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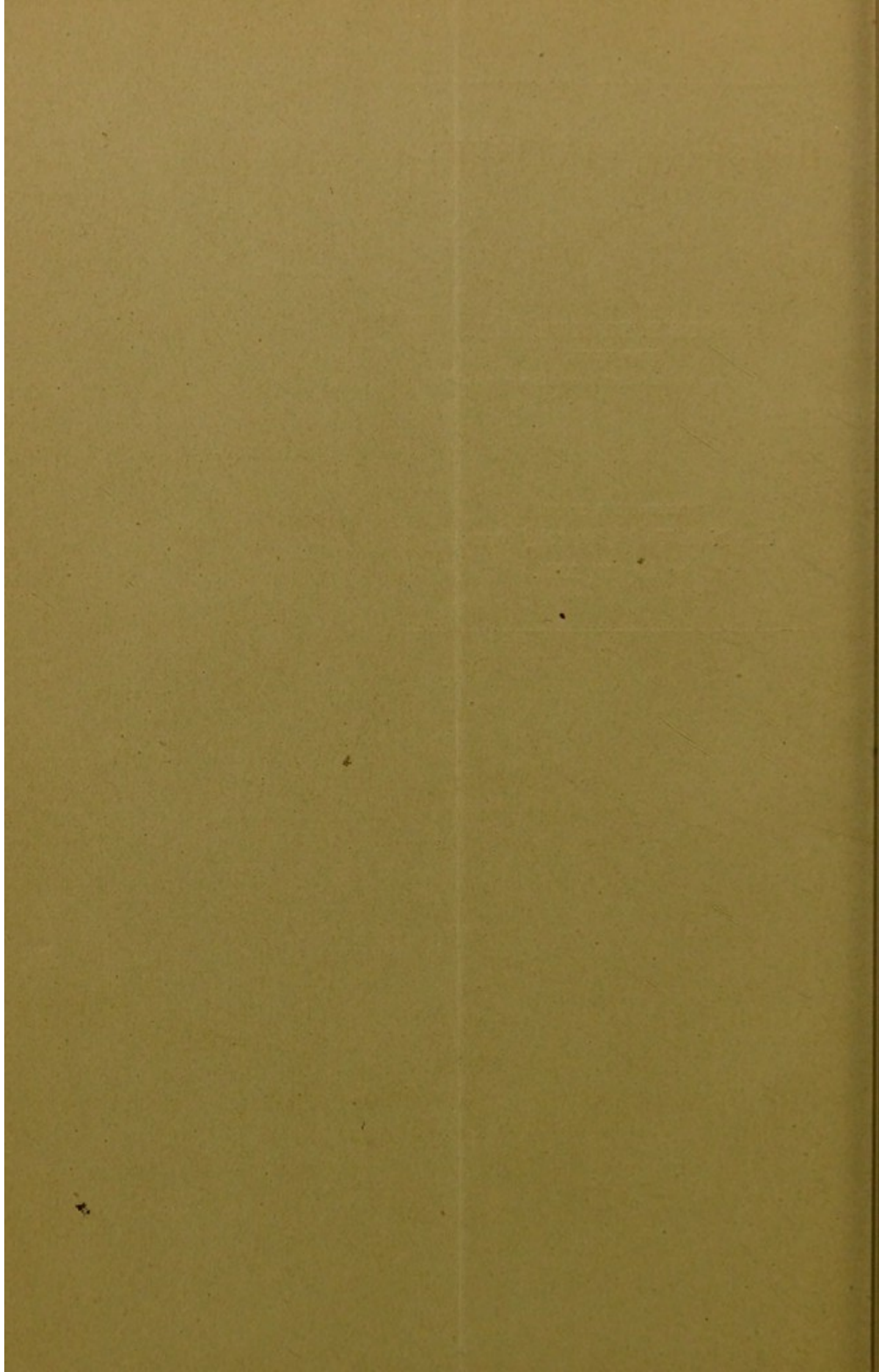
Hospital Antiseptic Surgery.

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BY
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BROOKLYN,
SURGEON TO ST. MARY'S GENERAL HOSPITAL.

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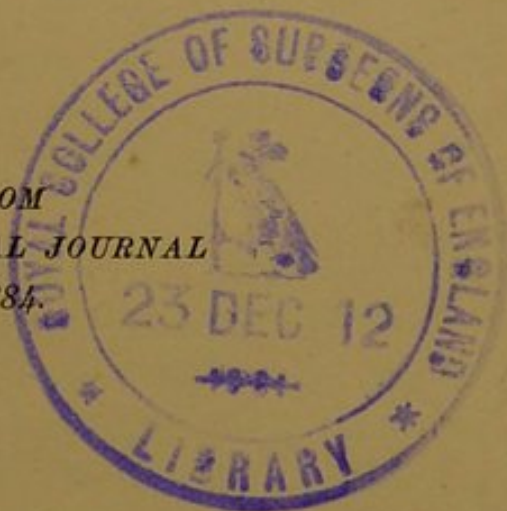


HOSPITAL ANTISEPTIC SURGERY.

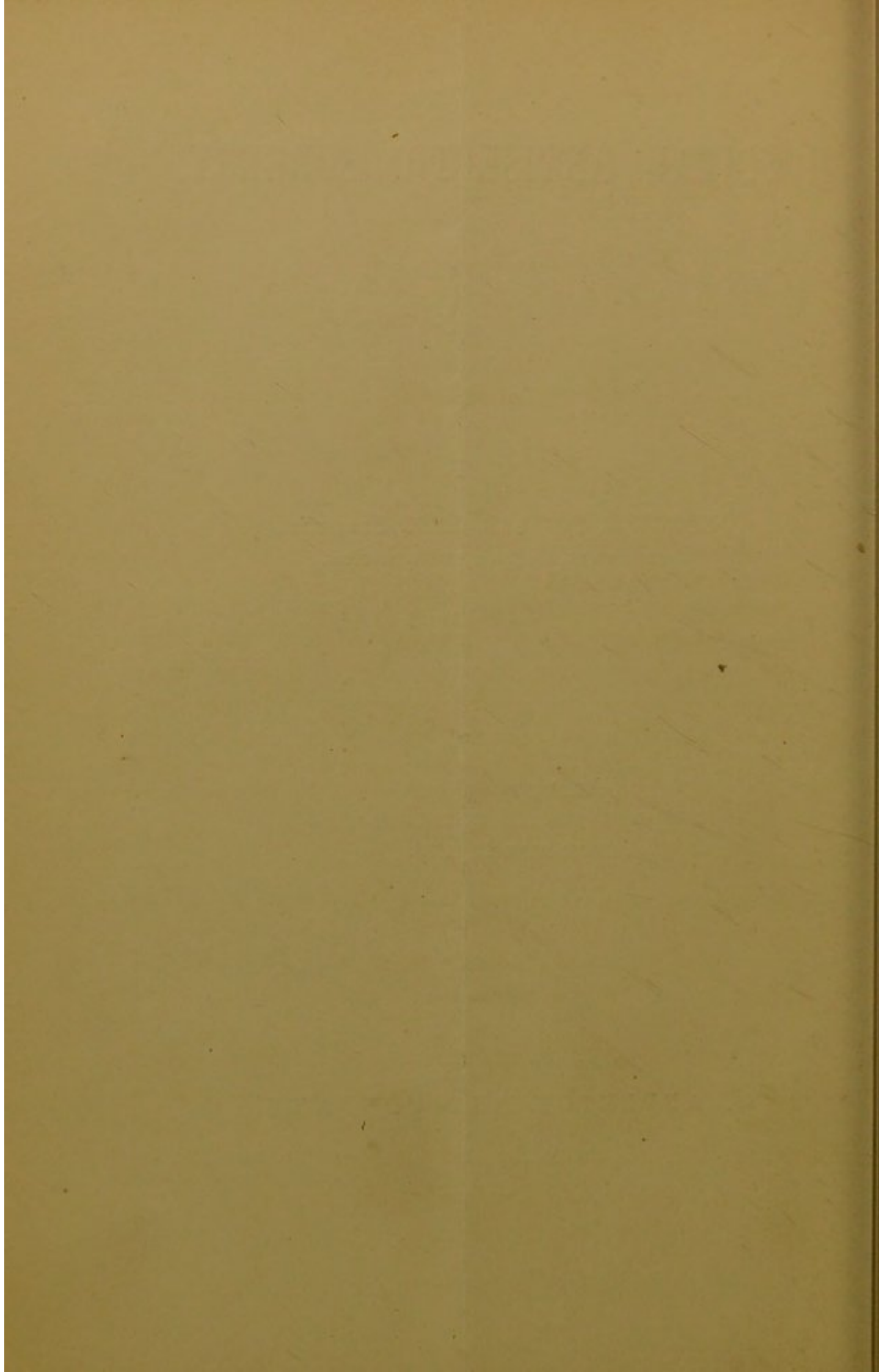
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HOSPITAL ANTISEPTIC SURGERY.*

I AM conscious that this title is far too comprehensive, for my present efforts will be limited to a description of the methods most popular with us at St. Mary's General Hospital. I am far too busy a practitioner of our art to find time to visit the other hospitals of this or the adjoining cities; I therefore know scarcely anything of methods there practiced, except that here and there, through the medium of the journals, I catch a glimpse of what they are doing for the advancement of the cause.

In every ward of our hospital there are large stock bottles of a five-per-cent. solution of carbolic acid. Tin basins, towels, and soap are disposed conveniently about, and no orderly would think of bringing anything else but the solution of carbolic acid, diluted with water one half, for the surgeon to wash his hands as he enters and leaves the ward.

It is required of internes that they shall not have visited the mortuary department, nor have handled any gangrenous ulcer, etc., upon the day that they are to assist at an operation. Prior to taking part in the operation they are re-

* Read before the Medical Society of the County of Kings, April 15, 1884.

quired to most thoroughly disinfect themselves with soap and a two-and-a-half-per-cent. solution of carbolic acid. After this their hands and arms are dipped in a solution of corrosive sublimate of the strength of one to one thousand.

Besides the ordinary preparation that patients undergo prior to operation, they are here thoroughly washed in carbolized water and soap for some distance beyond the point of operation; if, for instance, it is a foot to be operated upon, the entire leg takes part in the ablution. This is done in the ward, and towels, wrung out of the sublimate solution, are wrapped about the parts until the operation is about to begin. The patient being brought to the operating theatre, the rubber sheet covering the table is sponged off with the sublimate solution; the surrounding parts, as well as the site of operation, are again drenched with the same. Towels, wrung out of sublimate solution, are folded in convenient shapes and so disposed about the field of operation as to thoroughly isolate it from the rest of the surroundings.

Although corrosive sublimate is the favorite antiseptic with us, yet among the few objections to its use may be mentioned its blackening effect upon bright instruments. For this reason we still adhere to the use of a two-and-a-half-per-cent. solution of carbolic acid as a germicide bath for the instruments. These latter are conveniently arranged in square, shallow tin pans, in the bottom of which are placed folded towels; just before the operator is ready to proceed, the solution is poured upon them.

As we rarely use the spray in the hospital at the present time, the subject of irrigation becomes one of great importance, for we feel that some efficient method must be adopted to prevent the permanent lodgment in the tissues of floating matter from the atmosphere. We know of no method, next

to the spray, of accomplishing this object with a fair degree of certainty except by means of irrigation, and by some the latter is considered superior to the former. Frequent irrigation during the course of the operation is most desirable, and for this purpose the corrosive-sublimate solution would be by far the preferable antiseptic were it not for its damaging effects upon the Péan forceps and other instruments in use in and about the wound. For this reason it has never been popular in our operating theatre for irrigating purposes during operations. The two-and-a-half-per-cent. solution of carbolic acid here serves a good purpose, but at the close of the operation, after all instruments are out of the way, and just before placing the sutures, the wound in all its recesses and surroundings is most thoroughly douched with the corrosive-sublimate solution.

We look upon the arrest of hæmorrhage before closing the wound as a very important part of the antiseptic method, and no point of oozing is ever overlooked. It is at once grasped by a Péan or other flat-bladed and ring-handled spring-catch forceps, and, if these accumulate in the operating field so as to be in the way while the operator still continues at work, an assistant is directed to throw a ligature around each one, and whatever it may happen to grasp, without stopping to isolate the vessel. As catgut ligatures alone are used, it is believed that it makes but little difference about the tissues inclosed in the ligature, so long as the hæmorrhage is controlled. Of course, no one would think of including a large nerve trunk. Further, it is thought to be senseless folly to keep removing forceps to see if the oozing has been controlled by pressure, then having to reapply them or resort to torsion, and finally be compelled to tie the vessel. All this involves an extravagant waste of time and much awkward manœuvring. As only absorbable ligatures are used, and these of an unirritating

character, it is not deemed objectionable to have a large number of them in the wound.

It may be of interest to know the method we employ in the preparation of our catgut ligatures. We procure from Peck & Snyder, importers, 126 Nassau Street, New York, the best Italian guitar "E" and violin "E" strings, these two sizes being found sufficient for all practical purposes. In their preparation the latest method of Lister is adopted, as follows: The catgut is first immersed for twelve hours in a one-tenth-of-one-per-cent. solution of chromic acid, then dried, and immersed for twelve hours longer in a solution of sulphurous acid of the strength of the British Pharmacopœia. They are then dried and laid away for use. We keep some powdered iodoform in the box with the ligatures. It should be remembered that the strings are almost sure to untwist, unless prevented from doing so, and become thereby useless, when soaked in these solutions for so long a time. In order to prevent this we have adopted the following expedient: The skeins are slipped, just as they come from the importers, upon a round glass bottle upon which they snugly fit; this is filled with sand, so that it readily sinks into the solutions, and here they are kept during the whole process of preparation, and, when finally dried, are removed, and will be found to have retained their original size and shape, the latter a very convenient one. When they are to be used, we cut, say, half a dozen ligatures of about eight inches in length, and place them in a two-and-a-half-per-cent. solution of carbolic acid, or, better still, in the one-to-one-thousand solution of corrosive sublimate. This is done just at the beginning of the operation, and, when needed, they are found soft, pliable, strong, and perfectly antiseptic. They may be relied upon to hold, in a non-suppurating wound, either as ligatures or sutures, for at least ten days.

Next in importance to the securing of every bleeding

point, and thereby securing a dry wound before closing it, is the consideration of some simple and efficacious mode of draining away the wound secretions as they occur. As in most hospitals, rubber tubing of different sizes, having perforations in its walls, is the stock material for this purpose. It is cheap, and, upon the whole, quite efficient, although occasionally, it is to be regretted, a sinus is left marking the track of the drainage-tube long after the rest has fully healed. In amputations of the breast we prefer Neuber's absorbable bone drains, and have had some remarkably rapid healing under one dressing with their use. In cases of extirpation of large tumors, where quite a cavity remains, and perhaps several pockets, I have devised and practiced a method called "branched drains." It consists essentially in taking a single stitch, with a needle threaded with catgut-ligature material prepared as before described, in the deeper portion of the wound, and bringing out both ends from the most dependent angle of the wound. This is repeated in different parts of the wound and its flaps, all the strands being thus brought to the lower angle of the wound from different parts of its cavity and lower surface of its flaps. Other strands of the same material are laid along the middle of the wound directly underneath the line of sutures in the ordinary way, if deemed needful. Thus it will be seen that these branching drains, coming, as it were, from every part of the wound-surfaces and leading to the most dependent portion, must drain more efficiently than a single tube or bundle of capillary drains simply laid along the middle line of a large wound-cavity. Being likewise absorbable, their presence need give the surgeon no uneasiness, and the dressings can remain, but for some reason other than the removal of the drains, until the wound is entirely healed, thus realizing the surgeon's *beau idéal*—viz., perfect healing under one dressing. Attempts other than by this method

and that of the absorbable-bone drains to accomplish this latter object have not been made by myself, with one exception. This was a patient in whom, after an amputation of the thigh just below the trochanter, I tried the method of drainage known as "canalization," introduced by Neuber likewise. This consists of punching numerous holes, from a quarter to half an inch in diameter, through the flaps at various points, and relying upon these for drainage from the wound. The case was one of disease of the femur of long standing, the man was in incipient phthisis, and his vitality was far from being good. Yet, in spite of this, the punch-holes were found blocked with partly organized lymph, the cavity of the wound was filled with sero-sanguinolent fluid, and its interior gangrenous from pressure, when upon the third day the dressings were removed on account of a sudden rise of temperature. This is the only case that I have lost, after operation, from pyæmia since I began, understandingly and intelligently, the practice of antiseptic surgery.

As sutures, carbolized silk, horse-hair, silver wire, and catgut hold about equal rank in the estimation of our surgeons, my own practice more recently has been to close operation wounds, which, of course, are expected to pursue an aseptic course, at once with the continued catgut suture. By this means both time and material are conserved, and a much neater line of union obtained. Usually the outside loops of the sutures drop off and come away with the dressings when the inner loops are absorbed. In comparing the irritating qualities of the non-absorbable materials (horse-hair and carbolized silk), we have determined that horse-hair sutures, well cleaned and kept in sublimate solution ready for use, remain rather longer in the tissues without producing irritation, as evinced by slight suppuration along their track, than those of carbolized silk.

When we reach the matter of dressings, we open up the

most important part of the subject of hospital antiseptic surgery, for it is the expense attendant upon the use of antiseptic dressings that has been urged by boards of trustees of hospitals, and prevented many surgeons from adopting them in their wards. Now, I would venture to say that even the expense of a Lister dressing, in all its completeness, when intelligently used, with its need for but infrequent change, will compare favorably with the cost of a daily, and perhaps twice daily, application of ointment, lint, plaster, and bandages. The question that meets us at this point is, What are the requisites of an efficient antiseptic dressing? First of all, the basis, or that which seems to hold our antiseptic and serve at the same time as a dressing, must be of a highly absorbent character, and it must be readily obtainable. Furthermore, it must be light and easily molded to the parts operated upon, non-irritating, and readily impregnated with some active antiseptic substance. For this purpose the material in most common use at the present time is absorbent cotton. This substance is, however, in my opinion, very much overrated as a surgical dressing. I have used it extensively, and find that, although there may be a large mass of it surrounding the wound, yet but a very thin layer, and that only lying immediately upon the wound, became saturated with the secretions. A sort of crust is formed by the discharges combining with and drying in the meshes of the cotton, which becomes impermeable to the fluids, and any further secretions must either remain upon the parts under this crust of cotton, or find their way along the surface of the adjacent parts, and finally make their appearance under the edges of the dressings. When the latter are removed, the large mass of cotton-wool is found to be entirely dry, except the thin layer before mentioned. The district covered by the dressings are sodden, and covered by accumulated wound secretions. Such

a condition of affairs is certainly not consistent with the proper carrying out of the principles of antiseptic surgery. In small wounds, and where but little discharge is expected, absorbent cotton, impregnated with an antiseptic, may be used; but the principal use to which we put antiseptic absorbent cotton, in connection with the dressing of wounds, is for the purpose of making firm and equable compression, and to fill in and back up the absorbent material proper of the dressing. The article known as Westhorp's antiseptic marine lint is a much better absorbent material than the cotton; its antiseptic properties, however, are but feeble, depending as they do upon a variable proportion of tarry compounds in its meshes. To increase its antiseptic virtues, we have been in the habit of incorporating in it, after picking and carding, naphthalin. The latter, when well powdered, will adhere to the fibers of oakum or marine lint through the medium of the tar in the latter. This makes a good substitute for the cotton, and, thus prepared, is reasonably antiseptic. It, however, is an expensive when large dressings are used, and another objection to its use lies in the fact that there is formed, by its application to the skin, a black scale of tarry, gum-like substance that adheres tenaciously, particularly in regions where the hair is growing; it also hides from the observer the color and other conditions of the wound district. Except, therefore, where but a feeble antiseptic effect is required, but one or two dressings are needed, and these to remain but a short time, the use of this material is not advised.

During the past winter I procured some of the material known as glass-wool, first introduced as an inorganic dressing material by Kummel in connection with his mercuric bichloride. Either because I did not procure as fine a sample as that used by him, or for some other reason, it was found to be so irritating to the skin as to cause me to

refrain from using it. Peat, dried and powdered moss or turf-mold, and Esmarch's latest innovation, "*Wald-Wolle*" (pine cones or needles, ground and prepared), we have not tried, for the reason that we found that the easiest to obtain, as well as that which gave the greatest satisfaction in every way up to the time of our first using it as a basis for our antiseptic application, was pine sawdust, dried and forced through a common flour sieve, coarser particles and sticks being thus removed from it. After drying and sifting, we mix it in the proportion of one to one thousand mercuric bichloride, and, in order to prevent the decomposition of the bichloride and the formation of calomel in the presence of so much organic matter, chloride of sodium, or pure common salt, is added in the proportion of four grains of the latter to every grain of the mercuric bichloride. The following is a good working formula, and sufficiently exact for all practical purposes: Dissolve twenty-four grains of chloride of sodium in half an ounce of glycerin, heated to the boiling point. Then dissolve six grains of corrosive sublimate in half an ounce each of sulphuric ether and alcohol. Mix these two solutions together, and triturate well with one pound of well-dried and finely sifted sawdust. Spread out to dry, and, when the ether and alcohol have evaporated, add naphthalin in the proportion of one part, by weight, to ten of the sawdust. Thus prepared, the sawdust will absorb about four times its own weight.

Iodoform, salicylic acid, and other antiseptics in powder form may be used instead of naphthalin, or the sawdust may be impregnated with carbolic acid, after the manner recommended by Symonds, of Oxford, and thus used to advantage; but, from the non-poisonous and unirritating character of naphthalin, and apparent specific influence over the contagion and spread of erysipelas, besides its, in our hands, well-tried and proved antiseptic qualities, we are fain to

believe that it fulfills all the purposes of keeping up an antiseptic atmosphere in the dressings and about the wound. The corrosive sublimate in the absorbent material acts as a most powerful germ destroyer and disinfectant to the secretions as they come in contact with it. Thus we have in the dressing two valuable antiseptics, each of which fulfills a separate office; the bichloride, in the dry state in which we find it desirable to use it disseminated through our dry and absorbent sawdust, would be no bar to the entrance of air laden with germs directly to the cavity of the wound. But the naphthalin in the dressing, which under the influence of the heat of the body is being constantly given off in a gaseous state, keeps up a true antiseptic atmosphere, the gauntlet of which must be run by floating matter in the air finding access to the deep dressing. On the other hand, the somewhat scanty solubility of naphthalin in the wound secretions detracts from its usefulness somewhat in disinfecting them, while the ready solubility of the corrosive sublimate in these secretions, as they percolate into the sawdust pad, at once renders their decomposition impossible.

Desiring to still further increase the absorbent power of this class of dressings, after much inquiry and search I succeeded in obtaining a sample of so-called "wood-flour." This material is similar to the "wood-wool" of Professor Bruns, of Tübingen. After obtaining my first sample of it for trial and becoming satisfied as to its utility, I found it easy to obtain it in any quantity from N. R. Hopkins, Esq., of 72 Duane Street, New York. It is a very finely ground wood fiber, and is used in making oval picture-frames, medallion heads, etc., by hydraulic pressure, in paper-making and similar industries. It absorbs from ten to twelve times its own weight, and is the most highly absorbent material that I have ever used as a wound dressing. I procured a bale of it, for our use at the hospital, weighing about five

hundred pounds, at six cents a pound; but I am informed that in smaller quantities it costs about ten cents. Prepared the same way as described for the sawdust dressing, except that it need not be dried preliminarily, it possesses about three times as much absorbing power as the latter, and costs about one third more. Either is cheap enough, however.

In using the sawdust or wood-flour dressing, it is necessary to have some very coarse gauze with which to make the pads for the dressing. For this latter purpose nothing in my experience is so well adapted to the purpose, handy, and withal so cheap and easily obtained, as the material known as mosquito bar or netting. It is better to render it hygroscopic by boiling it for eight hours in a strong solution of common washing soda and then rinsing it out in clean water to get rid of the alkali. After drying, it may be folded in convenient-sized squares for future use. It is not at all necessary that bags should be made beforehand of the gauze; this is obviated by simply dipping a proper-sized square of the gauze in the one-to-one-thousand sublimate solution; when needed, it is spread out upon a common dinner-plate, or, when such is not at hand, upon the outspread palms, previously dipped in the same solution, of an assistant. Upon this square is piled, in its central portion, what may be judged a sufficient quantity of the sawdust or wood-flour. The pad is completed by doubling in toward the center the free margins of the square of gauze, and there securing them by a single safety-pin previously dipped in the sublimate solution. No protective is required; the pad is placed directly upon the wound and is so disposed that its thicker portion may be in position to receive the discharges from the drains. The pad is supported by naphthalinated cotton, or, what I have found to be equally serviceable for the purpose and which costs less than half as much, naphthalinated jute. A few turns of a

roller bandage, applied to hold the dressing in position, is all that is required; no Macintosh nor outer impermeable covering is needed nor desirable. The indications for its removal are the same as in other antiseptic dressings, viz., unaccountably high temperature, excessive pain, or the appearance of the discharges through the dressings.

Such, I would say in conclusion, is a *résumé* of the antiseptic methods in vogue in the surgical wards of the hospital to which I have the honor to be a surgeon. I do not claim originality for all of them, nor can the special method of dressing described be considered as the result of any one man's thought; it is simply the outcome of our own experience and that of others. We fully believe, however, that, with corrosive sublimate and naphthalin as our fixed dressing, and carbolic acid for our instruments, and, again, corrosive sublimate for irrigating (for this we use almost exclusively in redressing, when there are no instruments in the way to become blackened), we practice antiseptic surgery with pleasure to ourselves and profit to our patients.

For the beautifully prepared naphthalinated cotton and jute, samples of which I have the pleasure of exhibiting, I am indebted to Mr. C. Am Ende, of Hoboken, N. J., who has made special efforts to place at the disposal of the profession reliable antiseptic dressings of every kind, including the wood-flour. Mr. G. H. Sohns, of this city, prepares the catgut according to the method above given. The latter gentleman also prepares the sawdust and wood-flour.

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