will be a bulge or pocket for the corner of the supporting frame.

Allowances can be made for seams and hems, as well as for wider, narrower or taller window casings, and as well as for a double bed.¹

As a cheap substitute for the wire supporting frame used in these illustrations a frame can be made of inch square pine slats, say, five and one-half feet tall and separated about four feet by a cross slat at the top and this frame held out parallel to the window by two thin slats loosely screwed at their ends to the sides of the window casing. A much better plan, however, is to have a blacksmith or a wire-screen firm make a frame like that shown in the illustration (Fig. 5), namely, of five-sixteenths-inch iron rods, taking about fifteen feet for a four-foot-wide window frame. The side arms, of same sized wire, to be, say, two inches longer than the bed is wide. These are hinged on the wire uprights near their curved tops and flattened for the reception of a screw when fastened to the outside jamb of the window casing.

This form of awning is not expensive. It can be made for from six to twelve dollars, according to the size and kind of material used. It is recommended because of its simplicity and its adjustability to the varying house and weather conditions which obtain in every invalid's home. It may find a place among the many other substitutes proposed for out-door sleeping tents, and especially the "window tent" of Dr. S. A. Knopf, described with others in his excellent paper read before the

Fig. 7.—Cross-section of plan for windows hinged to open outward. J K, sliding rods through pivoted stops (I I) to hold windows (C D), in place.

National Association for the Study and Prevention of Tuberculosis, at Washington in May, 1905.

In closing, I wish to suggest what appears to me an ideal arrangement for such a sleeping canopy as this, to be incorporated into the building plan of a house (Figs. 6 and 7). The plan is suggested with the belief that something of the kind ought to be quite generally used in hospitals, dormitories, tenements and homes, since this principle of spending all the sleeping hours practically in the open air probably affords the best adaptable means of preventing, not to say curing, tuberculosis. The architect's plan should either represent his own intelligent forethought or the owner's demand for adequate ventilating possibilities; then such complete ventilation as is here sought can always be easily and cheaply provided. It will not be very much more expensive to substitute this possible wide-open window method, shown in the diagrams (Figs. 6 and 7) for the ordinary sash plan everywhere in vogue.

1. If one does not mind about the curtains not fitting the frame exactly, the making of the sides (after the front lengths are cut off) can be very easily done by next making a square, the hypotenuse of the triangular half of which equals the length of a front piece. Sew the long sides of these two halves to the sides of the front lengths to make the two curtains.

AN IMPROVED ABDOMINAL SUBTOTAL HYSTERECTOMY, ESPECIALLY APPLICABLE IN CHRONIC PELVIC INFLAMMATION;

A METHOD GIVING PARTICULAR ATTENTION TO THE RESTORATION OF LIGAMENTARY SUPPORTS.

WILLIAM F. METCALF, M.D.

DETROIT.

It is not my intention to bring up for discussion the relative merits of the so-called conservative and radical methods of treating chronic inflammatory conditions of the uterus and its adnexa. I frequently remove one

Fig. 1.—Adhesions having been separated, the uterus is lifted upward into or toward the abdominal wound and pulled to one side, making taut the ligaments of the opposite side. Forceps on the infundibular and round ligaments.

Fig. 2. Line of incision through infundibular, round and broad ligaments to the side of the uterus at a point of junction of cervix with corpus.

tube and ovary or one ovary and both tubes or leave only a portion of one ovary, in order that menstrual life may be prolonged. In some of these cases I get good results. In others, continued invalidism, denoting error of judgment on my part, compels the patient eventually to submit to the more radical operation.

In cases of chronic gonorrheal pyosalpinx, Schauta, Doederlein, Hegar, Fritsch, Martin, Winter, Landau

* Read in the Section on Obstetrics and Diseases of Women of the American Medical Association, at the Fifty-eighth Annual Session, June, 1907.

and others, as well as many American surgeons, among whom are Bovée, Kelly, Shoemaker, Mann and Van der Veer, have all expressed themselves in favor of the radical procedure. According to Noble's statistics, the removal of only the tubes and ovaries in such cases is more dangerous than total extirpation. In various other conditions in the pelvis there may not be the same unanimity regarding treatment, and in many, as I have already indicated, there may be opportunity for the exercise

Fig. 3.—Forceps on peritoneal flap separated from anterior surface of uterus, holding bladder forward and ureters further away from uterine vessels. Incision extended through the lateral cervical musculature into vagina, also through anterior cervical musculature and posteriorly through the vaginal wall. The fundus uteri replaced in the abdomen and the vaginal cervix lifted toward the abdominal incision. Where there is much discharge it is covered by a gauze sponge which is held in place by the grasping vulsellum.

Fig. 4.—The uterus and its appendages are removed, the incision being extended in opposite directions through the ligaments. The lateral strips of cervical muscle united by the fibers from the anterior surface of the lower cervix. Gauze in the vagina.

of a limited conservatism, especially as affecting the ovaries, but for present purposes I wish only to consider the best method of removing the organs when it has been decided to sacrifice the ovaries.

The development of hysterectomy proceeded in the direction of lessening the cervical remnant until it was maintained that there was little added danger in complete removal. Any risk involved in the more complicated vascular arrangement at the lower point of section was believed to be compensated by the improved drainage afforded, and latterly it has come to be recognized that the stump of cervix may itself be a harbor for more or less dangerous infection.

A supravaginal hysterectomy for fibroid of the uterus was done as long ago as 1843 by Heath, an English surgeon, but he performed it in a crude fashion by tying off, on each side, a half of the cervix and the broad ligament of the same side *en masse*.¹ Bellinger (1846), after removal of a uterus with fibroid, picked up the bleeding vessels separately and tied them with animal ligatures. Burnham (1853) purposely sought and tied the uterine vessels. These men had all amputated the uterus directly through the cervix at its upper portion. Clay (1863) threw a triple ligature about the cervix low down and cut across above this ligature. Koeberle effected the "low amputation" of the cervix by the application of a *serre-nœud*, the ends of the wire being

Fig. 5.—Needle piercing upper portion of lateral cervical strip to surround uterine vessels with suture and draw this point upward and outward to the fixation point at the pelvic brim, previously established by the union of the cut ends of the infundibular and round ligaments. Completion of the ligating process is shown on the opposite side.

brought up out of the abdominal wound. Pean developed this idea by bringing the stump of the cervix up and fastening it into the abdominal wound, a practice which remained in vogue for twenty years. Mikulicz (1878) applied a temporary ligature to the broad ligament *en masse* and followed this by isolated ligature of the uterine vessels.

To Schroeder (1879 and 1881) we owe the placing of supravaginal hysterectomy on a basis more nearly perfect. He recommended separate ligatures on uterine and ovarian vessels and round ligaments. He also first suggested closing the cervical canal from above by suturing over it two small flaps of cervical muscular tissue, and finally he covered this over with peritoneal flaps so as further to protect the abdominal cavity from infection. The operation, in this stage of its development, has been improperly ascribed to Emmet, who gave Schroeder all the credit for these improvements.

Two things in this operation as ordinarily done have

1. Jayle: *Rev. de Gynec.*, Paris, 1904, No. 1.

seemed to me faulty, and it is in these particulars that I will aim to demonstrate the possibility of its improvement. First, the portion of cervix left, even after "low amputation," so long as the incision does not reach the vagina, must contain a sinus of varying depth, and leading from this sinus are crypts in the form of branching glands which harbor infection; and, second, there is failure to give the remaining pelvic organs, especially the bladder, their best support possible.

The former criticism has been recognized by different operators who have aimed to meet it by cauterizing the cervical canal. In some cases, infection from this source may reach the iliac glands which, although they may not suppurate, may yet remain enlarged and tender, prolonging the convalescence to several months. In 1903 Pichevin reported a case in point in which a "metro-abdominal fistula" remained after supravaginal hysterectomy, as a result of infection from the cervical stump, until the latter was removed from the vaginal vault. He admits the reflection which this case throws on the operation as it is ordinarily performed, but at the same time failed to offer any adequate remedy. In later writing on this point,² he describes the method which he has adopted as follows:

A muff of conical form is cut out of the uterine stump by means of a bistoury. The center is formed by the cervical

Fig. 6.—Suturing of peritoneal flap attached to the bladder over the hammock support; the needle is passing through the end of the uterosacral ligament.

canal and the muff itself is cut from the parenchyma. The cervical mucosa and a part of the musculature are thus removed through a great portion of their extent, down about as far as the external orifice.

In speaking of supravaginal hysterectomy, Kelly³ says:

In order to make the drainage effective it is best to cut down through the cervical ring in the median line posteriorly so as to open the ring widely and give a large avenue of exit at this point.

This measure might prevent the accumulation of blood in the cul-de-sac, but would not give the most perfect drainage of the cervical perimetrium, a consideration of some moment, since it is here that much of the infiltration about the cervix can be shown to accumulate.

Bland-Sutton⁴ says:

The careful study of the subsequent course of patients after supravaginal hysterectomy has led observant operators to notice that those cases did best in which the supravaginal cervix had been most freely removed.

In the light of an experience of over three hundred hysterectomies, by various methods, for chronic pelvic inflammation, I wish to advance the opinion that the cervical mucosa should be removed entirely, so that no gland-bearing tissue may remain to harbor and spread infection. The method by which I accomplish this purpose is still a subtotal operation. I have used it as my regular method of abdominal hysterectomy for the past five years and it was developed out of my previous experience. It has been described in previous reports and papers, and I now feel that results justify my presenting it before this Association.

In the study of results, I have included for consideration my vaginal hysterectomies during the corresponding period, believing that my low mortality in the latter operation has been due to the perfect drainage of the pelvic lymphatics, even aside from any definite pus accumulation, and that, as soon as I had recognized this principle in its application to abdominal hysterectomy, my results with the latter operation, all things considered, were as satisfactory as those with the former had been. Of course, being the operation of choice, a somewhat higher percentage of mortality has fallen to the portion of the abdominal in the later years as was the case with the vaginal operation earlier, because the more

Fig. 7.—More diagrammatic, showing the line of incision.

serious cases naturally were submitted to the operation preferred. More and more pelvic lesions have been approached by the abdominal route because of the opportunity which it affords for the application of a wise conservatism and the facility also given for a careful examination of the abdominal organs.

I can with some assurance state that the operation which I shall describe distinctly meets the second objection that I have raised to the ordinary supravaginal operation, namely, the failure to give the remaining pelvic organs, especially the bladder, their proper support. In order to obtain definite evidence on this point, a standard was sought by which to estimate the efficiency of bladder support attained; and the most satisfactory, as well as the most simple, was found to be a measurement of the distance from the meatus urinarius to the vault of the vagina. My confidence in the results which I report is based on a large number of such measurements, many of them taken years after the hysterectomy.

All the gland-bearing tissue is removed, yet a portion of the cervix is left. I, therefore, speak of this operation as subtotal, a term in use since 1899 and said to

2. *Rev. pratique d'obst. et de gynec.*, Paris, January, 1905.

3. *Operative Gynecology*, 11, 268.

4. *Lancet*, London, May 27, 1905.

have originated with Longuet. The operation is as easy as the supravaginal in the case of fibroid tumors and is safer in suppurative conditions. The leaving of the lateral strips of cervical musculature is a protection against free bleeding from the vaginal arteries.

TECHNIC OF THE OPERATION.

A thorough cleansing, not only of the skin over the abdomen, but also of the vagina, is of especial importance, since the incision extends into the latter area. Standing on the right of the patient, who has been placed in the Trendelenburg posture, the abdomen is opened by an incision in the median line extending upward from the symphysis pubis. The intestines are freed from adhesions and pressed upward out of the pelvis, being held up and protected by long gauze towels. Other adhesions are then broken or cut and any pus pockets opened are wiped dry.

At this point it may be remarked that, contrary to the experience of Faure, Kelly, Doederlein and Pichevin, who claim that the adnexa are more easily removed after the removal of the uterus, I find that the adhesions about the adnexa are more easily broken up by first attacking those posterior to the uterine body and then, while the uterus may still be utilized as a tractor and guide, by following the lines of cleavage from the uterus outward and upward at either side. The methods advocated by H. A. Kelly and J. L. Faure, of splitting the uterus in hysterectomy, I consider objectionable, inasmuch as by so doing the field of operation is unnecessarily exposed to infection from a large area of uterine mucosa.

The fundus of the uterus is now grasped by a pair of strong double volsellum forceps and drawn partly through the abdominal incision and over toward the operator sufficiently to place the left broad ligament under moderate tension. The left uterine appendage is picked up and the infundibular ligament, containing the ovarian artery, is clamped. Near this another pair of forceps is placed, on the left round ligament (Fig. 1). With a pair of stout scissors, sharp-pointed and curved on the flat, both these ligaments clamped are cut across, and the incision is extended down through the broad ligament to the side of the uterus at the point of junction of the cervix with the corpus uteri (Fig. 2). A crescentic incision, convex upward, is then made through the peritoneum covering the anterior surface of the uterus, sufficiently high, if possible, to afford a flap for covering any raw surfaces left in the field of operation. By this incision the vesico-uterine ligament is cut from its attachment to the uterus. This peritoneal flap, with its subjacent connective tissue, attached to the fundus of the bladder, is peeled up from the surface of the uterus and carries with it the bladder and, at each side, the anterior layer of the broad ligament. When this flap is held forward, it raises the bladder from the uterus and the ureters are lifted away from the uterine vessels, which are now uncovered and exposed to view. These vessels are now clamped on the patient's left and cut.

Resuming now the original lateral incision, the scissors pass downward through the musculature of the cervix until the vagina is opened at the side of the external os. A short, wide strip of gauze is passed into the vagina through this opening to guard against infection from that tract. The incision is then carried downward through the front of the cervix, leaving a semi-circular rim of its anterior musculature united by one

end to the lateral strip of muscle just separated from the cervix, and by the other end to the lateral strip to be separated from the other side. The volsellum is now loosened from the fundus uteri and made to grasp the cervix in such a manner as to close, if possible, the external os.

The fundus is now replaced in the abdomen and the cervix lifted upward into or toward the abdominal incision (Fig. 3). The cervical incision is then carried through the musculature in the opposite direction, i. e., from the infravaginal toward the supravaginal portion until it leaves the cervix at its junction with the corpus. The uterine vessels are here grasped with artery forceps and cut across. The incision is continued through the broad ligament after the round and infundibular ligaments are clamped as on the opposite side (Fig. 4).

The only cervical tissue left is a thin strip on either side and a narrow band, taken from the anterior surface of the cervix, uniting the lower end of the two lateral strips. The incision has passed through the posterior vaginal wall in separating it from its cervical attachment. If there has been pus in the pelvic cavity, or an extensive raw surface, necessitating the packing of the cavity with gauze, I extend the incision in the median line through the posterior vaginal wall between the uterosacral ligaments to afford better drainage and to insure easy removal of the gauze.

The course of the incision, as has been seen, resembles in a general way that described by Howard Kelly in the supravaginal hysterectomy that he reported in 1896, but in the treatment of the cervix they bear nothing in common. This operation was merely a "low supravaginal" and, in common with others of its type, left much to be desired in inflammatory conditions.

A suture of rather heavy catgut is now passed around the infundibular ligament with its vessels and tied. The round ligament of the same side is caught up and ligated with the same suture. If either of these ligaments is too long to give firm support as a fixation-point, then the ligature is sewed in at a point higher up and the free end of the ligament or ligaments is trimmed off. The uterine vessels or any of their branches in the broad ligament which it may have been necessary to clamp are now encircled with the same ligature-suture and again tied. The same suture now takes up the corresponding side of the cervical remnant and draws the latter into firm fixation with the newly-established point of junction of the round with the infundibular ligament. By this procedure the uterine vessels have been controlled (Fig. 5). If, as sometimes happens, a branch of the anterior vaginal artery on the same side should bleed when the forceps are removed, a separate suture of fine catgut should be used to ligate it.

Exactly the same plan of approximation is employed on the opposite side, the ligature and suture being continued from the lateral wall of the pelvis toward the median line; and it will be seen that the upper ends of the lateral cervical remnants are thus carried upward and outward toward the pelvic brim at either side. The lower ends of these lateral remnants being still united by the band of muscle tissue from the anterior surface of the cervix, we thus have a strip of cervical muscle extending, like a hammock, almost horizontally across the pelvic strait from side to side. Over this hammock is thrown the peritoneal flap attached to the bladder, the edge of this flap being stitched posterior to the hammock, the sutures passing through the cut ends of the

uterosacral ligaments. Thus the supporting function of all the ligaments is maintained (Fig. 6).

Besides affording normal support to the remaining pelvic organs, the restoration thus effected helps to preserve the normal intra-abdominal pressure. Palmer Findley⁵ says: "The uterosacral and uterovesical ligaments play an important part in the action of the diaphragm."

When it is not necessary to place a packing of gauze in the pelvic cavity, the operative area is made entirely extraperitoneal, and the possibility of spontaneous drainage to the vagina is vastly greater than after the ordinary supravaginal operation. If it be desired to pack the pelvic cavity with gauze for drainage and the prevention of intestinal adhesions, the peritoneal flap is simply made to cover the raw surfaces laterally, the center being left open for the removal of the gauze and for drainage. The original abdominal wound, in any event, is closed without drainage.

In this reconstruction of the supporting framework of ligaments within the pelvis, I believe this method offers something not previously accomplished.

* * *

In some of the cases which go to make up this report, the principal pathologic change was in the uterus itself. Although pyosalpinx might not be present, in many cases microscopic examination revealed the products of old inflammation of the tubes corresponding to the changes in the uterus, and the ovaries in such cases rarely failed to show an advanced state of degeneration. I believe, however, the metritis, in such cases, was the main cause of the patient's symptoms. In some of these cases the diagnosis had to be confirmed by exploratory laparotomy before the necessity for the operation could be finally determined or extirpation advised.

Where the uterus is greatly hypertrophied and harder than normal or, in certain cases, where with enlargement it is soft and edematous and there have been profuse or irregular hemorrhages, or profuse purulent discharge without greatly disturbed menstruation; again, where the uterus, though not at present much, if any, larger than would be considered normal, yet has the consistency of a senile uterus, the result of contraction, secondary to previous hypertrophy; when, with any of these conditions, there have been extreme tenderness to pressure and dragging pain in the pelvis, together with various annoying reflex disturbances; in other words, where pronounced organic changes are accompanied by symptoms sufficiently severe to incapacitate the woman and relief does not follow curettement and systemic treatment, I have advised hysterectomy. In the years remote from the menopause, especially where the patient's surroundings are such that she is not immediately dependent on her own efforts for support, I would often advise repeated curettings or other temporizing measures, but I believe the patient, from the first, has a right to know what she may reasonably expect, and choose her course accordingly.

Believing that the value of any technic will be largely determined by the ultimate results of its employment, I have made an especial effort to gather and compile such evidence. I find that in many of these cases more than a year has been required for the slow clearing away of varied symptoms dependent on the organic changes, so that some of my more recent cases, even though compiled as unimproved, may later be classed with the more satisfactory.

5. Am. Jour. Obst., 1905, vol. xlvii.

HYSTERECTOMIES FOR CHRONIC PELVIC INFLAMMATIONS.

GROUP I.—(April 24, 1896, to Dec. 31, 1902):		Number.	Percentage of deaths.
Abdominal	.....	55	
Recovered	.....	54	
Died (sepsis)	.....	1	1.8
Vaginal	.....	69	
Recovered	.....	67	
Died (acute nephritis, 1; pneumonia, 1)	.....	2	2.9
Total cases	.....	124	
Total deaths	.....	3	2.4

During this period the abdominal operation described was being developed, but the vaginal was considered the operation of choice.

GROUP II.—(Jan. 1, 1903, to April 1, 1907, four and one-fourth years):

	Number.	Percentage of deaths.
Abdominal	142	
Recovered	136	
Died (peritonitis, 2; streptococcic septicemia, 1; internal hemorrhage, 1; acute nephritis, 1; acute dilatation of the heart, 1)	6	4.2
Vaginal	37	
Recovered	37	
Died	0	0.0
Total cases	179	
Total deaths	6	3.34
Total of Groups 1 and 2	303	
Total deaths	9	2.97

During this second period, the abdominal, subtotal hysterectomy described was employed in all except cases especially suitable for the vaginal operation.

CLASSIFICATION OF CASES IN GROUP II.

	Abdominal.	Vaginal.	Total.
Total number of cases	142	37	179
Average age of patients (171)	34	41.4	35.6
Oldest	56	60	
Youngest	18	26	
Married (176)	118	34	152
Single (176)	21	3	24
Patients having borne children (169)	83	32	115
Patients having borne no children (169)	50	4	54
Miscarriage, history of, (165)*	58	15	73
Puerperal sepsis, history of, (161)*	34	14	48
Gonorrhea, history of, (159)*	48	4	52
Patients having had previous operations by other surgeons			40
Patients having had previous operations by myself			30

*These estimates, based on the histories given by the patients, must be taken as low. In this connection the following further analysis of the evidence is interesting:

	Abdominal.	Vaginal.	Total.
Number of patients denying either gonorrhea or puerperal sepsis (167)	62	17	79
Number admitting both (167)	11	0	11
Number admitting only gonorrhea (167)	37	4	41
Number admitting only puerperal sepsis (167)	22	14	36

OTHER OPERATIONS COMBINED WITH HYSTERECTOMIES IN GROUP II.

	Abdominal.	Vaginal.	Total.
Bilateral salpingo-oophorectomy	120	31	151
Unilateral salpingo-oophorectomy	15	3	18
Appendectomy	38	0	38
Anterior colporrhaphy	0	8	8
Perineorrhaphy	1	11	12
Cholecystostomy	1	0	1
Rectal operations	5	6	11
Nephrorrhaphy	1	0	1

Mortality among patients having operations involving other organs than the uterus and appendages, at same time, 3, a percentage of 4.22.

ULTIMATE RESULTS IN CASES UNDER GROUP II.

	Number.	Per cent.
Number of patients on whom reports of ultimate results were received	147	
Number of patients who remain permanently relieved of symptoms for which operation was done	118	80
Number of patients whose condition is reported improved	21	14.28
Number of patients whose condition is reported not to be improved	8	5.4
Three patients have died from other causes since leaving the hospital.		

SYMPTOMS IN GROUP II.

	Number.
Pain elsewhere than in the pelvis	115
Marked frequency of urination	41
Diarrhoea	5
Constipation	57
Other conditions found:	
Neurasthenia	38
Hysteria	4
Melancholia	4
Acute mania	2
Drug habit	2
Tertiary syphilis	3

BLADDER IRRITABILITY IN CASES UNDER GROUP II.

	Number.	Per cent.
Number of patients on whom reports were received	110	
Present after but not before operation	26	23.6
Present before but not after operation	18	16.3
Present neither before nor after operation	55	50
Present both before and after operation	11	10

INFLUENCE ON SEXUAL DESIRE IN CASES UNDER GROUP II.

	Number.	Per cent.
Number of reports received	68	
Patients who experienced no change	50	73.5
Patients who reported increase	7	10.3
Patients who reported loss	6	8.8
Patients who reported decrease	5	7.4

FUNCTIONAL EFFICIENCY OF BLADDER SUPPORTS AS INDICATED BY DISTANCE FROM VAGINAL VAULT TO THE URETHRAL MEATUS.

	Cases.	Inches.
Number of measurements taken	107	
Abdominal cases	92	
Vaginal cases	15	
Average distance in abdominal cases		4.24
Average distance in vaginal cases		4.06
Number in which vagina was shortened:		
Abdominal	1	2.75
Vaginal	1	2.5

INDUCTION OF THE ARTIFICIAL MENOPAUSE IN CASES UNDER GROUP II.

	Number.	Per cent.
Patients on whom reports were received	122	
Patients in whom natural menopause had been previously established	21	
Patients experiencing hot flashes	72	59
Patients exhibiting marked nervous symptoms in addition to hot flashes	18	14.7
Patients showing no symptoms referable to the artificial menopause	36	29.5

PATHOLOGIC FINDINGS.

In the 102 specimens examined microscopically, the following conditions were observed:

1. CERVIX. (84 CASES EXAMINED.)

	Cases.	Per cent.
Squamous cell mucosa about the external os uteri, was found in varying degree, thickened and irregular	28	33.3
(In 3 cases the degree of irregularity suggested the possibility of ultimate malignancy.)		
Erosion about the external os	16	19
Nabothian cysts	24	28.5
Endocervicitis, hyperplastic or interstitial	44	52.3

2. CORPUS UTERI. (95 CASES EXAMINED.)

	Cases.	Per cent.
Endometrium.—Hypertrophy, with edema	8	8.4
Hypertrophy without edema	2	2.1
Subacute interstitial endometritis	3	3.1
Glandular hyperplasia, without excess of interstitial increase	27	29.4
Transitional stages between hyperplasia and chronic interstitial endometritis	24	25.2
Chronic interstitial endometritis	10	10.5
Atrophy, secondary to chronic interstitial endometritis	16	16.8
Atrophy, secondary to removal of uterine appendages at previous operation	2	2.1
Myometrium.—Subacute metritis	4	4.2
Chronic metritis, with edema and muscular hypertrophy	19	20
Chronic metritis, in transition from hypertrophy to sclerosis	27	28.4
Chronic metritis, in more advanced contraction	44	46.3

3. FALLOPIAN TUBES. (77 CASES EXAMINED.)

	Cases.	Per cent.
Uterine Portion.—Thickening, by infiltration, of epithelial folds	9	11.7
Isthmus.—Infiltration of tube-wall by round-cell groups	36	46.7
Connective tissue thickening of plicae, representing old inflammation, of varying extent	59	76.6
Pyosalpinx	22	28.5

4. OVARY. (82 CASES EXAMINED.)

	Cases.	Per cent.
Cases where at least a few primordial cells were found	53	64.6
Cases where sections showed corpora lutea in which normal degeneration was not progressing	14	17
Cases, with corpora lutea undergoing degeneration	17	20.7
Cases where no primordial cells were found	25	30.5
Cases where the ovary gave the following general picture	56	68.2
Follicular cysts varying in size and number. Hyaline degeneration, in masses and in walls of vessels, both of stroma and cortex. Fibrous thickening of the tunica albuginea and of the cortex itself. Congestion, often to the point of dilating quite large venous sinuses. Besides engorgement and degeneration of thick-walled vessels, an apparent increase in their number in section from increased tortuosity. Corpora lutea, often undegenerated and increasing in size by proliferation of the lutein cells. In some, while degeneration has begun or advanced, absorption is prevented by congestion and consequent extravasation into the cyst thus formed.		
Cases with the following condition	7	8.4
Essentially as above, without infiltration of the ovary itself, although contiguous structures were the seat of extensive round-cell infiltration.		
Cases where the ovary, chiefly in the looser part of the stroma, presented a few areas of infiltrating cells	9	11
Cases presenting macroscopic abscess of the ovary	7	8.4

CASE HISTORIES OF PATIENTS WHO DIED AFTER HYSTERECTOMY, AND REPORTED IN GROUP II.

CASE 1.—Mrs. D., aged 36, married 12 years; never pregnant. Never well; under treatment since a child. Choreiform attacks. Always pain in the pelvis; headache, occipital and vertical; backache, continuous. Pain in right lower abdomen, almost constant. Feet always cold; constipation; "cystitis" for past three weeks; same three years ago. On bimanual examination, the pelvis was found to be the seat of extensive adhesions, involving not only the genitourinary tract, but the walls of the intestines. A bad prognosis was given, but exploratory laparotomy, with probable hysterectomy, advised as the only relief. On Feb. 28, 1903, the abdomen was opened; many firm adhesions were loosened, a process which involved the bowel by a tear, which was promptly repaired. Hysterectomy and double salpingo-oophorectomy. Appendectomy. Reaction rather slow, but pulse regular and good quality on following morning. Urine, about four ounces in 24 hours; became restless and during evening of 29th her talk was wandering. Urine again four ounces in 24 hours. Elimination by skin could not be effected. During the 30th, stupor and muttering. Very restless. Urine, two ounces; large numbers of granular casts. Died at 8 p. m.

CASE 2.—Mrs. G., aged 39. Married at 24; three children, two miscarriages, last five years ago. Good health until six years ago, after last confinement. Three years ago vaginitis, with frequent urination. Lacerations following childbirth had been repaired seven months before (February, 1904), without material improvement. Examination on September 3 showed extensive pelvic adhesions, pelvic abscess, and double pyosalpinx. On September 12, under ether, a cyst of the left broad ligament and a double pyosalpinx were found. Uterus, tubes, ovaries and bladder were all involved in dense adhesions; intestines likewise. Adhesions were broken up; a tear in the bladder resulting from the difficulty of this process was repaired; hysterectomy and double salpingo-oophorectomy were performed. Cultures gave a streptococcus from the pus of the tubes. The symptoms of generalized peritonitis developed and she died September 20.

CASE 3.—Miss J., aged 19. One brother had tuberculosis of joints. Patient never well after menstruation developed. Severe dysmenorrhea. Became extremely nervous and apprehensive. On Sept. 29, 1903, I removed the right ovary and vermiform appendix. No benefit. Later her pains became severe and dragging in the renal region, right. Nausea, severe cramping, and inability to urinate. The right kidney under palpation was found to descend to the pelvic brim. Right nephropexy, Feb. 13, 1904. Uterus again curetted. Recovery satisfactory, but dysmenorrhea and headaches continued. She would not recover from the exhaustion due to suffering at one period before another was due. Examination December 5 showed uterus somewhat edematous and the other ovary had become cystic, about size of hen's egg. Right kidney in normal position. As a last resort, in spite of her age, hysterectomy was advised, and was done, with removal of the other tube and ovary, December 9. She was apparently in good condition when last seen eight hours later (8 p. m.). During the night symptoms of internal hemorrhage developed. I was not notified until her death at 8 a. m.

CASE 4.—Miss M., aged 21. Mentally irresponsible for six years. Bladder inflammation for eight months. Dysmenorrhea. Had colicky pain whenever bowels moved; more aggravated of late. Backache; headache, frontal and occipital; pain extending down anterior crural region. Examined first on Feb. 1, 1906, she had a temperature of 101 and pulse of 130. Bimanually, there was found pyosalpinx, metritis, and intestinal adhesions. While the bilateral pyosalpinx seemed of gonorrheal origin, an appendicitis was also suspected. On February 23 right tube was found distended with pus and about 5 cm. in diameter; the left about half as large. Uterus increased one-fourth in size. Ovaries fibrocystic. Firm adhesions of intestines to pelvic viscera; one loop of ileum about 20 cm. long, was doubled on itself and firmly adherent in the cul-de-sac of Douglas. Appendix unusually long and lying in the abscess. Head of cecum adherent and bathed in pus. Hysterectomy with double salpingo-oophorec-

tomy, after breaking up the numerous adhesions. Appendectomy. Five days later she died of general peritonitis.

At autopsy the abdominal wound was found to have proceeded satisfactorily toward healing. Cultures from various parts of the abdominal cavity showed streptococcus and the colon bacillus. The seat of the appendix was healed, but about 10 or 12 cm. from it was a darkened area 1.5 cm. in diameter. Behind the cecum and firmly closed in by adhesions was an abscess which extended upward some 15 cm. A thin fibrinous exudate was spread generally over the intestines.

CASE 5.—Mrs. R., aged 43. Married at 18; four children, oldest 17, youngest 4. Attack like appendicitis in August, 1906. In October pain began in left ovarian region and has continued since. In October, cystitis, which she had first eight years ago. She has profuse leucorrhea, constipation, and sacral backache. Examination showed a mass at either side of uterus. On opening the abdomen (Jan. 29, 1907), adhesions were so firm that a resection of a portion of ileum, 28 cm. long, was done, rather than risk any effort at repair. The portion removed was covered with adhesions, was twisted, and its lumen was greatly constricted. Appendectomy. Appendix subsequently shown to be seat of chronic inflammation. Hysterectomy with double salpingo-oophorectomy. Microscopically uterus showed metritis and chronic interstitial endometritis; tubes were chronically thickened, and ovaries showed no primordial cells. She progressed favorably for two days, when symptoms of cardiac dilatation developed and she died four days later. Autopsy was not permitted.

CASE 6.—Mrs. Mc., aged 29. Married 12 years. Father died of cancer of stomach. Patient's menstruation always irregular. First pregnant at 21; miscarried. First child now (Jan. 28, 1907) 6 years old; last child 3 years old. Has had attacks of frequent urination; urine sometimes clear, sometimes thick with pus. Constipation alternating with diarrhea. There was tenderness over abdomen and bimanual examination showed dense pelvic adhesions. The family physician had made a diagnosis of pyonephrosis, which had an apparent confirmation when, with Luys' segregator, a clear urine was obtained from the left side while that from the right was loaded with pus, giving a pure culture of a streptococcus. Cystoscopic examination of the ureteral meatus on either side further showed the pus flowing into the bladder by the right one only. It was thought best to drain the kidney before approaching the pelvic lesions. Exploratory nephrotomy February 12, however, revealed no pus. The exploratory wound did well, and on February 27 an abdominal incision was made. Omentum was found densely adherent to intestine; separation caused slight tear of latter; repaired at once. A mass at the left and above uterus contained the tube and ovary. At the right and lying close against the uterus was the abscess which had evidently broken into and thus had been drained by the right ureter; it enveloped the right tube and ovary. The uterus and the suppurating tubes and ovaries were all removed. Cultures here gave the same streptococcus. Blood-examination gave 26,000 leucocytes, with 70 per cent. of polymorphonuclear cells on February 5; on the 27th, 36,668, with 83 per cent.; on March 2, 49,444, with 97.8 per cent.; on the 4th, 81,468, with 98.8 per cent. From this, on successive days, the count fell thus: 44,500, 97 per cent.; 38,068, 95.3 per cent.; 42,632, 96.75 per cent.; 18,872, 94.6 per cent., the last count being taken on March 8, six hours before her death. Meantime the red cells had fallen to 2,697,000 and the hemoglobin to 40 per cent. She died March 8 of streptococcic septicemia (confirmed by autopsy).⁶

SYNOPSIS.

In the supravaginal hysterectomy the portion of cervix left after even "low amputation," so long as the incision does not reach the vagina, must contain a sinus of varying depth, and leading from this sinus are crypts in the form of branching glands which harbor infection. Drainage of the cervical perimetrium is not established and drainage of the pelvic cavity and of the pelvic lymphatics

is not adequate, with the result that the lymphatic glands along the iliac vessels may become so changed in their effort to care for the infection as to prolong convalescence or make necessary subsequent operation for their removal, or they may suppurate.

By this method the cervical mucosa is entirely removed so that no gland-bearing tissue remains; the pelvic cavity and lymphatics are thoroughly drained; the proper support of the remaining pelvic organs is assured, and, therefore, subsequent bladder irritability is less, also more nearly normal intra-abdominal pressure is maintained. It is applicable to practically all cases except those of malignancy.

The microscopic studies show that hypertrophy of the endometrium is accompanied by hypertrophy of the myometrium; that there is a temporary increase of muscle as well as of connective tissue; that, where marked chronic inflammatory changes are observed in the tubes and ovaries and in the myometrium, corresponding changes are found in the mucosa of the cervix and of the corpus uteri; that in this class of cases the ovarian substance is slow of involvement. There may be marked infiltration in the surrounding tissue and yet the ovary remain free. When involvement occurs, the infiltration shows first about the vessels of the stroma. The ovary is protected by a fibrosis of its cortex—a thickening of the tunica albuginea, the condition in many cases preventing the rupture of follicles. In many cases the congestion dependent on these conditions prevents the normal degeneration of corpora lutea, the lutean cells developing to form a new growth.

Abscess is more likely to occur in corpora lutea cysts than in follicular cysts.

I wish here to acknowledge my indebtedness to Dr. Homer E. Safford for his painstaking microscopic studies of tissues removed; to Dr. Herbert W. Hewitt for his indefatigable efforts in collecting and tabulating clinical data, and to Dr. E. P. Billings for the drawings.

DISCUSSION

ON PAPERS OF DRs. METCALF, MARCY AND CHASE.*

DR. WALTER B. DORSETT, St. Louis, Mo., referred to a paper he read last September at the meeting of the American Association of Obstetricians and Gynecologists, entitled "The Utilizing of the Round and Broad Ligaments in Supravaginal Hysterectomy." The *raison d'être* for this paper was a very disagreeable enuresis following two vaginal hysterectomies, and in which he attributed the condition to a prolapsus of the broad ligament and a retroversion of the bladder, consequent on the hysterectomy. About three or four months ago Dr. Dorsett had a case in which the ovarian artery slipped away when too great tension had been put on it. He reopened the abdomen and tried to find the artery, but never found it on account of its retraction, and the patient died. Dr. Dorsett then described his technic in such cases. After opening the abdomen, he seizes the broad ligament with a pair of forceps and places around it a loop of No. 2 chromicized catgut threaded in a needle. He then ties the distal end and leaves the needle with the forceps hanging over the abdomen. Next he makes an incision down to the point at which he wants to take off the uterus. Next he makes the usual anterior and posterior flaps, and as he cuts through the round ligament he puts on a pair of forceps, leaving them on until they are wanted. Then, by means of the ligature which was passed through the upper portion of the broad ligament, the ligament is pulled down and fastened in the musculature of the uterus on the opposite side. The anterior and posterior flaps and the round ligament, which are still secured by forceps, are next drawn together and fastened in the uterine neck. Then he brings over the broad ligament and whips it over. The operation is very similar to

6. Besides the above deaths, it should be added that three other deaths, at more or less remote periods after leaving the hospital, have occurred among this series. One was from suicide, one from empyema. Cause of death in third case could not be ascertained.

* The papers of Drs. Marcy and Chase appeared last week.

that of E. C. Dudley and Charles Mayo, except that Mayo uses a simple purse-string suture.

DR. J. RIDDLE GOFFE, New York City, stated that so far as he could see the only original feature about Dr. Metcalf's operation is that he takes out all of the cervix, except two strips of muscular tissue at either side where the broad ligaments are attached. In regard to other points in the technic, he thought that other methods are quite as good. In the first part of the operation Dr. Goffe puts on his ligatures from the start. In regard to the freeing of the diseased organs, he thought that Dr. Metcalf's method is the same as his own. Instead of taking out the uterus first and the appendages afterward, Dr. Goffe frees the appendages. He can follow down to the bottom of the cul-de-sac and work from below up toward the line of cleavage. He also commences out nearer to the brim of the pelvis than if ligaments are short, because he wants to bring the upper free border of the broad ligament down to the vagina. He, therefore, estimates length of broad ligament needed to reach down, takes one continuous suture, using that same suture over and over again, in steadily going down the broad ligament where he cuts away the uterus. The broad ligament is puckered up and the free border carried down to the uterine stump. Instead of going across, as Dr. Metcalf does, Dr. Goffe does the same thing at the other side until he gets down to the cervical stump. Dr. Goffe thought that by going down into the cervix and laying it open, as Dr. Metcalf does, there is a source of infection during all the rest of the operation. It takes some little time to get down and leave the strip of glandular structure which Dr. Metcalf described, and it leaves an open surface, and open surfaces below are in danger of infection. Dr. Goffe did not think that Schroeder is entitled to the credit of this method of a free peritoneal flap. As he studied Schroeder's work, Schroeder brought together two flaps of uterine structure covered by peritoneum, but he never made a uterine flap as Metcalf made to cover over the tissues. Dr. Goffe make a flap posteriorly as well as anteriorly to reach out on broad ligament and cover all raw surfaces. He passes the suture first into one flap, then outside, and attaches the flap below. By this method there are no raw surfaces whatsoever extending into the peritoneal cavity, and no danger of infection.

DR. C. L. BONIFIELD, Cincinnati, did not consider it a matter of great importance how a hysterectomy is done by various operators. The vital question is whether or not hysterectomy shall be done for inflammatory disease. In his opinion it is unnecessary. He believes that in abdominal operations, and in any other operations, as little damage as possible should be done to the patient, removing as little of the structures as need be. As to removing the uterus in these inflammatory cases, Dr. Bonifield said that the fact that Dr. Metcalf reports 300 cases of hysterectomy for inflammatory conditions shows that he uses this operation as rather a routine procedure. Dr. Cullen, in speaking of the pathology of endometritis, said that in cases of gonorrheal infection of the tubes, examination months or years afterward showed no disease of the endometrium. That shows that the endometritis does and will get well. The reason given that because of the muscular walls of the uterus, making it perpendicular, the organ drains well, Dr. Bonifield thought a good one. What, he asked, led some operators to believe that there was necessity for removing the uterus in these inflammatory cases? In his opinion, it is that in the early operations for pyosalpinx a ligature was thrown around the tube at this first point, and there was left anywhere from one-half to one inch of tube that was infected at the time of operation. It remained infected afterward and every once in a while it would pour its infection into the uterine cavity and give rise to a new endometritis or a new endocervicitis. Dr. Bonifield has reoperated in such cases, and removed these little stumps of tubes and absolutely cured the patients. So that instead of doing hysterectomy, as the doctor advised, and which he thinks is more dangerous and certainly more tedious, Dr. Bonifield removes all of the tube, even cutting out a wedge-shaped piece from the wall of the uterus in order that the side which will not drain is removed, and, then, by closing the horn of the uterus with some absorbable suture, he gets satisfactory re-

sults. In examining these patients months or years afterward he finds that the uterus is healthy and gives no trouble at all.

DR. F. F. LAWRENCE, Columbus, Ohio, stated that the first debatable question is the presupposed idea that drainage is the essential element of good pelvic surgery in a larger number of cases. He thinks that practically every operator has year after year gradually drained a smaller and smaller percentage of his cases. While he is an ardent believer in drainage in proper cases, he does not use drainage once to-day where he used it twenty times seventeen years ago. There is probably not one out of ten of the chronic inflammatory conditions of the tubes and ovaries, he said, in which a hysterectomy would be performed, even by the author of this method, in which the necessity for drainage lies above the point of the original infection. The character of the infection for which the hysterectomy is done lies not on the wall of the uterus, but within the subperitoneal tissue below. Dr. Lawrence was particularly pleased with Dr. Chase's reference to stitch abscess, which he thought, in the great majority of cases, are produced not by infection, but by improper method of suture. He said that we must not lose sight of the part played by traumatism in causing infection, and of the fact that, in the majority of operations, the tissues in the lower part of the abdomen have a normally low vitality and when diseased their vitality is lowered still more. Consequently, a traumatism which is here inimical to good results might be passed by or overcome without serious results in the upper part of the abdomen. A rise of temperature can not be avoided, but, the more we simplify, the less we traumatize; the less foreign material in the way of ligature is introduced, the greater will be the success.

DR. B. F. BAER, Philadelphia, Pa., called attention to the fact that about fifteen years ago there was read before the American Gynecological Society a paper entitled *Supravaginal Hysterectomy without Ligature of the Cervix*. A year later a supplement to the first paper was presented. These papers may be found in the Society's Transactions for 1892 and 1893. The technic there described was so simple and the result obtained was so unusual that the method was at once adopted here and abroad by all of the best abdominal surgeons; and although thousands of hysterectomies have been performed by this method since that time and with results that had hardly been dreamed of before, it would seem that Dr. Metcalf was unacquainted with that work. There can be nothing simpler and less harmful to the tissues, he said, than ligature of the vessels, either separately or including the broad ligament coverings, severing the ligaments and then amputating the cervix, and closing the raw surfaces by covering with peritoneal folds, which are formed by the stripping down of the peritoneal reflection of the bladder before amputation of the cervix. Particular stress was laid in the description of the technic on the value of leaving the cervical canal absolutely alone. The dilating, cutting, cauterizing and placing of drainage tubes or gauze, which had been invariably done previous to that time, were entirely omitted. Two cardinal features were insisted on, namely, the cervix is left without a ligature, and nothing whatever is done to the cervical canal; drainage in abdominal surgery is a delusion. Leaving a gauze pack to drain or to check hemorrhage is most unsurgical. Gauze does not drain and hemorrhage should be controlled by ligature. The cervical canal, undisturbed, has been found sufficient for any possible drainage or the discharge of a stray ligature. Dr. Baer regards the adoption of the technic described by Dr. Metcalf as a step backward fifteen years. Regarding the use of catgut so strongly urged by Drs. Marcy and Chase, Dr. Baer is still ligating the larger blood vessels with silk. Why, he asked, should he give up a ligature that is generally admitted to be safe for one less so, when he has not had any trouble with silk since he gave up the routine use of a drainage tube?

DR. JOSEPH TABER JOHNSON, Washington, D. C., was absolutely certain, from an experience covering thousands of cases, that silk is not a dangerous material to use for ligating large vessels in the abdominal cavity, and he is also certain that an honest search of the records of hysterectomies done for fibroid tumors will disclose the fact that there are a dozen cases of

infection and death from the use of infected catgut or from the use of catgut that has absorbed or slipped off and allowed hemorrhage to occur, to one where sterile silk was used. For that reason Dr. Johnson is not willing to give up absolutely the use of silk in the abdominal cavity. During a recent discussion on this subject, a number of cases were mentioned in which the abdominal wound had burst open within five or six days from the time it was sewed together with tiers of buried catgut sutures. This may occur as a result of vomiting, coughing, sneezing or straining at stool, or too early absorption. In most of these cases continuous sutures of catgut had been used. While catgut may do all that Dr. Chase says it does, Dr. Johnson said it has, in addition, another side; it does not always remain strong enough to hold the wound together long enough to get good, strong union. To say that one should never use silk, and that any one who does use it is an old fogey, is not a correct statement to make. While catgut is better sterilized now than it used to be, still, within a couple of weeks, he has seen two of three operators in Washington, who invited him to see them operate with catgut, fail in its use. In each of these cases they would tie their knots and the catgut would break, and after a third ligature was tried they would call for silk. Dr. Johnson insisted that no one should say that silk shall not be used in the abdominal cavity. Too many good surgeons are using it, and have used it hundreds and hundreds of times with no trouble, for such a statement to be credited. The trouble that comes from the use of silk is not so serious as the trouble that comes from the use of catgut. Dr. Archibald MacLaran of St. Paul, in a paper on "Surgical Errors," reported two deaths from the giving way of catgut ligatures in the abdominal cavity. The worst that is said of silk ligatures is that they occasionally cause sinuses on account of infection, delay perfect union in few cases and may have to be fished out, but they are not the cause of death from infection or hemorrhage, as has occurred from the use of catgut.

DR. WILLIAM F. METCALF, Detroit, Mich., explained that the gauze, put into the vagina from above in the course of an operation, is for the temporary purpose only of preventing infection of the field of operation, and with no thought of drainage. The drainage to which he desired to call especial attention is that effected, whether with or without the assistance of gauze, by the removal of the cervix. He believes that the establishing of a free outflow from the pelvic lymphatics thus opened is of importance in these infected cases, and that, by reason of the drainage thus established, both immediate and ultimate results are better than can be attained by the supravaginal operation. Dr. Metcalf did not claim originality in the method of covering raw surfaces, but he did claim for this operation, besides the merit of free lymphatic drainage, a satisfactory restoration of the supports of bladder, vagina and rectum. In 110 cases reported, with ultimate results, some of them five or six years after the operation, the percentage presenting bladder irritability after operation, but not before, was 23.6; bladder irritability before, but not after, in 16.3 per cent., neither before nor after, in 50 per cent.; both before and after, in 10 per cent. These figures, Dr. Metcalf thought, speak for the efficiency of the bladder supports. In the pathologic study of these cases, there were 95 in which the endometrium was examined microscopically. In 77 the Fallopian tubes were studied in section, and in 82 the ovaries were carefully examined. Of the last named, 30.5 per cent. showed no Graafian follicles nor primordial cells in the section. There were 80 per cent. of ultimate cures from all symptoms for which the operation was done. By way of comparison, it is interesting to note that Schauta reports 80 per cent. of ultimate cures after total extirpation, a better showing, Dr. Metcalf thought, than can be made by those who resort to bilateral salpingo-oöphorectomy in preference to hysterectomy.

DR. HENRY O. MARCY, Boston, Mass., called attention to his depressor speculum; it brings the uterus quite external. The needles he uses were devised twenty-five or more years ago. On either side of the eye they are formed so as to keep the ligature from slipping, a matter of importance in the use of the double continuous suture. In reference to animal suture, he said that the connective tissue of the catgut is the sheath

of the intestine. In preparing catgut, it is a putrefying mass until the connective tissue sheath is separated. It is divided longitudinally into different sizes. Catgut is strong and inelastic only when dry. The moment it is buried in the tissues, it is put to soak. Dr. Marcy regards the buried animal suture his best contribution to surgery.

DR. WALTER B. CHASE, Brooklyn, admitted that the question which Dr. Johnson emphasized is a very pertinent one. Plain catgut will last from three to ten days, while chromicized catgut will remain longer, according to chromization, which is a matter of detail with the maker. There is, he said, a scientific basis for the assumption that any suture material which is unabsorbed in the tissues beyond the period of three weeks may act as a foreign body and is unnecessary. Without wishing to cast opprobrium on the gentlemen whose experience Dr. Johnson related, he stated that they only attempted its use, the incident has no conclusive pertinency here; and apparently they lacked familiarity with its use in intraperitoneal surgery. Plain catgut must be tied as directed in his paper or the ends may macerate and cause slipping. With this precaution it may be used with satisfaction and safety within proper limitations. As soon as surgeons get away from the idea that buried sutures and ligatures are of more than temporary value, Dr. Chase said, much will be accomplished in the technic of operative procedure.

ISOPRAL AND CHLORAL HYDRATE.*

E. IMPENS, M.D., PH.D.,

ELBERFELD, GERMANY.

In an exhaustive paper which I published in 1903¹ I was the first to draw attention to the hypnotic properties of trichlorisopropyl alcohol, or isopral. I have made numerous experiments which show that the drug acts more effectively than chloral, while at the same time the range of the dose is greater.

The results of my experiments have been confirmed by Dr. Schmitt, professor of therapeutics in the University of Nancy.

He says:² "My experiments have led to results which correspond closely with those obtained by Impens. . . ." With reference to its rapid action—one of the characteristic properties of isopral—he expresses himself in the following terms: "The rapidity of absorption is demonstrated by the fact that the effects of the drug appear very quickly, from two to three minutes sufficing for an intraperitoneal injection, and when given by the mouth five or six minutes being sufficient with slightly larger doses. The absorption of chloral is sensibly slower."

Schmitt also found, as I had done, that the hypnotic action of isopral is not only greater but that the toxic quotient is more favorable. I may be permitted to reproduce a table published in his paper which shows the hypnotic and toxic doses as determined by him and by myself. It will be seen that the similarity of results leaves nothing to be desired (Table 1).

TABLE I.

	FISH.		Chloral hydrate.
	Impens.	Schmitt.	
	Per ct.	Per ct.	Per ct.
Hypnotic dose	0.01	.....	.....
Toxic dose	0.25	.....	.....
Toxic quotient	2.5	.....	.....
FROGS.			
Hypnotic dose	0.143	0.175	0.312
Toxic dose	0.673	0.71	0.937
Toxic quotient	4.7	4.0	3.0

* A reply to an article with the same title by Dr. R. A. Hatcher which appeared in THE JOURNAL, June 1, 1907, p. 1849.

1. Therap. Monatshefte, September, 1903.

2. Rev. Méd. de l'Est, No. 20, Oct. 15, 1904.