I. BASIC FACTS

1. Small-pox contagion or inoculation gives rise in man to small-pox, a highly contagious, generalized disease of considerable mortality, characterized ordinarily by a preeruptive stage, and other stages related to the appearance, development and subsidence of the eruption.

2. Passed through monkeys and cattle for a few generations and brought back to man, the virus gives rise to vaccinia, a localized, non-contagious, mild disease, that in itself causes no mortality, though septic complications may cause some.

3. Having, by passage, once lost its power to produce small-pox, the virus *never regains* it, even though passed from person to person (proper hosts for variola virus) for from thirty-five to one hundred years.

II. EXPLANATION OF BASIC FACTS

Many explanations have been attempted by others and by myself, but all but two are at once rendered null by one or more of the stubborn basic facts. The two exceptions are:

1. The germ of small-pox by passage through certain lower animals loses (acquires) certain properties, and it transmits its altered condition to its offspring forever, a more striking instance of hereditary transmission of acquired characteristics than has ever before (so far as I know) been cited.

2. *Small-pox is due to a dual and divisible virus, one part of which causes vaccinia and the specific small-pox eruption, the other part being necessary for the production of the contagious, generalized, mortal disease with a distinct preeruptive stage and initial rashes.*

The latter is the favored explanation, both because it seems more reasonable and because it is supported by numerous well-established facts. Though these will not be considered at length here, the more striking ones will be indicated under three general heads.

III. EVIDENCE FAVORING THE EXPLANATION

1. More or less analogous close association of two viruses—hog cholera, dog distemper, etc. (filterable virus and bacillus). Hydrophobia is so closely analogous, street virus corresponding to variola and fixed virus to vaccinia, that the same explanation (duality of virus), probably applies to it.

2. Animal poxes and variolation of animals.

A. Small-pox, cow-pox, horse-pox and sheep-pox mutually protect one against the other (Immermann). Clinically and otherwise they differ.

B. It is very difficult and often impossible to carry small-pox direct from man to calf, the latter being highly resistant. Once established in the calf the pox virus becomes exalted to such a degree that it protects against later vaccination better than does an attack of small-pox, though the latter, by causing immunity to both parts of small-pox virus, affords better protection against that disease.

C. The part of the small-pox virus which is not concerned in pox formation, but is necessary for the development of the contagious, generalized, mortal disease with an initial stage and initial rashes (small-pox), dies or disappears after a few bovine passages. It is therefore unable to participate in the immunization resulting from vaccination.

3. Clinical observations.

A. The three forms of small-pox not showing a pox stage, or only an incomplete one, purpura variolosa, varioloid and variola sine exanthemate, occur in vacci-

nated persons as often as, or more often than, in unvaccinated.

B. *Vaccinia therefore protects against the pox stage of small-pox rather than, or to a greater degree than, against the whole disease.*

C. Twenty-two per cent. of 2,601 persons who had had variola or been variolated were still susceptible to vaccinia, though immune to small-pox.

A much longer exposition of the above facts, all quoted from other authorities, with a list of references, will soon appear in the *Philippine Journal of Science* and in the *Military Surgeon*. Meanwhile it is hoped that others, more fortunate than we in being able to get hold of small-pox cases, will if possible anticipate this board in experimental work on the subject. For some months there has been no small-pox in or about Manila.

TUBAL REIMPLANTATION

A NEW CONSERVATIVE OPERATION FOR STERILIZATION OF WOMEN

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Permanent sterilization of the female in some cases has been advocated and more or less imperfectly carried out for many years. The indications have varied considerably with different operators. Chronic heart disease, tuberculosis, nephritis, diabetes and hereditary mental taints are generally regarded as indications for sterilization.

A few enthusiasts, such as Spinelli,¹ Cramer² and Polack³ would add chronic anemia, persistent albuminuria, epilepsy, syphilis, contracted pelvis, diseases of metabolism, infections, cholera, melancholia and cirrhosis of the liver.

Sterilization has been obtained through various unnecessarily mutilating operative procedures on the uterus, ovaries or tubes. The French school seems to prefer supravaginal hysterectomy, an operation which must often be considered as heroically destructive in its results, even though there be no loss of the ovaries and the ovarian secretion, often so essential to metabolic activity in such cases. The "castratio uterina atmocautica" of Pineus⁴ or vaporization of the uterine cavity in order to destroy its mucosa, and the use of the thermocautery as advocated by Kussman⁵ are also permanently destructive in their results. Although oophorectomy was and is still too frequently performed, I believe that, to-day, no thoughtful gynecologist would perform a double oophorectomy with sterilization as the only object in view.

Tubal sterilization has been obtained by a variety of methods—total excision, partial resection of the tubes with or without suture of the stumps, and single or double ligation without section of the tubes. R. T. Morris⁶ ties a silk thread about each fimbriated extremity. The ligature becomes encapsulated and closes the

1. Spinelli, P. G.: Indicazioni generali e tecnica della sterilizzazione della donna. Arch. Ital. di ginec., Napoli, 1898, 1, 443.

2. Cramer, H.: Ueber prophylaktische Sterilisierung der Frau. München. med. Wehnschr., 1904, 1, 605.

3. Polak, J. O.: Sterilization in Cesarean Section, Tr. Am. Gynec. Soc., 1909, xxxiv, 73.

4. Pineus: Quoted by Sarway, Deutsch. med. Wehnschr., 1905, 11, 202.

5. Kussman: Quoted by Sarway (see Note 4).

6. Morris, R. T.: Buffalo Med. Jour., 1903, p. 387.

tube. Harris⁷ implants the severed proximal ends of the tubes on the posterior uterine wall by flattening them out and suturing them to a peritoneal area previously denuded. H. D. Fry⁸ buries the cut proximal ends in the broad ligaments. A. E. Rokey⁹ excises the tubes at their cornua, draws them partly out of their peritoneal sheaths and cuts them off. (As shown by him, the severed ends of the tubes will slip into their sheaths and be completely covered by the latter.) He then closes the cornua and fastens the tubal sheaths to the fundus uteri. Van Meter¹⁰ makes a small slit through the peritoneal covering of the tube at its proximal end, hooks the tube up and severs it at its uterine juncture, reflecting the severed end, on the distal side, out through the incision in the peritoneal covering and closing the

who became pregnant and required abortion. Reiffenscheid¹³ reports pregnancy occurring in a patient one year after a similar technic.

Total extirpation of the tubes is advocated by Haberland,¹⁴ Frankel, Hubl, Sarway¹⁵ and others. Except when done by the procedures of Fry and Harris, tubal sterilization must necessarily be permanent in its results. Fry alone does not disturb tubal drainage, the severed tube apparently lying free between the layers of the broad ligament.

I call my operation tubal reimplantation. I devised it some eighteen months ago and believe it is indicated in fairly definite selected pathologic conditions such as tuberculosis, nephritis, syphilis and certain mental conditions. It is essentially non-mutilating, conservative, and is conceived on what appears to be a reasonably sound physiologic and anatomic basis. It can be performed, of course, only on normal tubes, but minor pelvic lesions or displacements can be corrected at the same time. In multiparae it can be performed either abdominally or vaginally; in virgins lack of space makes the technic by the latter route somewhat difficult.

STEPS OF THE OPERATION

1. Make mediolateral incision 4 inches long. Open peritoneal cavity in median line after retracting rectus muscle and opening posterior sheath with scissors.

2. Grasp fundus uteri with vulsellum forceps and draw it up through the incision.

3. Amputate tubes on either side one-fourth inch from the uterine cornua. With a fine rat-toothed forceps or a probe, invaginate the distal half of each stump and close the lumen with two catgut sutures. This produces a serous adhesion which will effectively close the canals.

4. On the posterior uterine wall, make two parallel vertical incisions 1 inch long and one-half inch apart. These incisions should not be over one-fourth or one-fifth inch deep. With a curved forceps, burrow between these incisions, creating a canal of sufficient size to contain the two tubes.

5. With the same curved forceps remaining in the new canal, grasp the opposite tube and draw it through the canal so that it emerges on the opposite side. Reintroduce the forceps from the opposite side and repeat the same procedure with the remaining tube. In the new canal the tubes should be parallel to each other, one lying above the other, the cut extremity of each tube emerging on the opposite side of the new canal.

6. Make a small cuff by everting the tubal mucosa (it is sometimes necessary to make two small incisions before being able to evert satisfactorily) and secure cuffs to the margins of the new canal by fine catgut stitches which also control any uterine oozing which may be present. Test the patency of both tubes by means of a fine probe.

7. Close the abdominal incision.

RESULTS AND PURPOSE OF THIS METHOD

This operation, I believe, preserves the delicate function of the tubal ciliated epithelium; that is, the tube remains an open canal from end to end and continues to drain normally, if we believe in Menge's wave.

Fig. 1.—Tubal reimplantation; A, invaginated stump of tube; B, posterior surface of uterus; C, reimplanted tube; D, bladder; E, sigmoid.

peritoneal slit with catgut. Kirchoff¹¹ makes a longitudinal incision through serosa from 4 to 5 cm. long over the uterine portion of the tube, elevates the tubes with tissue forceps, resects from 3 to 4 cm. of the tubes, ties both ends and drops them back into their serous sheaths.

Simple and even double ligation of the tubes has proved inefficient in several cases, however, patients reporting subsequent pregnancies. Kustner,¹² who resects 2 cm. of each tube per vaginam, had two patients

7. Harris: Quoted by Polak (see Note 3).

8. Fry, H. D.: Quoted by Polak (see Note 3).

9. Rokey, A. E.: New York Med. Record, 1906, II, 423.

10. Van Meter, M. E.: Stamping out Hereditary Diseases by Sterilizing the Sexes, Am. Jour. Surg., 1907, xxi, 18.

11. Kirchoff: Ztschr. f. Gynäk., 1905, p. 1132.

12. Kustner, Otto: Zur Indikation und Methodik der Sterilization der Frau, Monatsschr. f. Geburtsh. u. Gynäk., 1905, xxi, 279.

13. Reiffenscheid: Ztschr. f. Gynäk., 1905, p. 19.

14. Haberland: Ueber Indikationen und Technik der operativen Sterilisation vermittelst Tubenunterbindung, Med. Klin., 1906, II, 1310.

15. Sarway, O.: Ueber Indikationen und Methoden der fakultativen Sterilisation der Frau, Deutsch. med. Wochenschr., 1905, II, 292.

Many cases of hydrosalpinx, in otherwise normal patients, have been reported following sterilization by ligation of either the uterine or fimbriated extremity of the tubes. By securing the everted cut extremities in an artificial canal, one reduces the danger of adhesions to a minimum.

Finally, although I cannot as yet offer proof, I am of the opinion that, if occasion demands, these tubes can be reconstructed and that these patients having recovered, may again become pregnant. Reconstruction of the tubes would consist in resecting the invaginated portion of the uterine stumps, removing the tubes from their artificial canal and reuniting the ends, mucosa to mucosa, with very fine interrupted catgut sutures. This work can also be done either vaginally or abdominally.

I was led to evolve the above-described technic by the demand, in several previously sterilized patients, for some procedure which might restore them to a condition of potential fecundity. Tubal sterilization by any of the several methods advocated offered no such hope. Careful study prompted me to try to create a positive but, if necessary, a temporary sterilization.

I have performed this operation four times during the past eighteen months. Two of the patients were tuberculous, the third was a multipara suffering from chronic nephritis who had had eclampsia at the time of her last parturition, and the last patient was a multipara on whom a ventral suspension had been performed for prolapsus uteri. Pregnancy having supervened shortly afterward, the marked anteversion caused severe dysuria and pollakiuria. A laparotomy was performed, but the adhesions encountered were so dense and extensive that it was deemed best to sterilize the patient and empty the uterus. This patient will at some future date have her suspension relieved and the tubes reconstructed.

Sterility has been maintained thus far in all four patients. There has been no menstrual disturbance whatever and repeated bimanual examinations have failed to elicit the presence of any tubal enlargement or palpable pelvic lesion. The general health of these patients has not been impaired and the psychic effect of the knowledge that their pelvic organs had not been removed has been most gratifying.

I desire finally to lay special emphasis on two points: first, the invagination of the tubal stump, thus obtaining seroserosal coaptation; second, the eversion of the cut tube as it emerges from the tunnel on the posterior uterine wall, obliterating raw surfaces which would invite the formation of adhesions.

Ultimate success depends, in a large measure, on the careful observance of these two points.

THE ETIOLOGY OF ARTICULAR AND MUSCULAR RHEUMATISM *

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Acute articular rheumatism is now generally regarded as an infectious disease but much confusion exists as to the nature of the infecting microorganism. Poynton and Payne and others have found that there is present in the periarticular structures and joints in rheumatism a coccus (*Micrococcus rheumaticus*) which, when injected into rabbits, produces lesions very similar to those of rheumatism in man. Many attempts to isolate this particular organism in acute rheumatism however, have

failed, and the question of the etiology of the disease is not settled, although it must be emphasized that many clinical and experimental facts indicate that it concerns streptococci of some kind.

The etiology of muscular rheumatism or rheumatic myositis on the other hand is unknown. It is true that the clinical facts suggest that the cause of this affection is identical with that of acute articular rheumatism, but all experimental evidence is, as far as can be determined, entirely lacking.

In the course of my work on pneumococci and streptococci my attention became directed to rheumatism and I wish in this note to report very briefly certain results which seem to be of interest.

Organisms corresponding closely to *Micrococcus rheumaticus* have been isolated from one or more joints in seven of eight cases of acute articular rheumatism in the early stages. Blood cultures were made in four cases and gave positive results in two. Cultures of the tonsils yielded similar organisms in two cases. The cases were all typical and not unusually severe. In four there was a distinct history of tonsillitis. Two of the patients had marked pain and tenderness of the muscles, especially about the shoulders, neck and back, and of the more tendinous portions of the muscles of the extremities.

Experiments on rabbits, guinea-pigs, white rats and dogs show that the cultures are of relatively low virulence; they are, speaking generally, more virulent than *Streptococcus viridans*, but less virulent than hemolytic streptococci and the pneumococci. The results of injections into the ear vein in rabbits are very striking and different from those of injections of *Streptococcus viridans* of hemolytic streptococci or both. Multiple nonsuppurative arthritis, endocarditis, pericarditis and myocarditis have been obtained repeatedly in the same animal. The strains obtained from the tonsil at the height of the attack gave the same results as those from the joint but the one obtained from the tonsil eight days later, now growing exactly as a *Streptococcus viridans*, produced endocarditis but not arthritis, pericarditis or myocarditis.

The lesions of the joints are chiefly periarticular. Suppuration did not develop with the freshly isolated strains but after passing through animals abscesses about the joints sometimes developed.

By animal passage and by other means three of the strains from acute rheumatism have been converted into typical hemolytic streptococci on the one hand and pneumococci on the other. During one of the transition stages the strain (from a joint) lost much of its affinity for pericardium, endocardium and articular tissues but acquired what seemed like a pronounced affinity for myocardium and skeletal muscles and kidney, producing now a non-suppurative myocarditis and myositis and an acute nephritis. The lesions in the skeletal muscles have been obtained in twelve rabbits, three dogs and one monkey.

Similar lesions of muscles have been obtained also with strains from joints of two cases in which muscular involvement was present and with four strains of "non-virulent" streptococci which have passed through many animals and which resembled the rheumatism strains very closely at the time.

The lesions in the skeletal muscles vary greatly in size, are elongated, and run parallel with the muscle fibers. Some are so small as to be scarcely visible while some are 5 mm. in length. They contain few leukocytes but a large number of the living cocci, while adjacent muscle

* Preliminary note from The Memorial Institute for Infectious Diseases.