

**The cure of the more difficult as well as the simpler inguinal ruptures.**

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Halsted, William, 1852-1922.  
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**Publication/Creation**

Baltimore : The Lord Baltimore Press, 1903.

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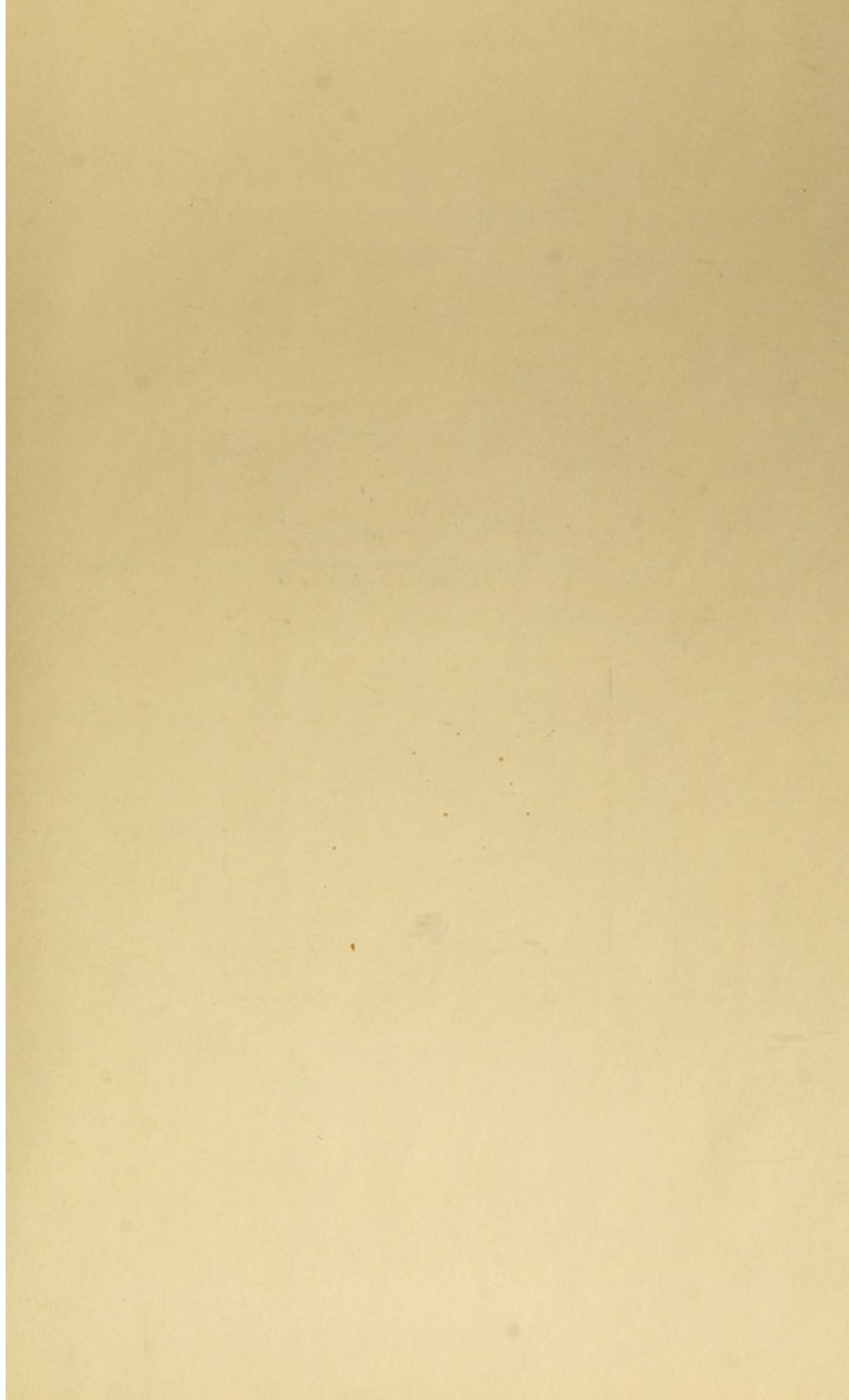
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GEO. S. HUNTING

THE CURE OF THE MORE DIFFICULT AS  
WELL AS THE SIMPLER INGUINAL  
RUPTURES

BY

W. S. HALSTED, M. D.

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Reprinted from The Johns Hopkins Hospital Bulletin, No. 149, August, 1903

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The Lord Baltimore Press  
THE FRIEDENWALD COMPANY  
BALTIMORE, MD.  
1903

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## THE CURE OF THE MORE DIFFICULT AS WELL AS THE SIMPLER INGUINAL RUPTURES.

BY W. S. HALSTED, M. D.,

*Surgeon-in-Chief, The Johns Hopkins Hospital.*

This communication will, I hope, be of interest to friends [208] who have asked for precise information as to the modifications which our operation for hernia has undergone in the process of development during the past thirteen years, and of service to operators who seek to obtain in each instance a result as perfect as possible and who recognize that not infrequently there occur cases of hernia requiring for their cure extraordinary operative procedures. The present operation has been evolved by degrees and stands for the experience of 14 years derived from more than 1000 operations for the cure of inguinal hernia; features of the old where they seemed unnecessary have been dropped and new ones, as they seemed to be indicated, added. To record even the cruder general results of so many operations (upon adults with few exceptions)<sup>1</sup> for the cure of inguinal hernia are required special training, some

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<sup>1</sup> The value of an operation for the cure of inguinal hernia can hardly be determined upon children for the surgeon is greatly assisted by nature as the child develops, and he is not confronted with the more difficult problems arising from an undeveloped or an acquired atrophy of the conjoined tendon, or from fatty degeneration and atrophy of the internal oblique muscle. Furthermore, the recurrences have almost invariably followed operations for the cure of very large and old ruptures, such as are impossible in children. And to quote from Bloodgood, "As we have had no recurrences" in children "whether the veins have been excised or not, it does not seem to make much difference what is done with the very small cord."



[208] zeal and a particular honesty of purpose; and for the recognition and interpretation of the nicer facts, keen perception and fine tactile sense are indispensable. A few drops or even a dram of fluid in the tunica vaginalis might readily escape detection, and to determine slight swelling or induration here and there in the epididymis and the relative size of the two testicles may be difficult. A novice can usually discover a distinct recurrence and so can the patient, but I have known an eminent surgeon to overlook a weakness in a scar of his own making sufficient to constitute, without doubt, a recurrence. The surgeon is fortunate and likely to be true to himself whose observations are controlled by mature assistants with large experience in the operative treatment of hernia and who are as eager as he to ascertain and state the exact truth.

If our operation for the radical cure of inguinal hernia has improved, it is due in no small measure to the arduous labors of Dr. Bloodgood, whose valuable contribution<sup>2</sup> should be better known. He established several facts of prime importance from his study of our first 300 cases of inguinal hernia. The majority of inguinal ruptures are now easily and quite well cured by a variety of procedures and by the average operator, hence it is difficult for the student and young practitioner to comprehend that it is hardly more than a decade since this variety of hernia completely baffled the efforts of the best surgeons to cure it. That so simple an operation as Kocher's can cure perhaps many of the milder ruptures, provided the neck of the sac is not too wide, leads to the inquiry whether the features, of these operations, upon which most stress has been laid may not be relatively unimportant, since operations of the magnitude of Bassini's and the author's are not in all cases indispensable. If the transplantation of the neck of the sac can cure so many cases, is it not possible that the transplantation of the cord, which at first was deemed so essential by Bassini and the author, may have owed its success in part to the fact that it made possible this very high closure of the sac's neck? Although for several years our operation, so far as transplantation of the cord and high closure of the sac is

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<sup>2</sup> Johns Hopkins Hospital Reports, vol. vii.



concerned, was even more radical than Bassini's (the cord was [208] transplanted into the substance of the divided internal oblique muscle), we were tempted, at the very outset, to test the relative value of cord transplantation in some of the cases, and permitted the entire cord to lie undislocated and altogether undisturbed in its bed and to trust to the suture of the internal oblique muscle to Poupart's ligament, to the "lining of the wound with muscle" to effect a cure. It was well worthy of note, as Bloodgood emphasizes in his article, that all of the cases treated in this manner (cord undisturbed) remained cured. Another fact which Bloodgood's painstaking study established was that of one hundred and nine cases in which the larger bundle of veins of the cord was excised and the healing was per primam, not one showed a recurrence or any weakness at the site of the transplanted vas deferens, whereas in 6.4 per cent of the cases which healed by first intention and in which the veins had not been excised, there was a recurrence at the upper angle of the wound, at the site of the transplanted cord. And even in the wounds which suppurred, there was not a recurrence in the nine cases of vein excision, whereas, of eleven suppurating cases in which the cord-veins were not excised, four (36.3 per cent) recurred. In 118 cases, therefore, in which the larger bundle of veins was excised there was no recurrence at the site of the transplanted cord whether suppuration<sup>3</sup> occurred or not. And, certainly,

<sup>3</sup> Nine suppurations in 118 cases, and for most of which the author was personally responsible, seems a large percentage (7.6%) even for hernia cases ten years ago, but it was considered a good showing in those days. Since every one, including the operator, has invariably worn rubber gloves, suppurations even in the operations for hernia, has occurred in probably less than 1% of the cases. In 1890, all the assistants at an operation, the nurses and physicians, systematically wore gloves, but the operator wore them only for special operations, such as exploratory laparotomies, explorations for foreign bodies, loose cartilages, etc., in the joints, suture of the fractured patella, etc.—in other words, when there was a possibility of doing serious harm and no certainty of doing great good. By degrees the operator wore gloves more frequently, until Dr. Bloodgood as Resident Surgeon, and who had become thoroughly accustomed to them as assistant, wore them invariably as operator and demonstrated from our statistics the necessity of doing so. It seems to be a fact that one who has been trained to operate always



[209] the cases in which the veins were excised, were not the simpler ones.

One of the most important of the facts ascertained by Bloodgood was the great variation in the width of the conjoined tendon and the responsibility of the insufficient tendon for the recurrences at the lower angle of the wound, through the external ring, direct. The transplantation of the rectus muscle recommended by Bloodgood<sup>4</sup> to close this defect seems to accomplish what its originator hoped it might, although, a priori, one would fear that this powerful straight muscle must eventually draw away from Poupart's ligament to which it had been sewed. Is it not conceivable, however, that a new encompassing fascia may develop about a transplanted muscle and that this fascia may remain even after the muscle has been pulled away? Experiments upon animals to determine this point would be interesting. M. Holl, now Professor of Anatomy in Gratz, directed attention many years ago to the part muscles probably play in the determination and development of the fasciæ.

Hence, so long ago as 1896 we recognized, thanks to Blood-

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in rubber gloves finds it awkward to operate without them. I have more than once heard my assistants, while performing some insignificant operation without them, call for gloves because, as they said, they were conscious of unnatural finger movements, of a certain clumsiness without them. With gloves one probably acquires special methods of tying knots, holding instruments, etc. In our clinic the heavier gloves are exclusively used, although probably every member of the Staff has by predisposition been in favor of the thinner gloves and had to convince himself by trial of the thinner varieties that the thick ones, even with seams on the fingers, were preferable. The thin gloves were too slippery; also too unsafe, chiefly because of the danger of minute undetected holes. Cotton gloves, if changed very frequently, are undoubtedly better than no gloves at all. If the operator desires the physical property of the cotton which enables him to hold more securely and handle with more precision the intestines and viscera he might wear a very delicate gauze-mesh glove over the rubber or over two or three fingers of the rubber glove. Possibly a rubber glove might be manufactured with a wide gauze mesh permanently imbedded in its palmar surface.

<sup>4</sup>Anton Wöfler, Beiträge zur klinischen Chirurgie (Festschrift f. Billroth), 1892.



good, the value of the excision of the veins of the cord and the [209] necessity for paying more attention to the neglected lower angle of the wound. Naturally, it was primarily to the upper angle that we had devoted our thoughts, for, as emphasized in one of the author's articles on the subject, "the cord is the first cause of the hernia and the ultimate obstacle to its cure." And this is true, notwithstanding the fact that recurrences at the lower angle were at first not very rare; for, our attention having been called to these lower angle recurrences, methods to cure them were soon found.

The success attending excision of the veins (one hundred and eighteen cases without recurrence at the site of the transplanted vas deferens) seemed to justify a continuance of this practice, provided it occasioned no undesirable results; but excision of the veins with transplantation of the vas deferens taught us that, not infrequently, a hydrocele, usually insignificant in size, was to be expected, and that in about 10 per cent of the cases atrophy of the testicle had occurred. Atrophy of this organ, however, was observed only in cases complicated by a very considerable swelling of the epididymis, and this observation of Bloodgood's, made so many years ago, has been verified by our study of more than one thousand operations. Great care was exercised, therefore, in excising the veins and, for a short time, a few months perhaps, this procedure was not so invariably practiced by all of us, being reserved for cases which seemed imperatively to demand it. We formerly handled the cord as, I presume, almost everyone still does; separated it, more or less roughly, by tearing, from the sac and its enveloping membranes, and raised it on a hook or strip of gauze preparatory to transplantation and while the stitches were being applied. We now treat the vas deferens with great deference, thanks again to Bloodgood. (Vide description of operation below.)

It occurred to Bloodgood before the publication of his report on hernia that it might be well to split the cord, transplanting only the veins to the outer angle of the wound and permitting the vas deferens to lie undisturbed. This method was finally abandoned by Bloodgood and other members of the staff who had practiced it, because the subtraction of the vas deferens



[209] did not appreciably reduce the size of the cord; furthermore, there were one or two recurrences at the site of the transplanted veins. This is a particularly good confirmation of the author's belief that the veins are largely responsible for the development of oblique inguinal hernia. The vas deferens contributes, relatively, very little to the size of most adult cords, but the veins, which at one moment make a bundle as large as one's finger, may the next and when empty be reduced to the size of a small quill. Is not this variation in the size of the cord possibly a factor in the production of hernia? When the hernia is first developing and the sac is, at operation, inside the internal abdominal ring, it can readily be demonstrated by a little pull on the veins. The fat, too, which is recognized as sometimes a probable factor in the production of hernia, accompanies for a short distance the veins rather than the vas deferens. This fat when present should be excised with the veins. For several years, then, we have been excising the veins in this careful manner, leaving the vas deferens untransplanted, undisturbed, and the internal oblique muscle undivided. In a few cases, however, without, that I am aware of, ultimate damage to the testicle, we transplanted the vas deferens to the outer angle of the wound. But we are quite certain that, as a rule, the less the vas deferens is manipulated and the more carefully the veins are excised, the less is the subsequent congestion of the epididymis. It is instructive from day to day to study the stump of the veins, the epididymis, the testicles, etc., after operations for hernia.

It is not the purpose of this communication to give the results in detail of these observations.

In a recent private case, urethritis Neisseri made its appearance a few hours after the operation. We naturally watched the epididymis on the operated side with some concern, fearing that excision of the veins might lower the resistance of this organ. On the twelfth day, without warning, a very slight induration of the epididymis became evident. I attributed  
[210] this to the fact that the patient carried out his irrigation-treatment badly, for the proper<sup>5</sup> method of irrigation being

<sup>5</sup> When the author's method of treating gonorrhœa can fail in his own wards, because improperly understood, it is not strange that so admir-



instituted, the swelling of the epididymis immediately subsided and the urethral discharge promptly ceased. [210]

Four years ago the author used, for the first time, a part of the aponeurosis covering the right rectus muscle to close the lower part of the right inguinal canal. I felt compelled in this case to resort to some such measure, for the internal oblique was fatty and attenuated to a degree not very often seen by us, and the rectus muscle did not seem to promise so much as its fascia did. This patient was a college-mate of mine and for this reason I wished, perhaps, more than ever, to be very sure of the result. One year ago I examined this patient very carefully and was gratified to find as solid a closure as one could desire. I considered the result as perfect as any that I had seen. Dr. Harvey Cushing, house surgeon at the time, made a sketch of this act of the operation, which Brödel has kindly elaborated (vide Fig. VII). This procedure may have a wider application than I have proposed for it. The

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able a surgeon as Dr. Orville Horwitz, apropos of Janet's work on the abortive treatment of gonorrhœa by permanganate of potash, should write: "In spite of the claim of quick cures and prevention of complications a length of time elapsed before it began to be generally adopted in this country. The profession was skeptical as to the claims made for its brilliant results. This was probably due to the disappointment which had followed the employment of retroinjections of hot water suggested by H. Holbrook Curtis, and of the continuous irrigation with a hot solution of mercury bichloride, recommended by Dr. W. S. Halsted, which at the outset seemed to offer more benefit to the patient than the conservative methods then in vogue, but resulting after a fair trial by a large number of observers in being found valueless and often dangerous; the employment of these remedies having been found to be attended with great discomfort to the patient and being frequently accompanied by severe complications, such as acute posterior urethritis, seminal vesiculitis, prostatitis, and cystitis." This is not the proper time to tell how one must use the bichloride solutions in order to obtain the best results which have been claimed for it, but to judge from my own experience with this method twenty years ago in private practice, too much has hardly been said in its favor. The bad and indifferent results probably come from mismanagement or misconception. I should be glad at some future time to publish the treatment in detail, for it happens that I have not heretofore described or, in print, claimed anything for the method which rightly bears my name. I agree with Dr. Horwitz that irrigation with hot water is not only useless but dangerous.



[210] anterior sheath of the rectus muscle might be employed in the way described whenever the conjoined tendon is insufficient, whether the cremaster muscle can be well used to remedy the defect or not. And Berger<sup>6</sup> has recently suggested using the rectus sheath in much the same way in operations for the cure of inguino-interstitial hernia.

In the upper part of the canal we have strong tissues and plenty with which to close, and hence it was perhaps natural to transplant the cord to the upper angle, to bring it out through thick muscle. But it is not perfectly certain that the cord may not be a useful adjunct in the closing or filling in of the lower angle in some cases, and it is a fact that with Bassini's operation the percentage of recurrence at the position of the transplanted cord in the case of adults has been quite large, probably over 6 per cent. Whatever the truth may be, we have in the excision of the veins a distinct contraindication to transplanting the vas deferens, and thus far we have had no reason to believe that the results would have been better if the vas deferens had been transplanted, as was our custom for several years, to the outer angle of the canal. We may eventually discover that the transplantation of the cord, which Bassini, and at one time the author, considered not only so important, but perhaps the principal feature of the operation, is harmful rather than helpful. Briefly, we may find that not only the vas deferens, but even the entire cord, would be more safely transmitted at the lower angle of the deep wound than at the upper. It would require a very large number of observations to determine this point because the percentage of recurrences is so small in these days; and it is unfair to compare the results of various operations in the hands of various operators. Surgeons do not seem to be agreed even as to what shall constitute a recurrence, or wound suppuration, and, if they were agreed, the personal element would still count for much.

*The Use of the Cremaster Muscle.*—A device which we hit upon in our efforts to close more securely the lower part of the

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<sup>6</sup>P. Berger: La Hernie inguino-interstielle et son traitement par la Cure radicale. *Revue de Chirurgie*, Janvier, 1902.



canal, but which we now make use of as often as feasible, [210] probably in over 75 per cent of the cases, is the utilization of at least a part of the cremaster muscle, which we formerly cut away. This is a step of the operation to which one is irresistibly drawn in some cases by the great strength of the cremaster and the firmness and extent of its attachments to Poupart's ligament. A natural insertion, such as this, of the cremaster and its fascia into Poupart's ligament, has in each case a value which can be demonstrated on the operating table and can be counted upon definitely to contribute something, and occasionally perhaps a great deal, to the strength of the abdominal wall; whereas the artificial insertion of the internal oblique into Poupart's ligament, although undoubtedly of the utmost importance and always to be tried for, may occasionally and perhaps often fail, from insufficient muscle, too great tension, or gradual redressment, to close securely even the upper part of the canal. The lower part of the canal, ordinarily protected by the conjoined tendon, can rarely be entirely safeguarded by the muscle fibres of the internal oblique when its conjoined tendon is deficient. The cremaster, on the other hand, seems in just these cases to serve a particularly good purpose. The cremaster, unaided, has repeatedly made such a complete and strong looking closure that we have felt the hernia would be well cured if the operation were abandoned at this stage.

I have today, June 10, 1903, examined a patient whose very wide inguinal canals (the gap would have admitted the hand) were closed eighteen months ago solely by the cremasters stitched over instead of under the internal oblique muscle; the result, in the opinion of those who examined the case, is absolutely perfect, on both sides. My house surgeon, Dr. Fol-  
lis, and one or two others examined the man<sup>7</sup> with me. Even [211]

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<sup>7</sup>The history is briefly this. Male, æt. 59 years; Surgical No. 12,905; was operated upon January 15, 1902, for two very large scrotal ruptures, eighteen and twenty-four inches long (from external ring to bottom of scrotum). The conjoined tendons on both sides were almost obliterated. The circumcentral rings easily admitted four fingers. The cremaster muscles, very well developed, were used to close the entire dehiscence because the internal oblique muscles could, only with great tension, be



[211] had I known what the result in this case was to be, I would have used, if possible, the internal oblique muscles in the old way, and hence have stitched the cremaster under rather than over the former. But the muscles were attenuated and not close at hand. Stitching the cremaster over the internal oblique muscle necessarily precludes the sewing of the latter to Poupart's ligament. The closure with the cremaster seems almost ideal in some cases; it is a method so inviting during the operation, and so true, when finished, to one of the *great principles of surgery; there is no tension*. It is, in this respect, as a plastic operation should be. What the ultimate verdict will be it is too soon to predict. The cremaster fibres, particularly the hypertrophied ones, will, in time, atrophy; but when this occurs, the cremasteric fascia, perhaps stronger than before, would probably remain, holding together the atrophied muscle bundles. There can, at least, no harm result from this attempt to strengthen the wall, for the internal oblique muscle has been used in the usual manner. The worst that could happen would be a recurrence, in a certain class of cases, at the lower angle, one that might, possibly, have been avoided if the aponeurosis over the rectus muscle had been employed instead of the cremaster as described by the author. The future will decide these nicer points, and it would seem that only the nicer points remain now to interest the operator.

Another feature of the present operation is to transplant the neck of the sac as described below. It is merely an additional precaution warranted by the good results obtained by Kocher and others with his operation.

And, finally, we overlap the aponeurosis of the external oblique muscle to insure the union which a mere approximation of the edges of the aponeurosis cannot do, and to close more snugly the external ring.

We still examine with the same care, but no longer with concern, the epididymis, testicle, stump of veins, etc., chiefly to ascertain if there is congestion (induration) of

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drawn down to Poupart's ligament; the former was stitched in front of instead of behind the latter muscles. We had never before and have never since had occasion to use the cremasters in this way. Dr. Mitchell, my house surgeon, operated upon one side, and the author upon the other.



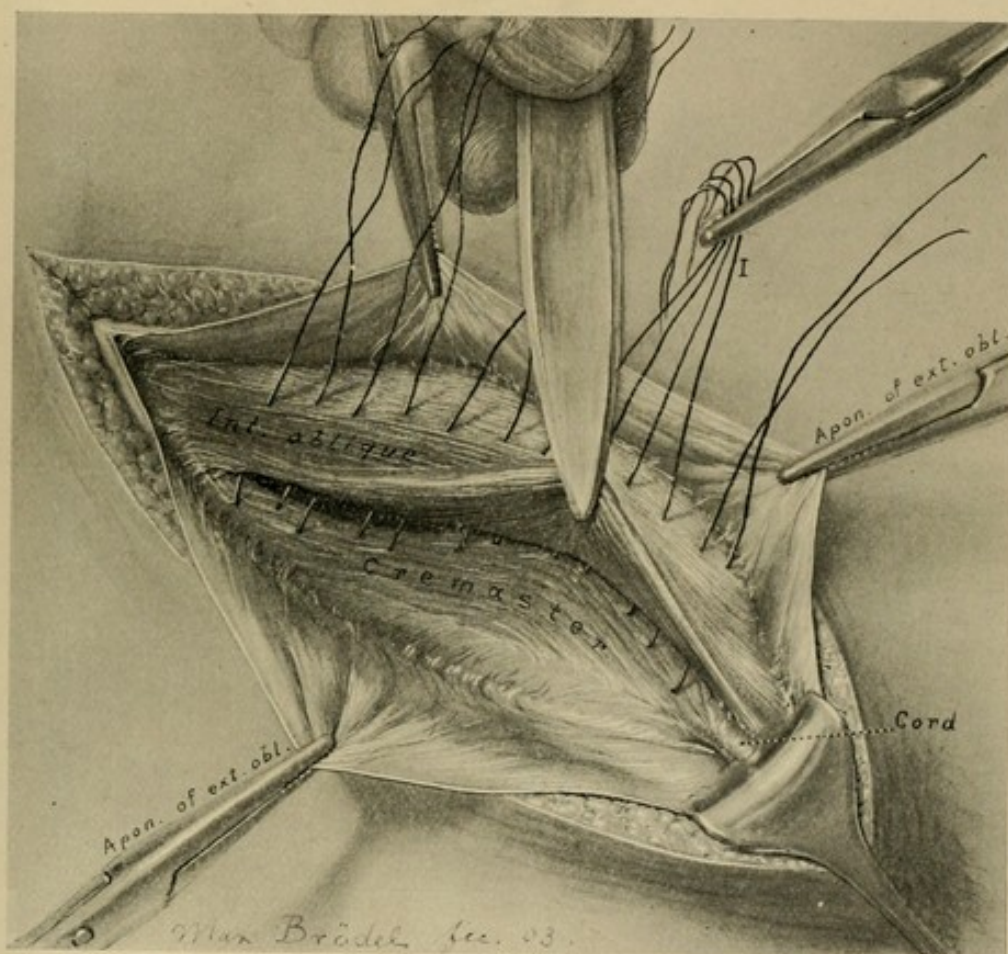


FIG. I.

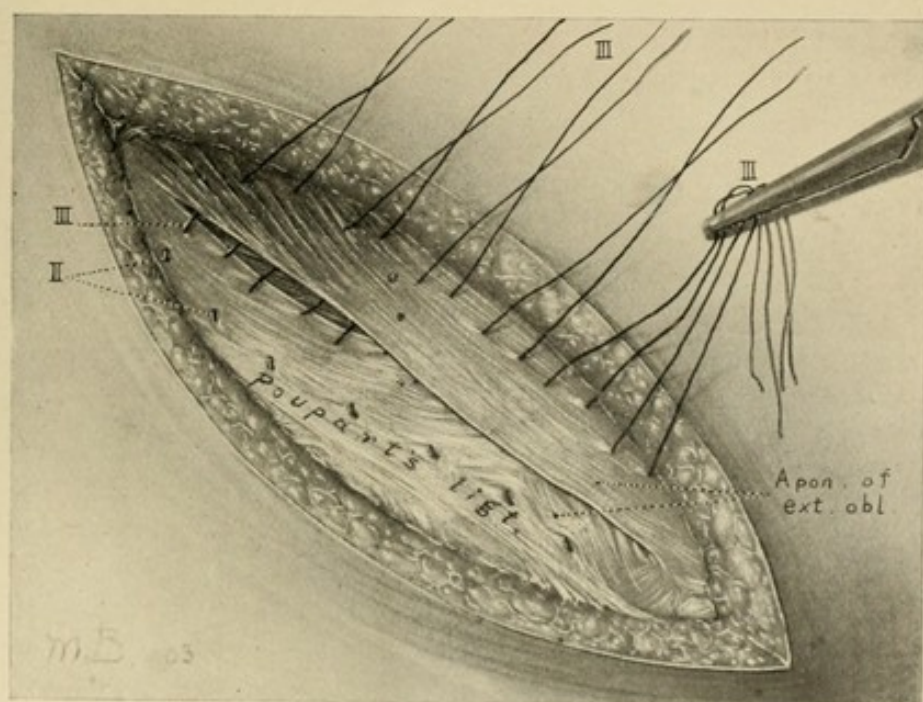
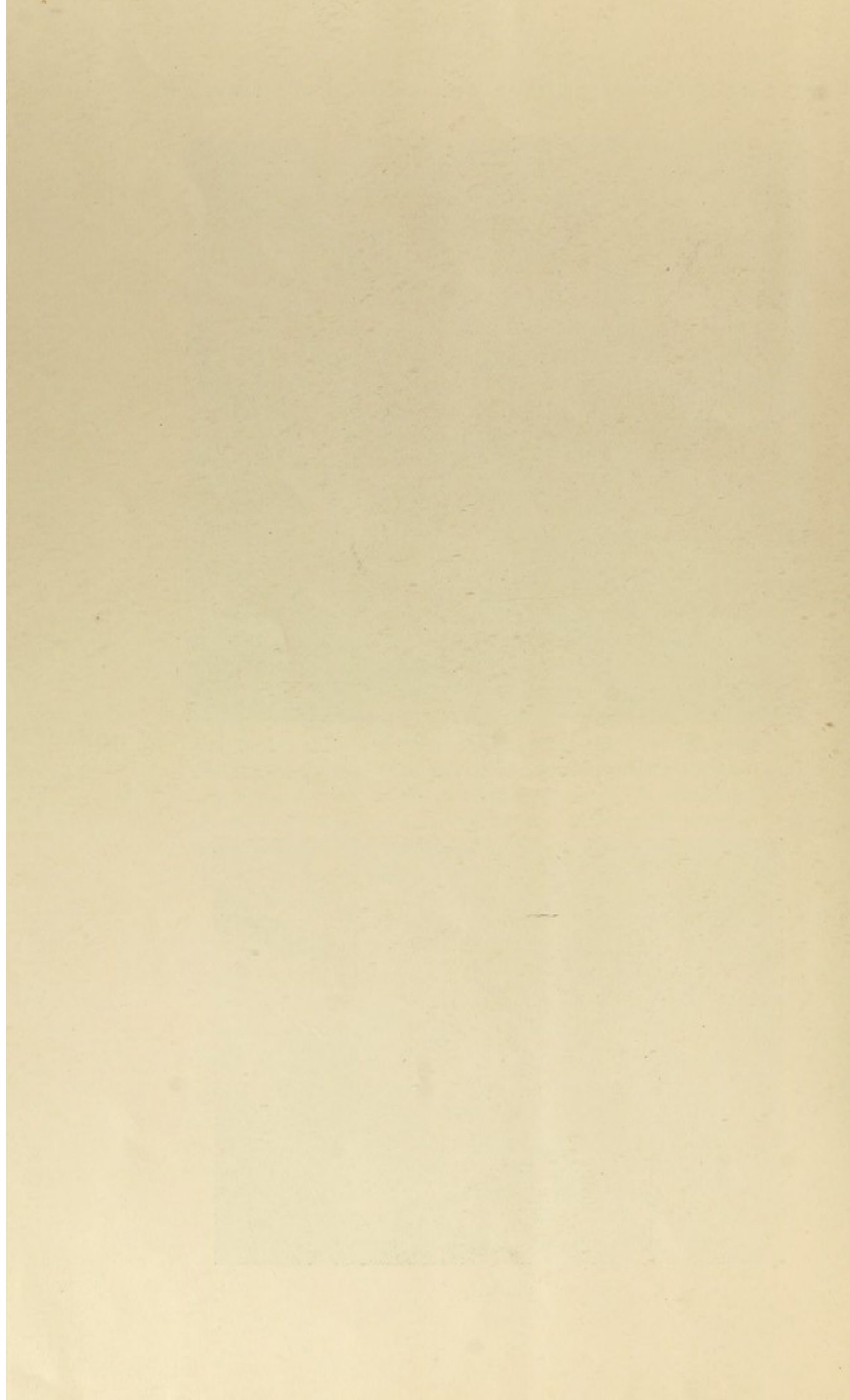


FIG. III.





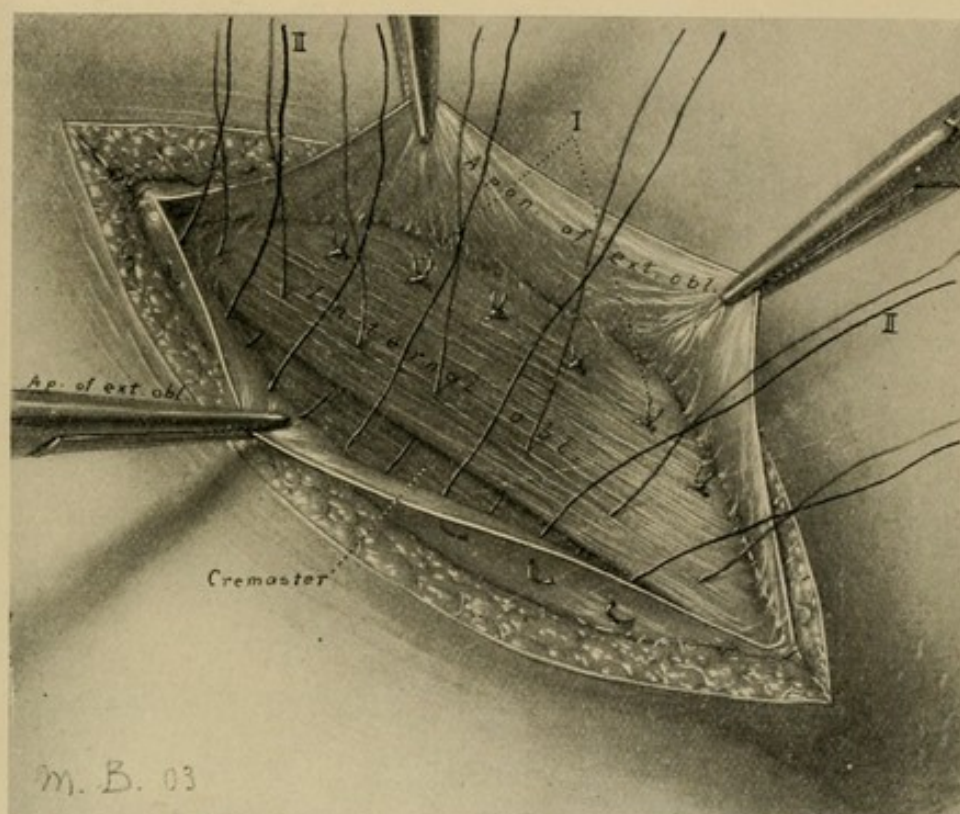


FIG. II.

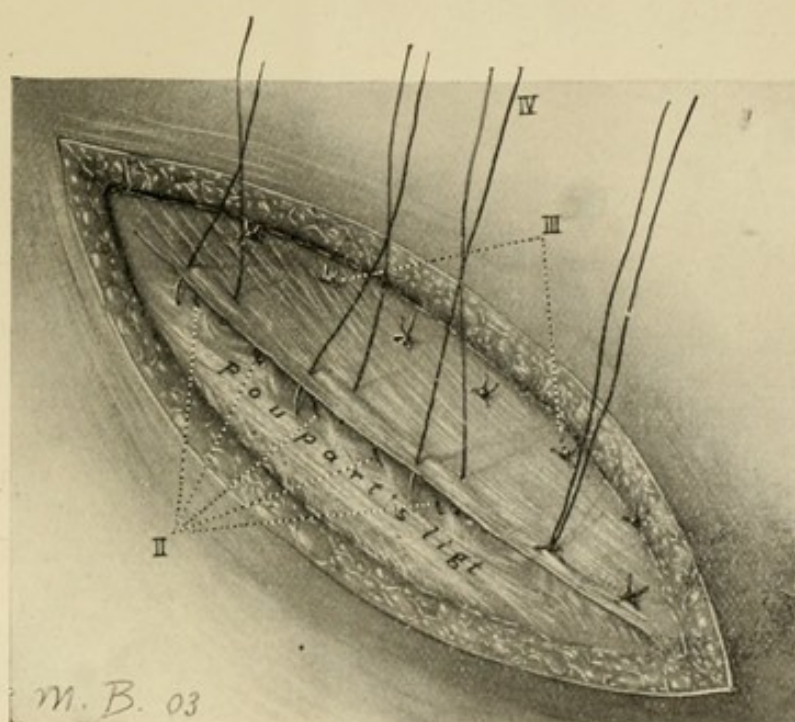
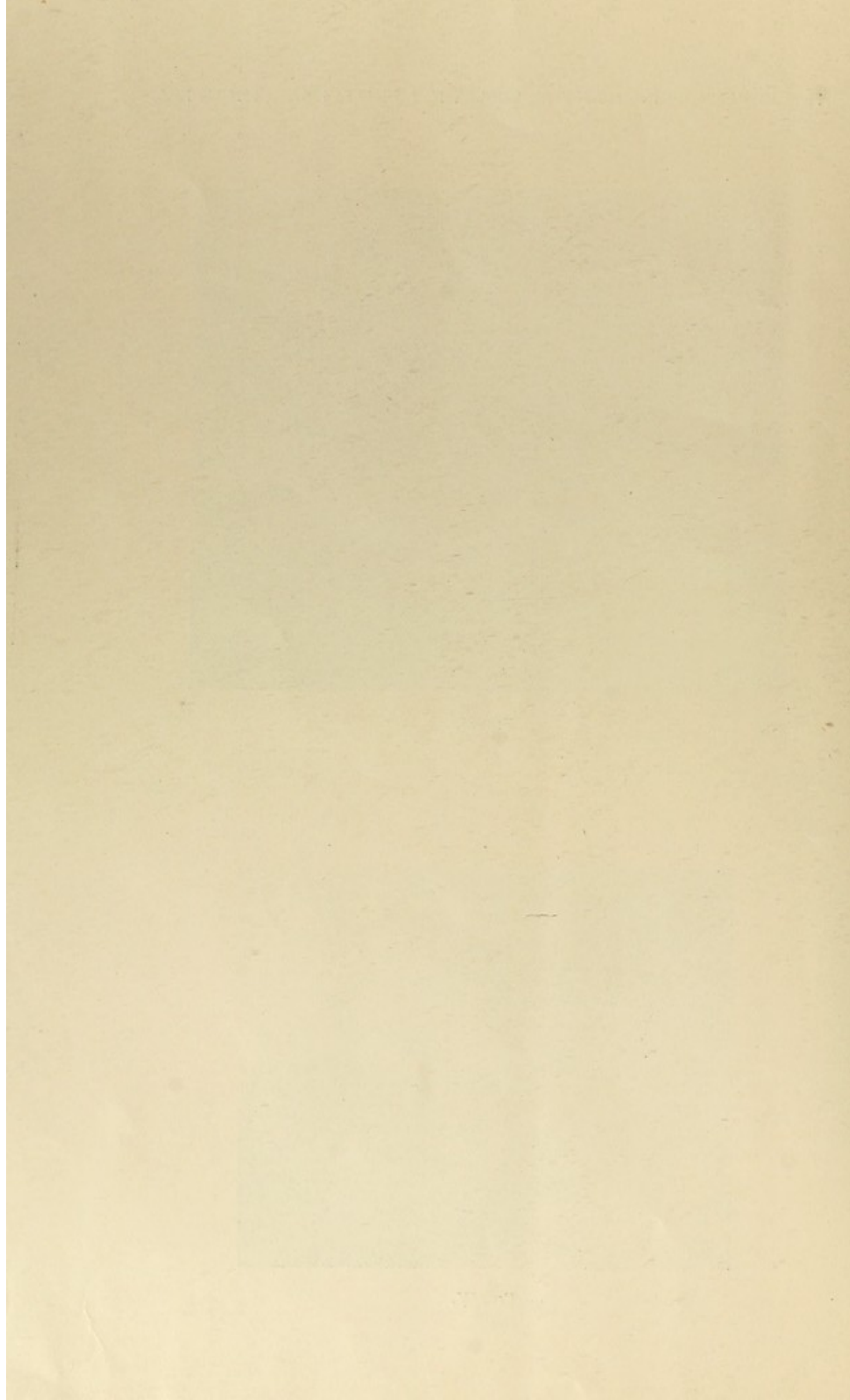


FIG. IV.





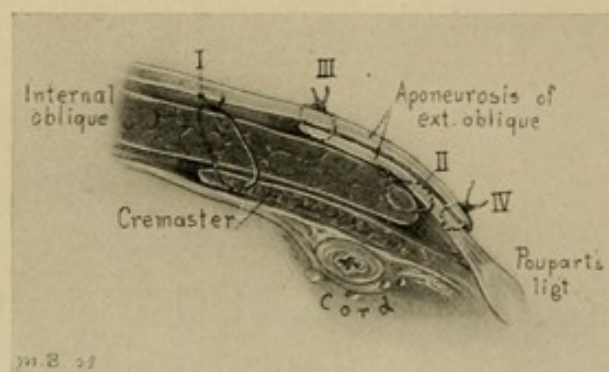


FIG. V.

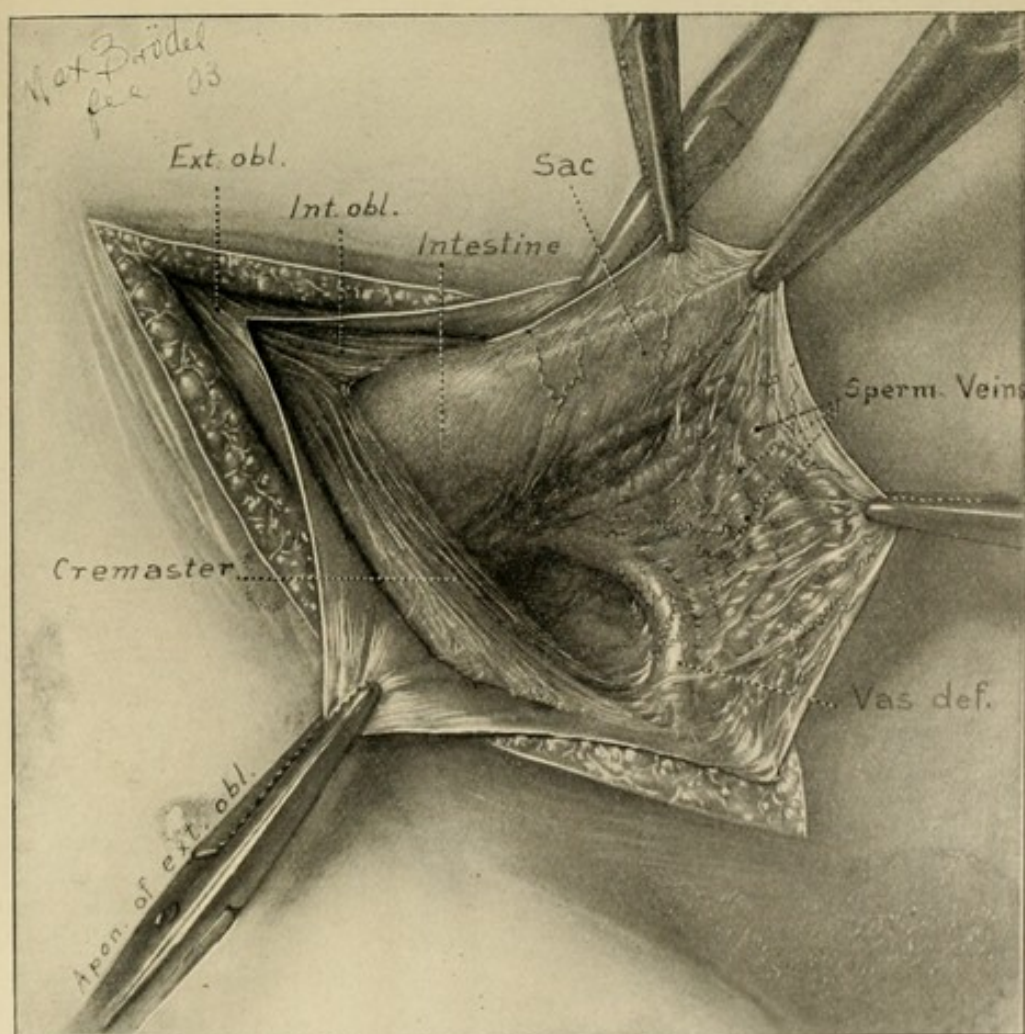
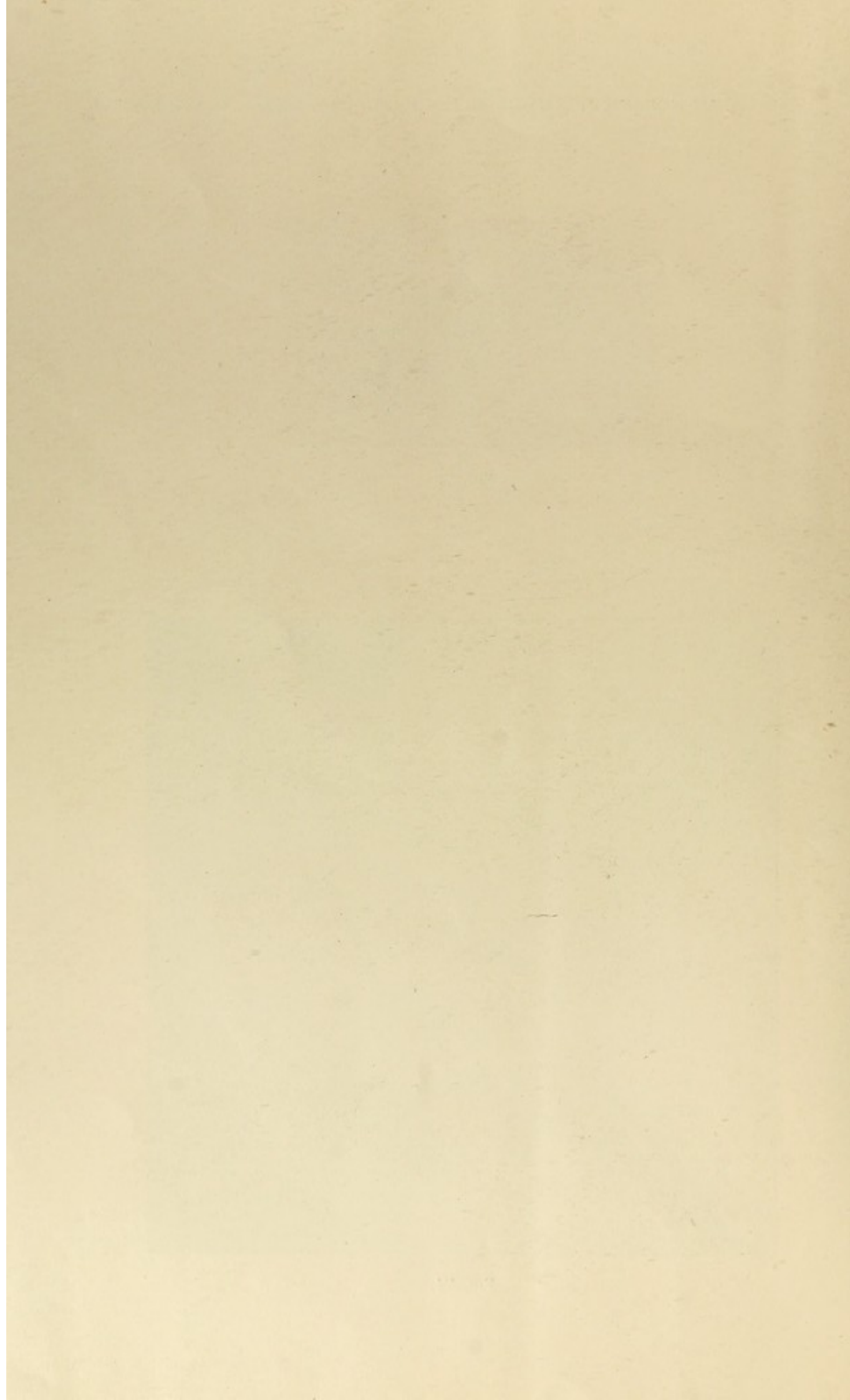


FIG. VI.





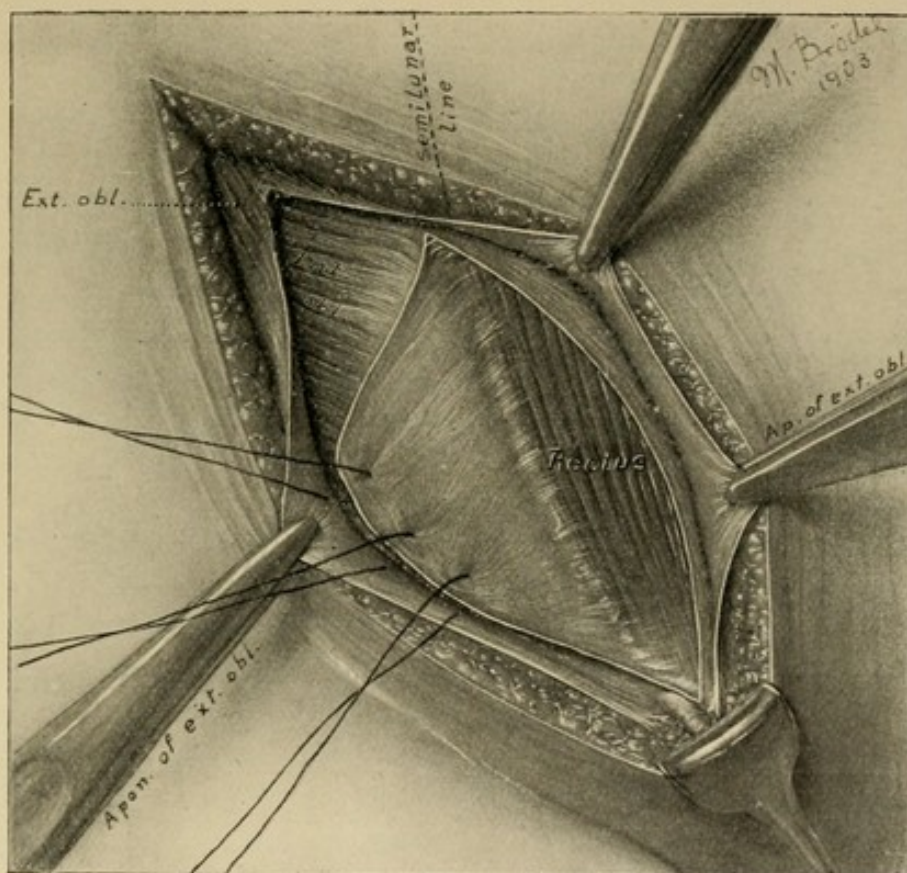
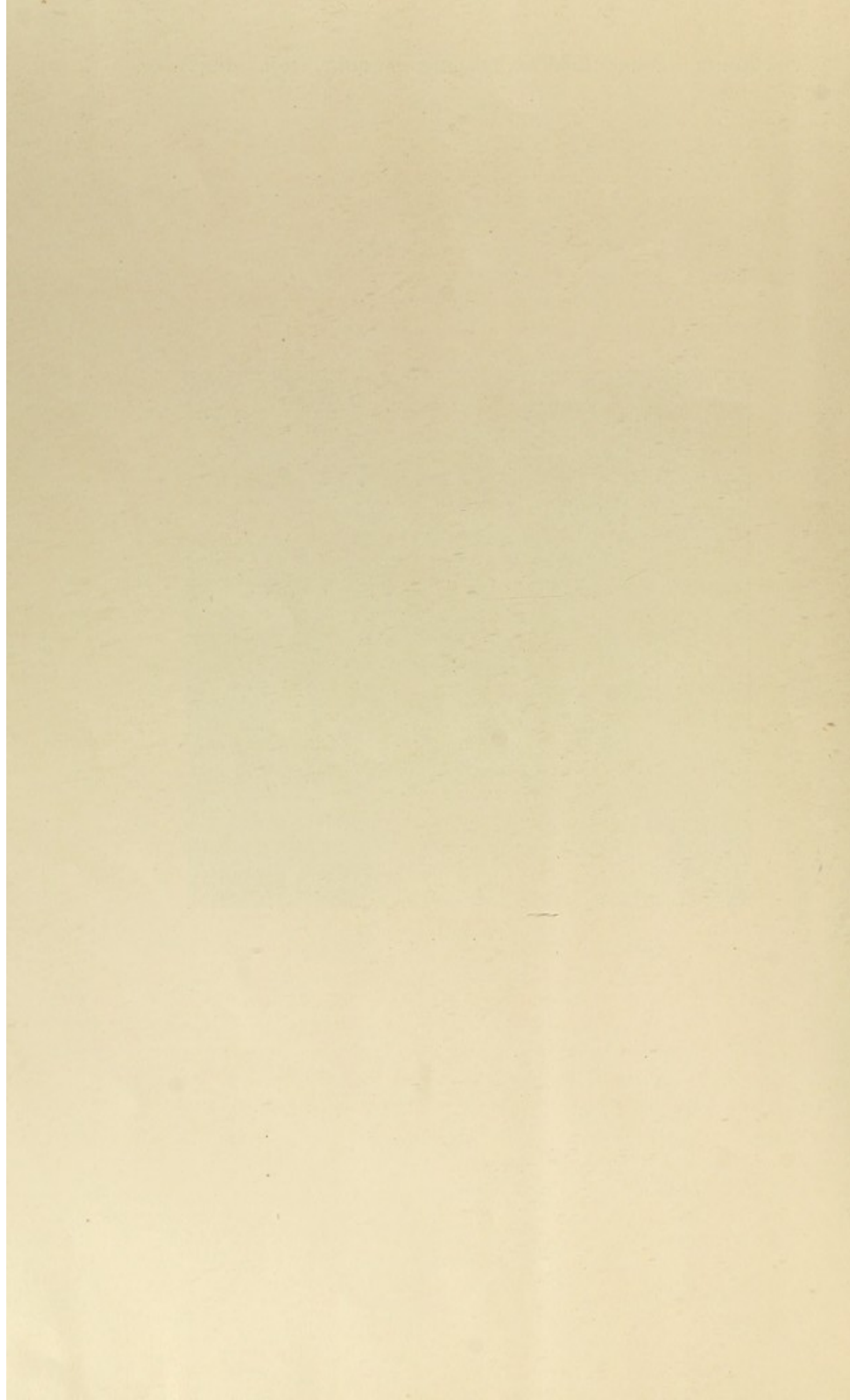


FIG. VII.





the epididymis or fluid in the tunica vaginalis. Often there [211] is an appreciable, though very slight, induration of the epididymis, particularly if the veins have been ligated through the dense plexus very near the testicle; and often a few drops or a drachm or two, or even more fluid is present in the tunica vaginalis. This may become absorbed in a few weeks or months and might, when present, usually not be noticed by the patient except for the repeated careful examinations. Hydroceles containing several ounces have been recorded in our histories; in two or three instances operation for the cure of the hydrocele has been performed. What the proportion of hydroceles is to the cases operated upon for the cure of hernia, without vein excision, I cannot say for the reason that we excise the veins almost invariably nowadays, and in the days when the veins were not excised we did not observe our cases quite so keenly with reference to this point. One of the larger hydroceles followed, as I have said, an operation in which the veins were neither excised nor transplanted nor in any way disturbed. The patient, a navy officer, had an indirect rupture on each side. Both sides were operated upon at the same time and on both, hydroceles developed in a few days, although neither epididymis became more than just perceptibly indurated; but the larger hydrocele was on the side of the undisturbed veins and of the smaller hernia. Not a single atrophy of the testicle has been recorded since 1899, when Bloodgood published his report, and I believe that at that time it was noted that not one had been observed for several years.

Possibly some of my readers will ask, "Why take so much trouble, why make the operation so complicated when such good results as are published may be obtained by simpler methods?" The operation is not complicated for the surgeon competent to operate for the cure of hernia, nor are all its details required for the simpler cases, and we do not know just what the results obtained by simpler methods are. We cannot ascertain definitely even our own results, although we make a great effort and are admirably equipped to do so. This can be said, however, that, since the publication of the author's second paper, June, 1892, not a single recurrence has been



[211] charged to him. One of the world's most distinguished surgeons, the inventor of a clever hernia operation, made, with reference to himself, some such remark to the author three or four years ago, and the next morning two recurrences presented themselves. This surgeon permits his patients to get out of bed in eight days because, as he said to me, "A man can better afford to be operated upon three or four times for recurrence by my method than once by a method like McEwen's, which requires lying in bed for five or six weeks." In my experience a man would, *after* operation, prefer to spend several additional weeks in bed than run the risk of a recurrence. It is only before, not after the operation that a patient objects so vigorously to the time to be spent in bed.

*The Operation.*—The several steps of the operation are so well depicted by the illustrations of Brödel that a verbal description is almost superfluous for those who have the plates.

(I) The aponeurosis of the external oblique muscle is divided and the two flaps reflected as in the Bassini-Halsted operation.

(II) The cremaster muscle and fascia is split, not directly over the centre of the cord, but a little above it.

(III) The internal oblique muscle is made as free as possible. A little artefaction is here often necessary. If the muscle cannot be drawn, without tension, well down to Poupart's ligament, it helps, I think, to make a relaxation cut or two in the anterior sheath of the rectus muscle under the aponeurosis of the external oblique muscle. This sheath being in part the [212] aponeurosis of the internal oblique muscle, one can readily comprehend that incisions into it, if properly made, might be of service. It is well, however, to postpone making such incisions until the sewing of the internal oblique muscle to Poupart's ligament is begun, for then the amount of tension can be nicely gauged and the number, length and precise position of the relaxation cuts determined. A second reason for postponing the relaxation incisions into the anterior sheath of the rectus muscle is that we sometimes use this portion of the rectus sheath to close the lower part of the inguinal canal, as already stated.



(IV) When the veins are large, and this is usually the case, [212] they should be excised with very great care to avoid even the slightest extravasation of blood into the tissues about the smaller veins and about the vas deferens which they accompany. And the vas deferens, as first emphasized by Bloodgood, should not be raised from its bed or handled or even touched, lest thrombosis of its veins occur.<sup>8</sup> (Vide Fig. VI.) The veins should be ligated as high up in the abdomen as possible, being pulled down quite firmly just before the ligature (in a needle with the blunt end first) is passed between them. As a precaution against slipping, we apply two ligatures of fine silk, both for the abdominal stump and for the testicle stump of the veins. The farther from the testicle the veins are divided, the better, provided, of course, that their stump is external to the external abdominal ring.

(V) Ligation of the sac by transfixion or by purse string suture at the highest possible point. Both ends of this suture, after tying, are threaded on long curved needles, then carried far out under the internal oblique muscle from behind forwards, and, passing through this muscle, about 5 mm. apart, are tied. The idea was suggested to the author by Kocher's operation, the principle being essentially the same.<sup>9</sup>

(VI) The lower flap of the cremaster muscle and its fascia is drawn up under the mobilized internal oblique muscle and held in this position by very fine silk stitches, which, having engaged firmly a few bundles of the cremaster, perforate the internal oblique, preferably where it is becoming aponeurotic, and are tied on the external surface of the latter; vide Fig. I.

(VII) The internal oblique muscle, mobilized, and possibly further released by incising the anterior sheath of the rectus muscle, is stitched (the conjoined tendon also) to Poupart's

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<sup>8</sup> The fact is that the vas deferens is frequently accidentally handled or squeezed, but harm that we know of has never resulted since we have recognized the necessity for exercising great care in the separation and ligation of the veins.

<sup>9</sup> I have read recently in the *Centralblatt für Chirurgie* a reference to some other surgeon's account of this very procedure, but, unfortunately, cannot recall the surgeon's name and have not the facilities at this moment to hunt for it.



[212] ligament in the Bassini-Halsted manner. (Vide Fig. II.) Catgut is usually employed for this suture. The drawing was made from an unusually muscular subject and possibly exaggerated the size and extent of the internal oblique muscle, as well as of the cremaster, although the artist endeavored to record accurately what he saw.

(VIII) The aponeurosis of the external oblique muscle is overlapped, as shown in Figs. III and IV. This is known as Andrew's<sup>10</sup> method, although devised independently by us.

(IX) The skin is closed with a buried continuous silver suture, and the incision covered with five or six layers of silver foil. It is unnecessary to dress or examine a wound closed in this manner for two weeks, when the wire may be withdrawn. Patients are kept in bed from eighteen to twenty-one days.

We hope to be able to publish very soon the results of the first 1000 operations performed for the cure of inguinal hernia at the Johns Hopkins Hospital. Certainly more than two-thirds of the operations have been performed by my associates, Drs. Finney, Bloodgood, Cushing, Mitchell and Follis, for we are all much interested in the subject. Each operator has been at perfect liberty and is encouraged to perform the operation according to his best judgment. This fortunately furnished a little variety, but of late the operation has, in almost every detail, been performed just as the writer has described it.

Inasmuch as only a limited number of surgeons see the Johns Hopkins Hospital Reports, in which Dr. Bloodgood published his article, it may be well to publish one or two of the Summaries which he prepared with such care and so great labor. He intends quite soon to investigate the condition of all those, so far as possible, who are included in these Summaries.

“SUMMARY OF THE ULTIMATE RESULTS. COMPLETE TO  
JUNE 1, 1899.”

“Recent cases, less than 6 months, and cases lost track of were not included.

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<sup>10</sup> The Chicago Medical Recorder, August, 1895, vol. ix, p. 67.

All cases Group I to V healing p. p.	301 cases.	13 recur.	4.3%	[212]
All cases Group I suppurating.....	31	“	9 “	29%
Total.....	332	“	22 “	6.6%

Halsted's operation, Group I, healing

p. p. ....218 cases. 9 recur. 4.1%

Halsted's operation, Group I, suppu-

rating ..... 20 “ 6 “ 30%

Total, Group I.....238 “ 15 “ 6.2%

#### “RECURRENCE IN WOUNDS HEALING PER PRIMAM.”

	Cases.	Recurrences.	
(1) At the position of the transplanted cord, veins excised.....	109	nil.	
(2) At the position of the transplanted cord, veins not excised.....	109	7 (6.4%)	
(3) Upper angle of the wound, cord excised or not transplanted.....	83	1 (1.2%)	
(4) Lower angle of the wound, conjoined tendon wide and firm, rectus muscle not transplanted.....	264	nil.	[213]
(5) Lower angle of the wound, conjoined tendon obliterated, rectus muscle not transplanted.....	8	5 (62%)	
(6) Lower angle of the wound, conjoined tendon obliterated, rectus muscle transplanted .....	14	nil.	
(7) Lower angle of the wound, conjoined tendon wide and firm, rectus muscle transplanted .....	16	nil.	

#### “RECURRENCE IN WOUNDS HEALING BY SUPPURATION.”

(1) At the position of the transplanted cord, veins excised .....	9	nil.
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	Cases.	Recurrences.
(2) At the position of the transplanted cord, veins not excised.....	11	4 (36.3%)
(3) Upper angle of the wound, cord excised or not transplanted.....	11	1 (9%)
(4) Lower angle of the wound, conjoined tendon wide and firm, rectus muscle not transplanted.....	27	2 (7.4%)
(5) Lower angle of the wound, conjoined tendon obliterated, rectus muscle not transplanted.....	4	2 (50%)

Dr. Bloodgood's "*Conclusions as to the operation for inguinal hernia*," published in 1899:

"Our observations prove that Halsted's operation with the excision of the veins will give perfect results, except in those few cases in which the conjoined tendon is obliterated; in these cases our observations so far have demonstrated that the transplantation of the rectus muscle will give perfect results."

"If the veins could be excised in every case of inguinal hernia and the remainder of the cord transplanted without any risk of epididymitis and atrophy of the testicle, a perfect result would probably be accomplished in every case."

"The operation would then be: The ligation and excision of the veins, the transplantation of the remaining portion of the cord into the upper angle of the divided and transplanted internal oblique muscle, and, in cases in which the conjoined tendon is obliterated, the transplantation of the rectus muscle. So far we have not observed a single recurrence when these procedures have been adopted. The sole objection to this method is the danger of atrophy of the testicle after excision of the veins. Atrophy of the testicle has been observed only after a very marked epididymitis. The probabilities of this epididymitis are very much less when the veins are excised without disturbing the vas deferens and its immediate vessels. For this reason I should advise that when the veins are excised the remainder of the cord, a very small affair, be left undisturbed. I am very much inclined to believe that the



cord, reduced to such a diminutive size by the excision of the [213] veins, will be as little likely to be the cause of a recurrence in the lower angle of the wound as in the upper angle when it is transplanted."

*"Cases in which the Veins should not be Excised."*

"When during the dissection of the sac the cord is torn from its bed in the inguinal canal and subjected to traumatism, and the testicle withdrawn from the scrotum, the veins should not be excised, because the probabilities of epididymitis and atrophy are too great. In such cases I would advise the transplantation of the veins alone, so that the larger cord is divided," and the wound is weakened less by the presence of a very small cord in two places than by the presence of a larger cord in one place, which from our results we know to have been the cause of a recurrence in 6.4 per cent of the cases."

"Note, June, 1899. In October, 1898, I performed for the first time the splitting of the cord, transplanting the veins only. Since this date the modification has been followed in 26 operations for inguinal hernia. In 12 the rectus muscle was transplanted. The wounds in 25 cases healed per primam. In 19 cases no swelling of the testicle followed operation. In 7 cases there was slight but temporary swelling. Thrombosis of the veins was not observed in any of the 26 cases. It is seven months since the first two operations. Both are perfect results. The others are recent operations."

"When the bundle of veins is unusually large, and complete excision is contra-indicated for reasons already given, I have suggested that a portion should be ligated and excised and the remainder transplanted. This has been done in a recent case by Doctor Cushing."

"In children the veins should not be excised; the probability of atrophy is greater than in adults. As we have had no recurrences whether veins have been excised or not, it does not seem to make much difference what is done with the very small cord."

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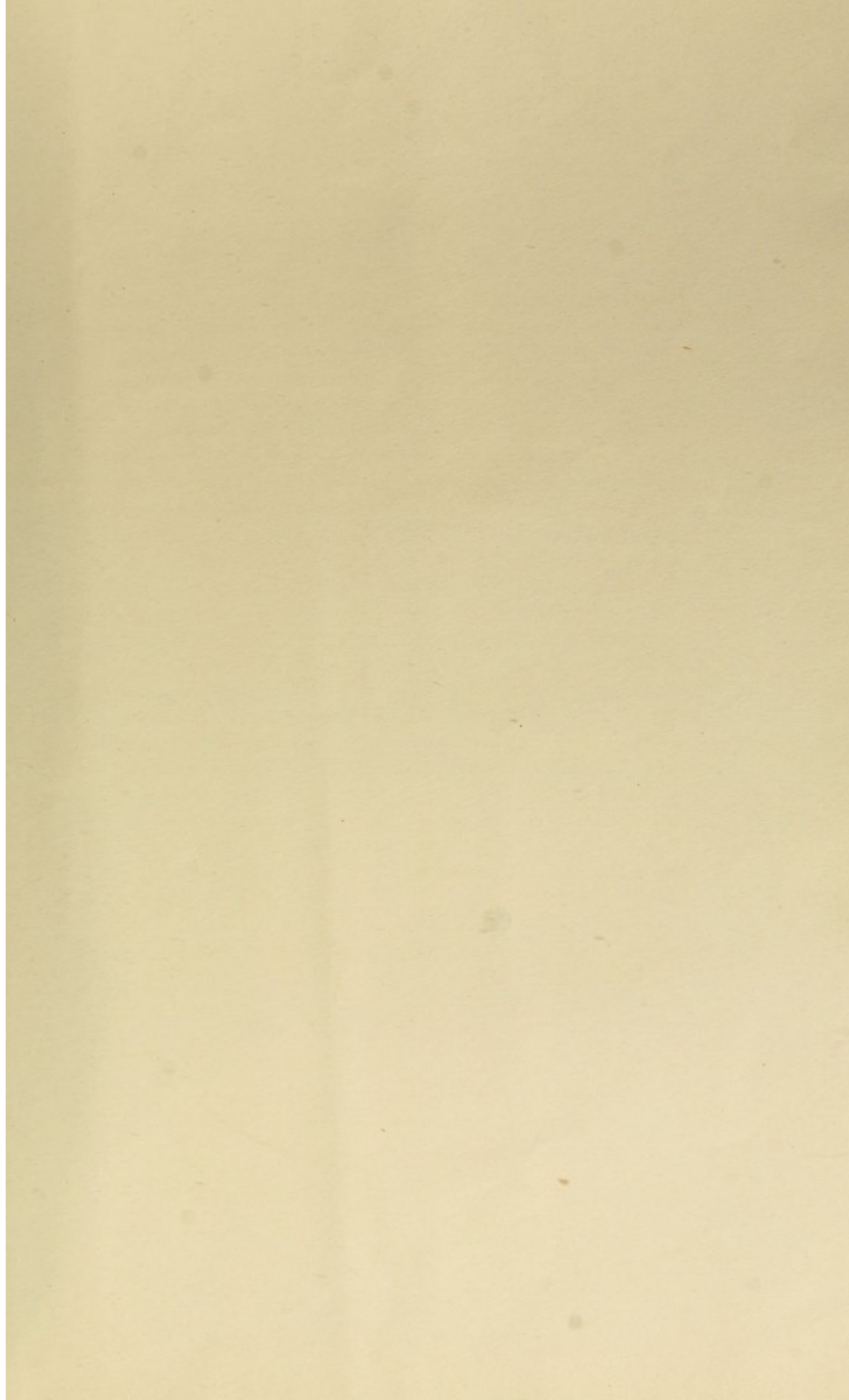
<sup>11</sup> The splitting of the cord has been discontinued by its author.



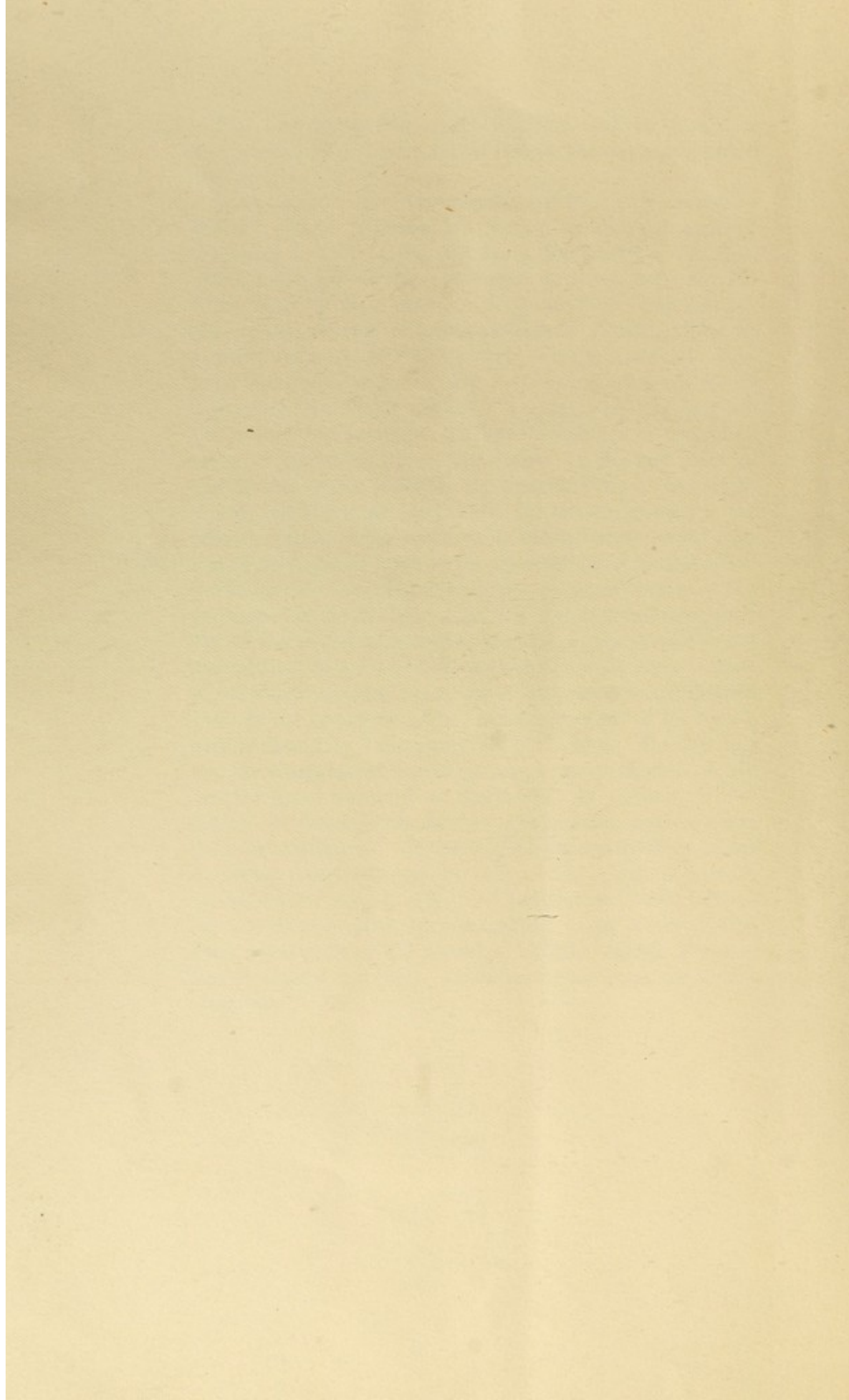
[213] "In the female the round ligament and its vessels is such a small affair that it makes little difference what is done with it."

"References to the transplantation of the rectus muscle by Wöfler: Wöfler published his method of transplantation of the rectus in 1892 in the *Beiträge z. Festschrift f. Th. Billroth*. I did not see this publication until my colleague, Dr. Clark, returned from Germany, in June, 1898. My preliminary report had then just been published. For this reason no mention was made of Wöfler's work. In the *Archiv für klinische Chirurgie*, June, 1898, Dr. Slajmer publishes 150 operations after the Wöfler method. A careful reading of these two articles has convinced me that this method of transplantation of the rectus differs from mine. In the first place no special reasons are given for the transplanting of the rectus muscle, while in my publication the reason given for the transplantation of the rectus is to strengthen the lower por-

[214] tion of the inguinal canal by the introduction of muscle which is weakened by the obliteration of the conjoined tendon. The description of the Wöfler method and the illustration on page 912 of the second article show that the rectus muscle is not transplanted in the best way to strengthen the lower portion of the wound, because the sheath of the rectus is not divided down to the symphysis pubis; but the division of the sheath ends at least 2 to 3 cm. above the pubic bone. For this reason the transplanted rectus muscle is approximated chiefly over the upper two-thirds of the wound. In addition, Wöfler divides the sheath of the rectus on the anterior surface above the linea semilunaris. In my method the sheath of the rectus is divided posteriorly and the belly of the muscle is brought out behind the internal oblique. I believe that by this method the muscle can better be transplanted so as to occupy the lower two-thirds of the wound. Slajmer reports 6 recurrences, about 6 per cent. In three of these cases the wound suppurated."

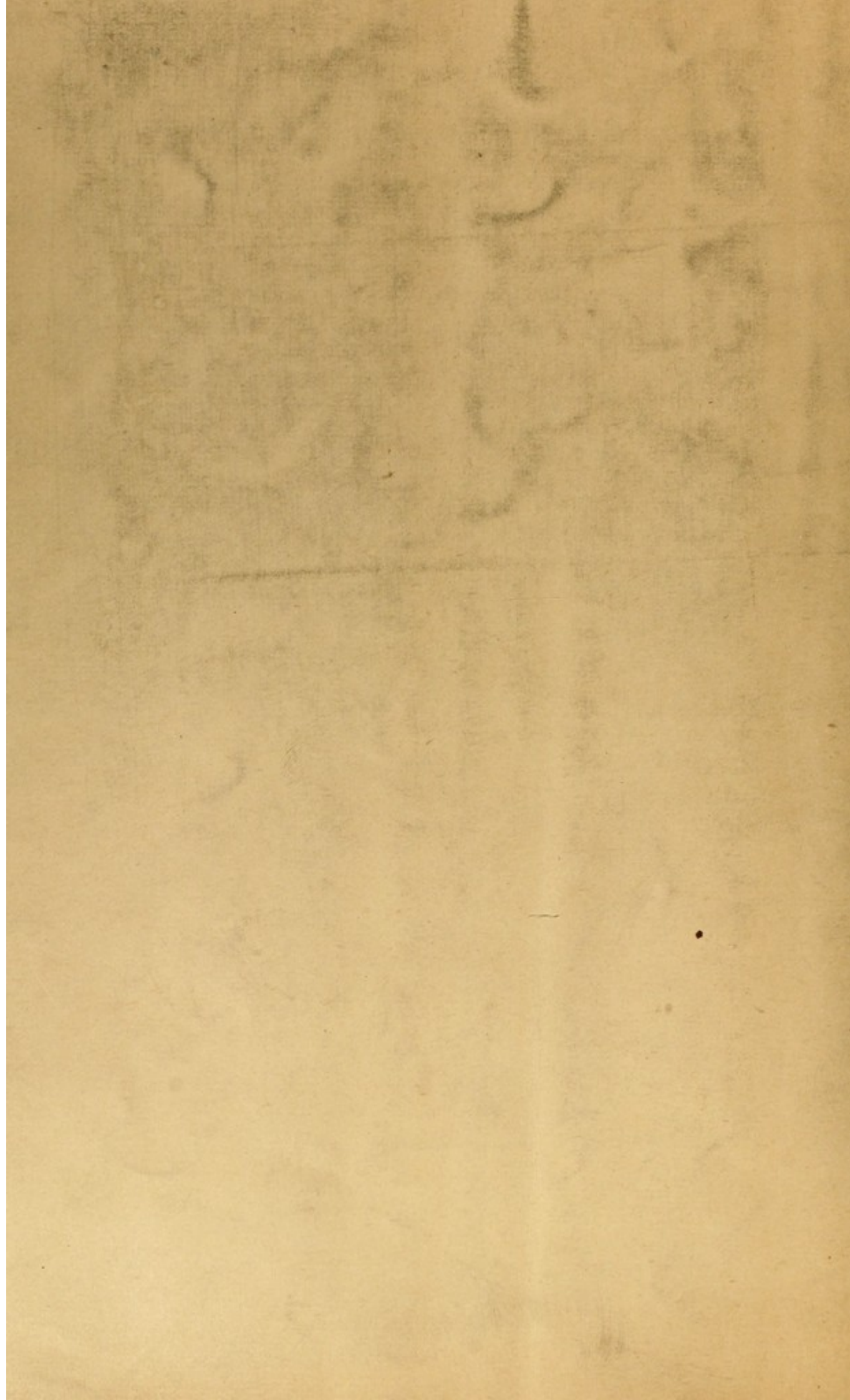


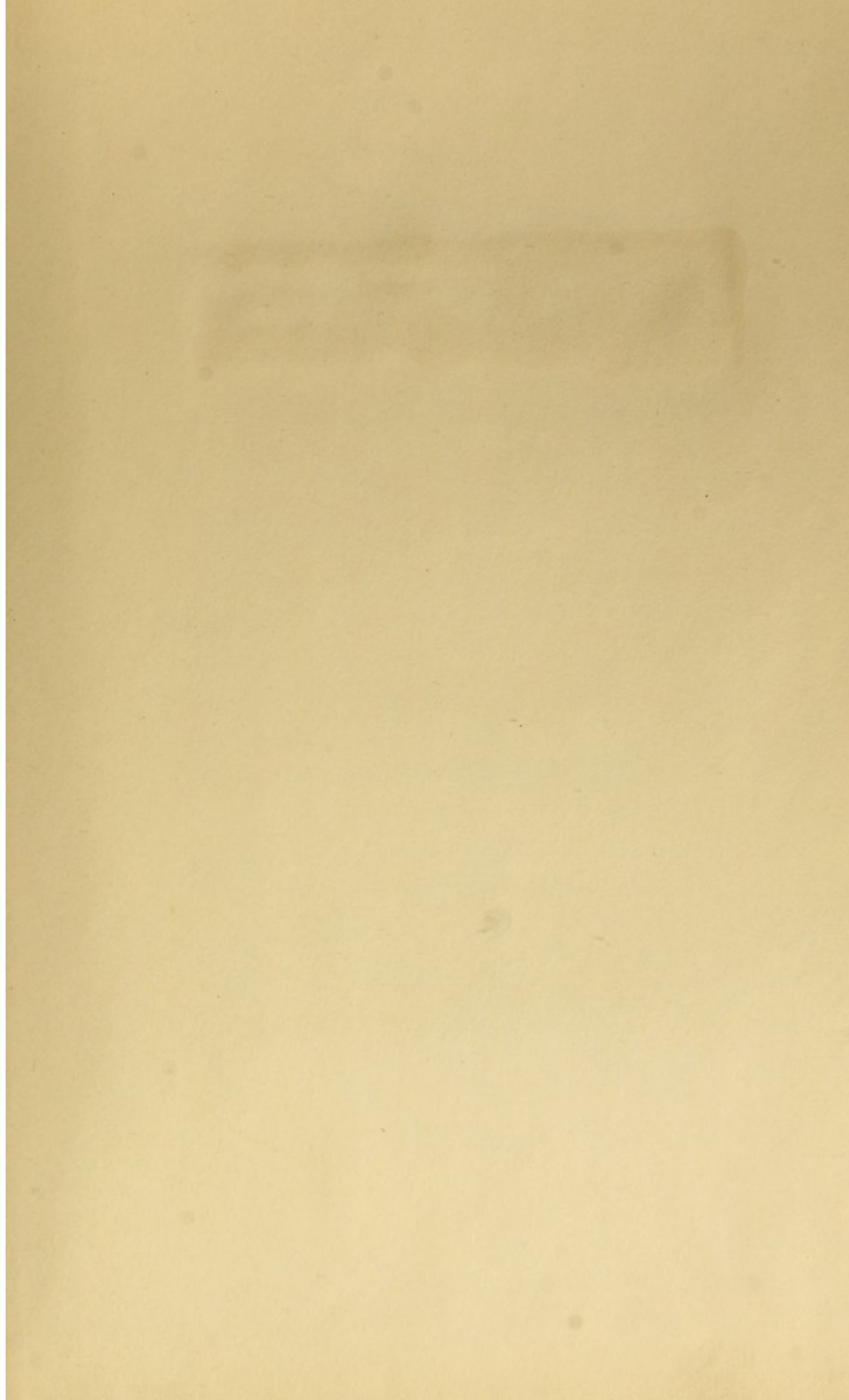














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Halsted

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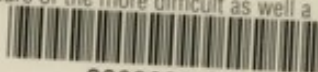
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