Greenblatt, R. B., Barfield, W. E., Garner, J. F., Calk, G. L., and Harrod, J. P.: J. Clin. Endocrinol. **10:** 1547, 1950.
Greenhill, M. H.: South. M. J. **39:** 786, 1946.
Greenhill, M. H., and Freed, S. C.: Endocrinology **26:** 529, 1940.
Grorud, A. C.: Endocrinology **11:** 748, 1951.
Harris, L. J.: Canad. M. A. J. **58:** 251, 1948.
Heckel, G. P.: J. Clin. Endocrinol. **11:** 790, 1951.
Ishmael, W. K.: J. Lab. & Clin. Med. **27:** 297, 1941.
Kuntz, Albert: The Autonomic Nervous System, ed. 2, Philadelphia, 1934, Lea & Febiger.
Levin, Ezra, Burns, J. F., and Collins, V. K.: Endocrinology **49:** 289, 1951.
Maranon, G.: The Climacteric (The Critical Age), Translated by K. S. Stevens, Edited by Carey Culbertson, M.D., St. Louis, 1929, The C. V. Mosby Co.
Masters, W. H., and Allen, W. M.: Geriatrics **3:** 183, 1948.
Masters, W. H., and Allen, W. M.: J. Clin. Endocrinol. **10:** 348, 1950.
Page, E. W., and Ogden, Eric: Am. J. Obst. & Gynec. **53:** 150, 1947.
Popenoe, Paul: GP **6:** 53, 1952.
Reiffenstein, E. C., Jr., and Albright, F.: J. Clin. Investigation **26:** 24, 1947.
Rowe, A. H.: J. A. M. A. **91:** 1623, 1928.
Sevringhaus, E. L.: J. Clin. Endocrinol. **4:** 597, 1944.
Sikkema, S. H.: Rocky Mountain M. J. **48:** 505, 1951.
Simpson, J. W., and Mason, K. E.: Am. J. Obst. & Gynec. **32:** 125, 1936.
Smith, D. R.: J. Missouri M. A. **28:** 382, 1931.
Swift, B. H.: J. Obst. & Gynaec. Brit. Emp. **43:** 1053, 1936.
Taylor, H. C., Jr.: Surg., Gynec. & Obst. **62:** 129, 562, 1936.
Taylor, R. D., Corcoran, A. C., and Page, I. H.: Am. J. M. Sc. **213:** 475, 1947.
Traut, E. F.: Letter to Editor, J. Clin. Endocrinol. **6:** 515, 1946.
Varino, G. A., and Beacham, W. B.: Am. J. Obst. & Gynec. **41:** 124, 1941.
Vaughan, W. T., and Fowlkes, R. W.: J. A. M. A. **105:** 955, 1935.
Wohl, M. G., and Pastor, Nathan: Am. J. Obst. & Gynec. **41:** 792, 1941.

Chapter 16
MEDICOLEGAL POINTS IN GYNECOLOGY

There are various conditions connected with the genital organs concerning which the physician may be called to testify in court or to give a written opinion.

Such testimony is, generally speaking, simply the recitation of facts in anatomy, physiology, pathology, symptomatology, diagnosis, treatment, and prognosis, with which the physician is necessarily more or less familiar because of his daily work. But there are certain things, of little or no value in the ordinray diagnosis and treatment of diseases, which assume much importance when the case comes into court. So, when called to attend a case in which there is any probability of court proceedings, the facts that are of medicolegal importance should be given considerable attention.

Some of these facts in connection with certain subjects that frequently find their way into court will be pointed out here.

RAPE

Rape is defined as "the unlawful carnal knowledge of a woman without her consent," and again, more in detail, as "sexual intercourse with a woman effected by violence, or with a young girl by abuse of her ignorance."

Medical evidence is ordinarily required to confirm or disprove the statement that rape has taken place. False accusations of rape are very frequent. Taylor states that for one real rape tried in the courts there are, on the average, twelve pretended cases. Some of these cases of false accusation are founded on a mistake, as may happen with infants, children, and persons mentally defective. In other cases the accusations are made willfully and designedly for the purpose of extortion or revenge, or from another ulterior motive. In some instances the false accusation may be at once disproved by medical evidence, though it has happened that the medical man has been deceived and duped by designing persons. In many cases in adults the medical evidence is not decisive, and the truth or falsity of the charge must rest almost wholly on the statement of the prosecutrix herself along with the corroborating circumstances.

The question for the physician to decide as far as possible, from his examination, is whether or not sexual intercourse took place, or was attempted, at approximately the time indicated. Subsidiary information may be required; e.g., as to whether there were evidences of violence elsewhere on the body, or as to whether intercourse has ever taken place or has frequently taken place, or as to whether death was caused by the injuries inflicted, or as

to whether disease was communicated at the time, and if so, what is the nature and probable outcome of such disease. On all such points the physician is supposed to be informed, and he is also supposed to keep such record of his cases as will enable him to testify with certainty, some years afterward, concerning his findings in any particular case.

For the consideration of the medical evidence of rape it is convenient to divide the cases into three classes, the first including infants and children, the second including young unmarried women, and the third including married women.

There are, however, certain points that should be kept in mind in all cases. When called to examine or treat a person on whom rape is alleged to have been committed, notice and record, as soon as you can conveniently, the following points, for you are likely to be questioned in court concerning them:

1. The precise time at which you were summoned, the exact hour and date of the examination, and the place of the examination. It is important in some cases to know whether or not the female, alleged assaulted, took the earliest opportunity to complain. Also, the exact time elapsing between the alleged assault and the examination has an important bearing on the signs found. The place of the examination at a certain time may be important as showing the truth or falsity of some statement of the defense or prosecution regarding the movements of the female shortly after the time of the alleged assault.

2. Marks of violence about the genitals.

3. Marks of violence on the body elsewhere or on the clothing of the complainant.

4. Presence of stains of spermatic fluid or of blood on the clothing. When the character of the stain is not clear, make a microscopic examination of the contaminating material.

5. The existence of disease probably conveyed in the alleged assault (gonorrhea, syphilis, chancroid).

The evidences of rape will vary with the age of the patient and other circumstances.

It may be stated that, to establish the fact of rape, it is not necessary to prove penetration into the vagina by the male organ. It has been decided that, if the evidence shows penetration of the vulva or to the vulvar cleft, that is sufficient—the legal establishment of the crime requiring only the fact of the penetration, the degree of penetration being quite immaterial. Consequently, the hymen is not necessarily ruptured, even in cases where entrance of the male organ into the vagina would be absolutely impossible without such rupture. Taylor, in his *Medical Jurisprudence* (American Edition by Clark Bell), states: "Medical men sometimes have fallen into error on this point, considering that, when the hymen was entire, rape could not have been committed, but the statute law says nothing about the rupture of the hymen as a necessary part of the medical evidence; it requires from the medical witness merely proof of vulvar penetration—this may occur and the hymen remain intact." However, laws differ, and in any case it would be well to look up the wording and interpretation of the law in the state or country where the alleged assault occurred.

Infants and Children

In the case of infants and children there are usually decided evidences of injury about the genital organs. Of course, such injury does not necessarily exist, but when it does not exist the proof of rape must rest largely on evi-

dence other than medical. Again, when there are evidences of injury about the genitals in a child alleged to have been assaulted, it does not necessarily follow that the injuries are due to rape. The abnormal appearance may be due to some disease or to some accidental injury, or to some injury inflicted by a designing person with the object of deceiving the physician. All these things must be kept in mind. In this, as in other situations, the physician's diagnosis of the conditions present and the interpretation of the meaning of those conditions must be founded on incontrovertible physical evidence that will stand attack from all sides.

The evidence of rape will, of course, vary much with the time that elapses after the occurrence before the child is seen.

1. If the child is **seen within a few hours,** the following conditions may be present:

a. More or less abrasion of the vulva and vaginal opening, with probably some bleeding or clots. If penetration into the vagina has taken place, there may be extensive injuries—tearing of the hymen, perineum, and vaginal walls into the rectum or even into the peritoneal cavity.

b. Evidences of violence elsewhere on the body or about the clothing—scratches or bruises on the body, tears of clothing, blood on it or disarrangement of it. In some cases the child has been rendered insensible by a blow on the head or by some drug administered.

c. Presence of semen in the vicinity of the genitals of the child or on the clothing. The contaminating material should be submitted to microscopic examination, that the presence or absence of spermatozoa (as a positive evidence of semen) may be determined.

d. Presence of gonorrheal pus on the genitals. The presence of pus about the genitals of the child does not necessarily indicate rape. The pus may have been put there, with blood and scratches, for purposes of deception. If microscopic examination of the pus shows gonococci, it has come, directly or indirectly, from gonorrheal inflammation in a male or female. Gonorrheal ophthalmia is a not infrequent form of gonorrheal inflammation, and the pus from such a condition in the mother or attendant may be responsible for the gonorrheal vulvitis in the child.

2. If the child is **seen after a few days** or a week or so, the following conditions may be found:

a. Acute inflammation, apparently due to violence. The fact that inflammation is present is established by the presence of a mucopurulent discharge, yellowish in color and staining the linen. This may not be present the first day or two, but after that it is ordinarily present if there has been much injury of the vulva or vagina. The inflammation is further indicated by the redness of the parts, the tenderness, and the pain on urination.

The acuteness or recent onset of the inflammation is shown by the severity of the process compared with its extent, the marked painfulness of the affected areas, the presence of recent abrasions and tears about the hymen and vulva, and possibly swelling from edema. The parts may be so painful that the child strongly resists any attempt to make an examination—even the separation of the thighs. This is of no diagnostic significance, as children with inflammation from other causes, or even with no inflammation, may do the same. If this obstacle to examination is extreme, it may be necessary to anesthetize

the child in order to make the examination. If extensive inflammation is present, there may be fever, and in the very extreme injuries the most serious acute symptoms may develop. Several deaths from this cause, with consequent convictions for murder, have been recorded.

The fact that the inflammation was immediately preceded by violence or mechanical injury is shown by the evidences of recent tears or abrasions, or by ecchymoses due to bruises from some cause, and also by the extent and severity of the inflammation in such a short time and without other apparent cause. Gangrene with sloughing of the external genitals and vagina and adjacent tissues has occurred from these causes, usually with fatal effect, though some have recovered after considerable sloughing.

Care should be taken to exclude similarly appearing conditions due to other causes. The very severe inflammation of the genitals called "noma" has more than once led to a mistaken supposition of rape. It is seen principally in debilitated children with severe acute diseases, such as scarlet fever, diphtheria, typhoid fever, etc. Occasionally, however, it occurs in apparently healthy children where the genitals are neglected and dirty, permitting some severe infection. It may follow marked bruising or injuries of the parts from any cause. It may follow even a comparatively slight injury in an otherwise healthy child. Taylor relates a rapidly fatal case in a child five years old who accidentally fell on some thorns, from which she sustained slight injuries, followed by a severe infection and noma and death. The condition of the parts, with the evidence of mechanical injury, was such that it might easily have led to a charge of rape, had the real cause not been known.

b. Gonorrheal inflammation in the acute state. Gonorrheal inflammation is likely to extend into the urethra, though the vagina may escape. The diagnosis of gonorrheal inflammation is established by finding gonococci in the discharge. The significance of the presence of acute gonorrheal inflammation depends on circumstances as already explained.

c. Evidences of chancroidal infection.

d. There may be present some of the other conditions mentioned under the earlier examination.

The disturbance of the parts may be very slight, as shown in cases where other circumstances proved the rape. For example, an adult was convicted of rape on an infant only seven months old. According to the medical evidence the vulva was somewhat swollen, there was slight excoriation about the labia minora and a small amount of blood. The hymen was not lacerated, and there was no evidence of penetration past it. Seminal fluid was found on the person of the child.

The evidences of rape, when not severe, may very quickly disappear. Casper relates a case of a girl of eight years upon whom rape was committed by a man in a drunken condition. The girl was examined the next day. The labia were then reddened, and there was congestion about the vaginal entrance, which was very tender. Examination ten days later showed the genitals to be in their natural state, and there was nothing at that time to indicate that the girl had been subjected to violence.

3. An examination **after some weeks or months** may show no evidence of the disturbance, or may show one or more of the following conditions:

a. Chronic mucopurulent discharge from the vulva or vagina. This is present in many infants and young girls from simple causes, such as want of cleanliness, scalding from frequent irritating bowel movements, seat worms, irritating urine, adherent prepuce over clitoris, skin diseases of the vulva, pediculi, and various other sources of irritation about the genitals.

b. Chronic gonorrheal discharge from the external genitals or vagina. The fact that the discharge is gonorrheal is established by finding gonococci. If the beginning of this discharge can be fixed as about the time of the alleged assault, it is strong corroborative proof. Gonorrheal vulvitis and vaginitis occur, however, not infrequently from wholly different causes, as previously noted.

c. Evidences of syphilis or chancroid.

d. Laceration or destruction of hymen. The presence of the intact hymen does not preclude rape, as previously explained; neither does the absence of the hymen or apparent laceration of the hymen necessarily imply injury of the membrane by rape or otherwise, though the condition of the hymen might be strong corroborative proof in a particular case, especially if it could be established by the mother or the nurse, or a physician who had made an inspection, that there was, prior to the time of the alleged assault, a well-formed and apparently intact hymen. The hymen is very different in shape and appearance in different individuals. Occasionally it is practically absent in a child otherwise normal.

e. Abnormal size of vagina, as though it had been at one time dilated. Permanent marked dilatation is not very likely to follow a single distention by coitus or otherwise. This condition, which is found occasionally in older girls where the question arises, is due usually to repeated distention of the vagina, by coitus or otherwise, extending over a considerable period of time. In such cases, the parts may soften and relax to a remarkable extent, even leading to the suspicion that childbirth may have taken place.

f. Scars from injury to the genitals. The genitals are exceptionally well protected, and are not often injured, except by some disease process or in attempts at coitus. Occasionally a child will fall astride of some object and inflict an injury. Again, injury may come from attempts of the child to introduce some foreign body into the vagina, though such injuries are more likely to be found in girls somewhat older. Scars about the genitals may, of course, result from any severe inflammation or destructive process, and also from chronic inflammation of milder grade when it is accompanied by persistent scratching, with resulting ulceration.

Older Girls and Unmarried Women

In this class, the severity and certainty of the signs decrease and the difficulties of arriving at a definite conclusion increase. The mechanical injuries following coitus, or attempted coitus, are less marked and sooner disappear, and there remain fewere deviations from the normal. Again, in the case of older girls and adult women, the medical man is likely to be subjected to two lines of questioning: (A) as to whether or not coitus or attempted coitus took place at about the time of the alleged assault, and (B) whether or not coitus had ever taken place before, and, if so, whether several times or over a considerable period.

A. **Evidences of Recent Coitus or Attempted Coitus.**—The evidences found will, of course, depend to a considerable extent on the period of time which intervenes between the assault and the examination. If the examination is made within a few hours after the assault, one or more of the conditions pre-

viously mentioned may be found. The mechanical injury to the genitals is likely to be less because the parts are larger, and the epidermis less delicate and less easily abraded. The evidences of injury on other parts of the body are likely to be more marked because of the greater resistance which the victim is able to make.

If the examination is made after a few days or a week, the additional points already mentioned must be investigated. As the local injuries are less than in younger females, they will subside more quickly.

If the examination is made after several weeks or months, the problem for the physician resolves itself into determining whether or not sexual intercourse has ever taken place. The determination of the time when the coitus took place is ordinarily impossible after several weeks have elapsed. In certain cases the medical testimony may be strongly corroborative of other testimony in establishing the time of the assault, even after several months. For example, if it should be established by other testimony (a) that up to the time of the assault the young woman was perfectly well and had never had coitus, and (b) that immediately afterward she had a discharge and had been sick more or less ever since, and (c) that there had been no subsequent coitus—then the finding of a chronic pyosalpinx with chronic endometritis, in an examination some month later, would be strong corroborative proof that the infecting coitus took place about the time of the alleged assault.

Ordinarily, however, after a few weeks all the acute and subacute evidences have subsided, leaving only those that, so far as any distinctive characteristics are concerned, might have been there some months or some years. So the question here is essentially whether or not coitus has ever taken place in the case of the individual concerned.

B. **Evidences of Remote Coitus.**—Ordinarily, it is easy to tell, by a comparatively superficial examination, whether or not a girl or woman has probably had coitus. The differences in appearance of the external genitals and vagina when coitus has taken place (especially if it has taken place several times) are usually so marked that the physician has little difficulty in distinguishing them. This is the general rule. There are, however, exceptional cases which present many of the ordinary evidences of coitus when in fact none has taken place. On the other hand, there are persons who present signs which are considered almost pathognomonic of virginity when in fact sexual intercourse has occurred, and not only sexual intercourse, but pregnancy and labor at full term. So, in exceptional cases it may be very difficult to decide certainly whether or not sexual intercourse has occurred, and in such a case it is particularly difficult to legally prove it, for the anomalies must then be considered.

The evidences of remote coitus or attempted coitus can be summed up as follows:

1. Evidences of **previous childbirth** at or near term.

a. Destruction of the hymen, leaving only irregular tags here and there about the vaginal opening, with scar tissue between. This condition is very strong evidence of childbirth at or near term. It means that there has passed through the vaginal opening some body large enough not only to stretch and lacerate the hymen, but to stretch out the vaginal ring enormously, and to so stretch and compress and bruise the hymen that the

subsequent sloughing and scar contraction have practically destroyed it. There is really no hymen that can be traced as a circular ring of tissue with simply laceration from intercourse. The hymen, as such, is gone, and there remain only irregular projecting particles of tissue (carunculae myrtiformes) here and there to mark the place where the hymen used to be. Of course a large tumor, e.g., a myoma, delivered through the vagina might do the same. Also, some destructive inflammatory process or serious injury during childhood or later might produce practically the same result, but such conditions are rare and show also other evidences. There are cases of congenital deformity in which the hymen may be present simply as irregular tags of tissue, or it may, as recorded in some cases, be absent altogether. In such cases, we would not expect the scar tissue about the vaginal opening or the marked enlargement of the opening. So the destruction of the hymen as described, when present, is strong presumptive evidence of previous childbirth.

Suppose the hymen is not destroyed—does that prove that no childbirth has taken place? Not necessarily. Occasionally during labor the hymen is simply torn and then the ring beyond it is stretched and torn. After labor, the portions may heal in such a way that the hymen appears practically intact. Still rarer cases have been recorded in which the hymen softened and dilated sufficiently to permit the child to pass and then underwent involution to about its former size. Such a hymen is likely to stretch also during coitus instead of tearing. The examination of such a patient would show an "intact hymen," or, as some, laying too much stress on the condition of the hymen, are wont to write, "virgo intacta." The absurdity of such a designation based only on the condition of the hymen is well expressed by Taylor when he remarks, "such 'virgines intactae' have frequently required the assistance of accoucheurs and have in due time been delivered of children."

b. Evidences of laceration or great stretching of the perineum, vagina, and pelvic floor. These evidences are a large vaginal opening, close approach of the opening to the anus (partial destruction of perineal body), scars about the opening or on the perineum, lax vaginal walls, and lax pelvic floor. These have about the same significance as the destruction of the hymen above mentioned—that is, their presence is strong evidence of previous childbirth, but their absence is not of much legal significance.

c. Laceration of the cervix. The establishment of a distinct laceration of the cervix is very strong evidence of a previous parturition or operation involving division of the cervical wall. There are conditions that simulate a slight laceration, but a deep laceration would hardly be simulated by anything short of some congenital deformity, and in such a case there would be likely to be other deformities. Also, there would be no scar tissue, such as is ordinarily found about a laceration of the cervix.

d. Evidences of previous lactation. It may be possible to press some fluid from the breasts, or the breasts may show the enlarged veins and the white striae (lineae albicantes) of a previous distention.

e. Evidences of a previous distention of the abdominal wall. There may be present the striae (lineae albicantes) indicative of previous stretching of the skin from distention from pregnancy or other causes. When other causes (obesity, tumor, ascites) can be eliminated by the history, such striae indicate previous pregnancy. Also, marked relaxation of the abdominal wall may be due to previous distention by pregnancy.

2. Evidences of **previous abortion.** After a short time, the evidences are exceedingly uncertain in many cases. There may be some slight lacerations, with resulting scars, that may be corroborative evidence, especially partial laceration of cervix. Their presence may help some, but their absence is of no particular significance.

3. **Laceration of hymen** and some dilatation and laxity of vaginal opening and vaginal canal. These are the ordinary evidences of coitus and are nearly always present, especially if repeated coitus has taken place. Usually the opening in a virgin hymen is so small that the introduction of one finger is effected with some difficulty and causes pain. Ordinarily, after repeated

coitus, the vaginal opening admits two fingers easily for examination, and without pain, provided the perineal edge of the opening is carefully depressed.

In exceptional cases the hymen may remain intact after coitus, particularly in those cases in which the opening is large and a little stretching will accommodate the male organ. Occasionally, however, a hymen with a small opening will remain intact. In such cases the hymen is usually elastic and unusually tough, and consequently it stretches and dilates under a force that would rupture an ordinary hymen. So that, though it may be said that there are many exceptions to the rule that "coitus ruptures the hymen," there are very few cases in which a hymen presenting the normal rupture capacity (or normal size, normally tense and having the normal consistency, elasticity, and strength) does not rupture on first coitus. In doubtful cases, then, the physician should take care to ascertain accurately, not only the presence of the hymen, but also its character.

The apparent laceration of the hymen or even the absence of the hymen, while presumptive evidence of coitus, is not positive evidence of the same. It may be absent wholly or partially from congenital deformity. It may have been destroyed or dilated by disease or injury in infancy, childhood or later life. It may have been lacerated by an operation or an examination. Its apparent laceration is, however, strong, corroborative evidence of coitus when taken in connection with the history of the case, and especially when there is reliable testimony establishing that it was formerly intact.

4. Evidences of a **disease** usually communicated in sexual intercourse, such as gonorrhea, syphilis, chancroid, pediculosis pubis.

5. Evidences of uterine or tubal **inflammation,** presumably due to infection following labor or abortion, or coitus.

Married Women

In married women normal sexual intercourse has, of course, already taken place, so that the establishment of the fact of coitus is of no help in establishing rape. The medical evidence, if any is required, must bear upon the question of coitus by some one other than the patient's husband and against her resistance.

The following points should be investigated:

1. Evidences of **injury about the genitals,** indicative of forced and hurried coitus. There may be abrasions, tears, bruises, or bleeding.

2. Evidences, elsewhere on the body or clothing, of **injury in resistance.** There may be bruises and scratches, or an excited or hysterical state, such as might be caused by a harrowing experience. The clothing may show tears or bloodstains, or contamination with dirt of the road, or disarrangement. Of course, none of these evidences of violence establishes the crime of rape. They only go to show that something was attempted that excited the woman's resistance. They might have been due to attempted robbery or to a quarrel. Again, they may have been placed there intentionally. The woman may be trying to deceive for the purpose of extorting money or for other reasons.

3. Stains of **spermatic fluid** may be present on the clothing or person of the woman. If there is any suspicious stain, some of the contaminating material should be submitted to microscopic examination, that the presence or absence of spermatozoa may be determined. Any discharge in the vagina may also be examined microscopically, but the presence of spermatozoa in the vaginal discharge is not of much significance unless it can be established that no coitus with the husband has taken place for three or four days.

4. **Disease** (gonorrhea, syphilis, chancroid) not present in the husband.

The Question of Consent

The question of consent is often the crucial point on the legal side of these cases of alleged rape in adult women, whether married or unmarried. This question is, as a rule, decided largely or wholly by testimony other than medical. In some cases, however, the medical man may be required to give testimony concerning corroborative facts. An adult woman of ordinary health and strength is supposed to make strong resistance. In such a case, if there are no obvious evidences of resistance, the legal assumption is that consent was given and the case is not one of rape. It has been claimed that a strong woman can make effective resistance, and therefore that an accusation of rape by such a woman is an absurdity. "Some medical jurists have argued that a rape cannot be perpetrated on an adult woman of good health and vigor, and they have treated all accusations made under these circumstances as false." This view is too extreme, for there are circumstances and conditions that would make effective resistance impossible even by a woman of unusual strength, as when two or more are combined in the attack or when the woman is rendered powerless by terror or by exhaustion from long struggling with her assailant. The physician may be required to state his opinion regarding the possibility or probability that sexual intercourse could take place without the consent of the woman under various circumstances; for example, the following:

1. When a woman is weak from age, sickness, or other bodily infirmity. That coitus could be forced under such circumstances is evident.

2. When there is imbecility or other form of mental irresponsibility. In such a case consent in the legal sense is impossible.

3. When the woman is attacked by several persons or by one person of superior strength. Rape is unquestionably possible under such circumstances.

4. Where there is unconsciousness or partial unconsciousness from narcotics or intoxicating liquors. Coitus may take place under such circumstances without the consent, and in some cases even without the knowledge, of the woman. Many young women are ruined in this way in the "wine-rooms" of our cities. This fact is recognized in the law which makes it a crime to give a woman intoxicants with the intention of stupefying her, so that coitus may take place without her consent.

5. When there is unconsciousness or parital unconsciousness from a general anesthetic, such as chloroform or ether or laughing gas. The fact that rape may, and occasionally has been, committed under these circumstances is sometimes taken advantage of by designing persons to extort blackmail from dentists and others who must, in their work, anesthetize or partially anesthetize patients without a third party present.

Anesthesia or partial anesthesia of a girl or woman without a third party present is hazardous for another reason. The patient, while going under the anesthetic or recovering from it, may experience certain feelings or hallucinations that cause her really to believe and firmly proclaim that sexual intercourse took place. Many such cases of false accusations, honestly made, are on record. In one instance "a young lady was accompanied to a dentist by her affianced lover, who never left her while the anesthetic was administered and a tooth extracted; yet she could scarcely be convinced subsequently that the dentist had not attempted to ravish her."

6. When there is unconsciousness or partial unconsciousness from hypnotic sleep. Convictions have occurred of undoubted rape under this condition. Also, false accusations may be honestly made from sensations experienced in this condition. This comes under

partial or complete anesthesia. Another source of false accusations, honestly made, is mental aberration of various kinds—from well-marked insanity to the various functional nervous disturbances.

7. When there is unconsciousness or partial unconsciousness from fainting, syncope, an epileptic seizure, a fall or a blow.

8. When the woman is temporarily helpless from terror or from an overpowering feeling of horror at her situation.

9. A woman may cease her resistance under threats of death or duress.

OTHER CONDITIONS

Presenting Medicolegal Points

1. The various medicolegal questions concerned with the state of pregnancy, abortion, labor, and the puerperium belong more strictly to obstetrics, and need not be considered here.

2. The question of the character of a disease present—particularly gonorrhea, syphilis, or chancroid—and the source from which it could have come, and whether or not it is still transmissible, or all questions that may assume medicolegal importance under various circumstances; for example, in suits for divorce, suits for possession of children, suits for alimony, suits for damages against individuals or corporations, etc. Also, of injuries of the genital organs you may be called to give the nature, extent, possible cause, and probable outcome. All these are simple clinical questions, and the information regarding them may be obtained from the clinical portions of this work.

3. Various questions in regard to sterility may come up in legal inquiries. The required information on this subject is given in Chapter 14.

4. In the case of the death of a woman or girl under suspicious circumstances, the physician may be called upon to make a postmortem examination and then to answer, as far as possible, various questions, among which may be the following:

What pelvic lesions were present?
What was the probable cause of these lesions?
What was the cause of death?

5. In coroners' cases, and much more so in malpractice suits (before or after death), the following questions may be asked concerning almost any gynecologic disease:

What disease is present?
What are the principal points upon which your diagnosis is based?
In your opinion did the attending physician use reasonable care and skill in the diagnosis?
What is the established treatment for the disease?
In your opinion did the attending physician use reasonable care and skill in the treatment?

6. In criminal cases and in damage suits the physician testifying as an expert may be required, particularly in the cross-examination, to explain in detail various points in the etiology, pathology, symptomatology, diagnosis, treatment, and prognosis of the affection under consideration. To answer

such questions, the physician must be well grounded in all the important facts and theories of the disease, and must be able to give the required explanations in a few words and in ordinary language, avoiding the little-understood technical terms.

On important contested points it is well to be fortified with the names of two or three recognized authorities on that particular subject, with their exact statements. This information is, of course, held in reserve, to be given only if requested.

In accident cases, retrodisplacement of the uterus is sometimes attributed to a fall or other minor injury. As a matter of fact, the uterus is so arranged and protected in the pelvis that a pathologic retrodisplacement by a minor accident is practically impossible. The following answer was given in the section on Queries and Answers of the *Journal of the American Medical Association:*

> The question of retrodisplacement of the uterus following trauma is complicated and controversial. Spicer states that "traumatic displacements (of the uterus) may result from a fall, sudden jarring of the body, such as landing on the feet or buttocks, lifting heavy bodies, and blows over the lower abdomen." Adair says, "It is also possible for a blow upon the back, or a fall upon the buttocks, to cause an acute retrodisplacement of a nonpregnant uterus, or of a pregnant uterus early in gestation. . . . It is also possible that a preexisting displacement may be aggravated by traumatic causes. . . ." Kessler states that there are two schools of thought concerning the relation between injury and uterine displacement. One flatly denies the relation and the other favors traumatic etiology in selected cases. Many authorities have apparently seen enough instances of retrodisplacement of the uterus following a severe fall to lead to the conclusion that forceful impact, such as falling on the back, may produce a bad retrodisplacement. For every such instance, however, there are many in which the patient gives a history of falling and has a retrodisplacement which is not ascribable to the injury. In almost all instances the exact relation seems difficult to prove.
>
> Failure to conceive is rarely due to retroversion of the uterus alone. Authorities are not wholly in accord concerning the tendencies to spontaneous miscarriage in patients with retrodisplacement, but the consensus is that retrodisplacement of the uterus is a factor of some importance in the etiology of spontaneous abortion. The following references should be consulted:

Spicer, F. W.: Trauma and Internal Disease, Philadelphia, J. B. Lippincott Company, 1939, chapter 17, p. 426.
Adair, F. L.: Trauma and Disease, edited by Leopold Brahdy and Samuel Kahn, Philadelphia, Lea & Febiger, 1937, chapter VII, pp. 224-225.
Fraser, A. J.: Trauma, Disease, Compensation: A Handbook of Their Medico-Legal Relations, Philadelphia, F. A. Davis Company, 1930, chapter IV, pp. 207-208.
Kessler, H. H.: Accidental Injuries: The Medico-Legal Aspects of Workmen's Compensation and Public Liability, Philadelphia, Lea & Febiger, 1931, chapter XIV, pp. 429-431.
Ropp, J. M.: Traumatic Displacements of the Uterus, *Virginia M. Month.* **51**: 101 (May) 1924.

7. It would seem that consent to operation and to such details of operation as the surgeon may find best on examination or in the course of the operation is implied when the patient accepts the surgeon's advice and goes through the preparation for operation. The jury, however, does not always take that view of the matter. Consequently, it is well to remove all chance of controversy on this point by having the patient sign a request for the operation and

having the signature attested by a responsible witness, such as the nurse or an assistant physician. The following, with place and date, is a satisfactory form:

> I herewith request the performance of the required operation and such additional work as may be found necessary or advisable at the time.
>
> Witness_____ _____
> (Signature of Patient)

When the husband appears dubious as to what is to be done or not done, it is a good plan to have him sign the request below the wife's signature. If the patient is a girl under age, her signature should be accompanied by that of one of the parents.

If the patient wishes to make any exception to the latitude of action, such exception should be noted in the request. This enables the operator and patient to understand each other clearly. For example, in a certain case of Dr. H. S. Crossen's requiring hysterectomy, the patient decided after full consideration that she wished both ovaries preserved even though one should be found diseased. The decision seemed to be against the patient's best interests, still it was her right to insist on it if she desired to do so. The exception to the latitude of action was noted in the signed request, and at the operation both ovaries were preserved.

For further information on the operative permit, the reader is referred to a book on *Doctor and Patient and the Law* by Regan.

8. The importance of the subject of foreign bodies left in the abdomen is often not appreciated by the physician until he is involved in a lawsuit concerning it. To make sure that no sponge or other foreign body is left in the peritoneal cavity at operation is a hard problem. This important subject in its various aspects is considered in detail by Dr. H. S. Crossen in a monograph, *Foreign Bodies Left in the Abdomen.*

References

Crossen, H. S., and Crossen, D. F.: Foreign Bodies Left in the Abdomen, St. Louis, 1940, The C. V. Mosby Co.

Queries and Answers: J. A. M. A. **114:** 912, 1940.

Regan, Louis J.: Doctor and Patient and the Law, St. Louis, 1949, The C. V. Mosby Co.

INDEX

B

C

D

E

F

G

I

K

L

M

P

S

T

U

V