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Modern Methods of Antiseptic Wound
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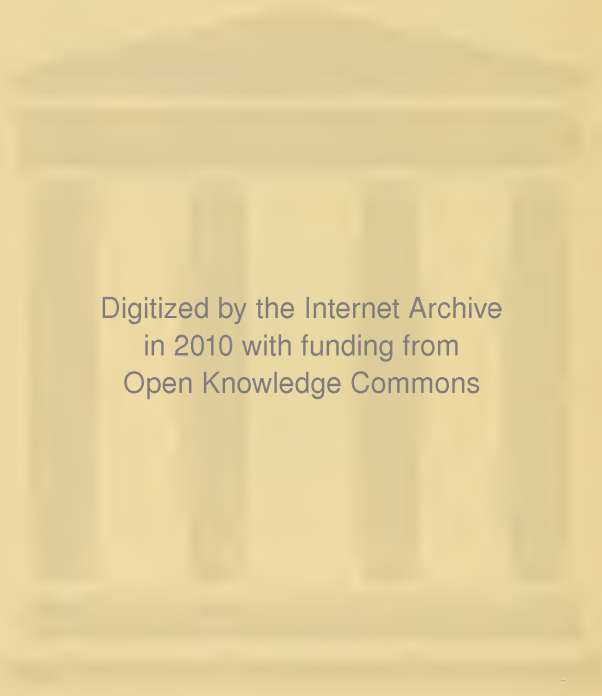
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MODERN METHODS

—OF—

Antiseptic Wound Treatment.



COMPILED FROM NOTES AND SUGGESTIONS FROM THE
FOLLOWING EMINENT SURGEONS:

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Professor of Surgery in the University of Pennsylvania, Philadelphia, Pa.

A. C. BERNAYS, M. D., M. A.,

*Surgeon to Lutheran Hospital, and Consulting Surgeon to the
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Published by JOHNSON & JOHNSON, New York.

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PREFACE.

The collection and publication of the matter contained in these pages are due to suggestions recently made by an eminent surgeon, to the following effect:

1st. That the aseptic and antiseptic methods in surgery being of comparatively recent origin, most of the text books do not contain concise information concerning the details of their application.

2d. That the publication of such information, together with some of the special methods practiced by our leading surgeons, and the recent improvements in the general method, due to sanitary science, would lead to a fuller appreciation of the value of asepsis and antisepsis in general practice, and prove interesting to the profession at large.

In consequence of the above suggestions, a considerable number of well-known authorities were invited to contribute matter relating to the different germicides, dressings, and other details, with comprehensive directions for applying them in private practice.

From the material cordially furnished in response to the above invitation, this little book has been compiled.

The matter in general is such as has been sanctioned by the majority of contributors. Wherever exceptions have been received they have been noted.

In the arrangement and revision of the manuscript much valuable assistance has been rendered by Dr. W. T. Gibb, formerly of the House Staff of Bellevue Hospital.

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ANTISEPTIC PROGRESS.

If we inquire into the history of the antiseptic treatment we must go back to the ancient practice of embalming to find its first systematic use. We follow it through the ages with note of the measures taken by the fishmonger to preserve his fish, the housewife her vegetables, the sailor his boat. We read all along the portentous word—putrefaction. The Roman controlling fermentation in his wine-vats with pitch, the German mothers preserving their dead children on ice, the Arabian destroying putrescence with alcohol. These practices of old were the forerunners of our present.

As applied to surgery the antiseptic treatment, in a restricted sense, has been attempted for at least two centuries. Even the writings of surgeons of remote antiquity, such as Paul d'Egeneta in the seventh century, and Rogerious and Bruno, of the thirteenth century, leave evidence that they grasped the idea of the effects of putrefaction. About this time Lisfranc discussed the dangers of treating the wounded in tents, owing to the exposure to the impurities of the atmosphere. In the sixteenth century Ambrose Paré demonstrated that a gunshot injury was "not necessarily a poisonous wound if protected from atmospheric influences." In the seventeenth century Megatus states his belief that "the air contains influences which cause or favor putrefaction, and recommends infrequent dressings." In the eighteenth century we find that Belloste, Parmanus, Anel, Boerhaave, Le Dran, Heister and Bilguer, adopt the same view, and that they are more specific regarding methods of excluding putrefactive influences. Next followed Abernethy, Corne, Demeaux and a long list of surgeons who approximated still nearer the present antiseptic treatment,* but it remained for Sir Joseph Lister to systematize what had been done and to build up antiseptic surgery on a new principle, namely, the absolute absence of putrefaction *ab initio*.

The problem that Lister sought to solve may be briefly stated as follows: "On all objects in the external world septic dust is present—on the skin of the patient, on the hands of the surgeon and his assistants, in water, in the air, etc.; and when a wound is made any introduction of this dust must be carefully avoided, as it provokes germination, and germination means pyæmia, gangrene and septicæmia. Some sort of a dressing must be provided which shall prevent its passage in an active state, and at each change of this dressing the problem is the same as at the time of the infliction of the wound."†

*Surgeon-Major John Martin—Antiseptic Surgery.

†Cheyne's Manual of the Antiseptic Treatment of Wounds.

This was Listerism. What matters it that scientists such as Pasteur, Tyndall and Koch demonstrate that the dust is made up of living germs, and classify the germs as Bacteria, Micrococci, Bacilli and Spirillæ? Listerism has to do with the destruction of the causes of putrefaction without inquiring as to their character.



Fig. 1.—Common forms of Bacteria, from Cheyne's Manual.
1.—Micrococci. 2.—Bacteria. 3.—Bacilli. 4.—Spirillæ.

Is the Antiseptic Method a Success ?

It is scarcely necessary to speak of the success of Listerism. The hospitals of the entire world have adopted it, and, after years of trial, the outcome is *success*. The results are astonishing! At Bellevue, where ten years ago the rule was pyæmia, septicæmia and few recoveries, now surgical fever is rare, pus is unknown and the patient eats and sleeps well from the first. The class of wounds that always suppurated never do so now, and of this category are the compound fractures, amputation wounds, excisions and other major operations. Dr. Stephen Smith says of the change at Bellevue: "It is a complete vindication of the antiseptic progress in, perhaps, the most unfavorable atmosphere in New York." Said Prof. Tyndall: "It is a matter of surprise that the London hospitals have made such progress." Queen Charlotte's Lying-in-Hospital furnishes an illustration. Out of 900 cases in one year not one was lost. If one reads the transactions of the British Association, or those of our American Association now-a-days, there will be found in every year's volume some reference in praise of antiseptis in both hospital and private practice.

Dresden has changed the mortality of 18 per cent. to nil. The record at Hamburg, Vienna, Paris, Berlin, St. Petersburg, New York, Philadelphia, Baltimore, Chicago and other large cities, has demonstrated beyond question the value of antiseptis. In private practice the record is the

same throughout the world. The surgeons of note who now dress wounds by other than antiseptic methods are so very few as to be scarcely worthy of consideration. It would be impossible to print in these few pages any considerable part of the enormous mass of statistics that have been gathered to prove the success of antiseptis. Suffice is it to say that the oldest and most experienced disciples of Lister do not now deem any wound too insignificant to be safe without treatment directed toward the exclusion of microorganisms.

Modifications of Listerism.

Formerly all operations were done and dressings applied under a spray of a solution of carbolic acid, which was usually made with a steam apparatus. This part of the method has been almost entirely superseded by irrigation.

The antiseptic par excellence of early Listerism was carbolic acid. In later years many agents have been the subjects of experiments, the outcome of which has been to establish bichloride of mercury (corrosive sublimate) as the leading germicide, as the one best calculated to insure aseptic conditions under a majority of circumstances. It is now employed by Sir Joseph Lister himself, who has not been slow to adopt the modern improvements of his method. Carbolic acid is, however, still extensively employed, as will be seen later.

Again, recent investigations by Koch, Schlange and others have proven that dry antiseptic gauze dressings, prepared from Lister's formulæ, are singularly faulty at best, and almost worthless unless used quickly after being prepared. Consequently moist dressings, made after new formulæ, are supplanting them. For remarks concerning sublimate gauze, by Robert F. Weir, M. D., Surgeon to the New York Hospital, and a description of the modern method of preparing gauzes, see page 23.

Table Showing the Relative Value of Various Germicides.

From a recent clinical lecture delivered by Robert Weir, M. D., at the New York Hospital, published in the *Philadelphia Medical News* Dec. 17, 1887.

(From the investigations of Dr. Weeks, of New York.)*

Antiseptic.	Strength.	Duration of exposure to destroy vitality of germs.
Corrosive sublimate,	1 to 500	10 seconds.
“ “	1 to 1000	45 “
“ “	1 to 2000	1½ minutes.
“ “	1 to 5000	3 “
Carbolic acid	1 to 20	15 seconds.
“ “	1 to 40	30-60 “
“ “	1 to 60	4 minutes.
Alcohol,	No effect on dried germs; very powerful when active in moistened condition.	
“	absolute alcohol,	1-12 seconds.
“	95 per ct.	20-30 “
“	66 per ct.	10-15 minutes.
Salicylic acid (makes a stable solution.)	1 to 600 parts of water,	1 “
“ “	1 to 1000	4-5 “
Chlorine water, very unstable, best when fresh,		1½ minutes.
Hydrogen bromide,	“ “ “	1-1½ “
Boracic acid had no germicidal action whatever; germs remained unaffected for 17 days.		
Iodine to saturation in water did not affect germs after 48 hours' exposure.		
Chloride of zinc, 1 to 20 in water, had no effect.		
Oil of turpentine,	“ “ “	
Thymol,	“ “ “	
Eucalyptol,	“ “ “	
Ointments of 10 per cent. of iodoform and of iodol of the same strength had no effect after 36 hours' exposure.		
Iodoform in power only retarded development of germs after 12 hours' exposure.		
Boiling water, and in fact heat from 165.2 deg. to 212 deg. F., destroyed germ life on contact.		

Says Dr. Weir : “Whoever among you that has kept abreast with the current literature will not be surprised at two things met with in the list. First, that the fact taught us several years since by Koch has been confirmed by Dr. Weeks, that oily solutions or mixtures of the various antiseptics have no value other than is slowly exerted by the fatty matters themselves; and second, that iodoform, concerning the power of which in germs much has lately been written, exerts its germicide action but slowly. On this point of the value of iodoform in controlling inflammation—ordinary and tuberculous—I may say that the clinical experience of surgeons is in favor of its usefulness, and is decidedly opposed to the laboratory deductions. Practically, it is nearly always used here in a dampened condition in conjunction with the moist sublimate gauze, and in this combination it is leaned on heavily as a supporter of antiseptics.”

*This article is entitled “The Antiseptic Value of the Topical Remedies used in Ophthalmology, and the Methods of Sterilizing Instruments; Tested Bacteriologically”—and was read before the Section on Ophthalmology and Otology at the Academy of Medicine, October 17, 1887, by Dr. John E. Weeks, and will appear in full in the next number of *The Archives of Ophthalmology*.

Articles Used in Antiseptic Surgery.

The Operating Table.—The ordinary kitchen table will generally answer ; if not, there is a table in nearly every house that will. Bricks or wooden blocks should be placed under two legs of the table in order that the irrigating liquids may drain off toward the pail used for catching them.

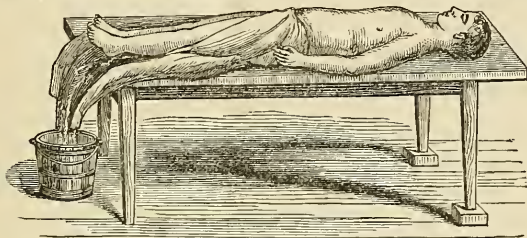


Fig. 2.—Showing arrangement of rubber sheet for drainage.

Receptacles for Instruments, Dressing, &c.—The household dishes may be utilized for this purpose as follows: Washbowl for rinsing sponges or preparing towels; soup tureen for rinsed sponges; large platter for large instruments; small platter for small instruments; small bowl for artery forceps; saucers for needles, ligatures, sutures and drainage tubes.

The Irrigator.—Use a fountain syringe of about four quarts' capacity, with a nozzle that will throw a strong single stream. In cases of emergency an irrigator may be improvised, by knocking the bottom out of a bottle and perforating the cork for the passage of a tube.

Rubber tubes for bottle and syphon irrigators are furnished by Johnson & Johnson, N. Y.

The Rubber Sheet.—A piece of rubber cloth, six feet long by three feet wide, is required to drain off the irrigating fluids into the catchpail.

Bichloride Solutions.—Compressed tablets of corrosive sublimate and tartaric acid or ammonium chloride are most convenient for preparing bichloride solutions. These tablets are prepared so as to make, when dissolved in a pint of water, a solution of 1-1000. Where the tablets are not used, the solution should be made as follows :

Bichloride of mercury,	gr. 7.50
Tartaric acid,	gr. 37.50
Or ammonium chloride,	gr. 7.50

Fig. 3.—Thiersch's champagne bottle irrigator.



which, added to a pint of water, makes a solution of 1-1000. Tartaric acid, or ammonium chloride, is used to prevent the precipitation of calomel and the formation of albuminate of mercury when the fluid comes in contact with the living tissues.

Dr. Bernays suggests corrosive sub., gr. 7.; citric acid, gr. 3.48; which makes a solution of 1-1000 in one pint of water.

Dr. N. Senn prefers tablets made of corrosive sublimate and chloride of sodium, each 15 grains, stained with analine blue.

Bichloride solutions should never be made in a metallic receptacle, as a precipitate is immediately thrown down.

Carbolic Solutions.—Liquefied carbolic acid in a small bottle is the most convenient form for use. One ounce in thirty ounces of water makes a 1-30 solution.

Absorbent Cotton.—Select cotton that is prepared in even layers and which has been sterilized by being subjected to the proper degree of heat. Absorbent cotton is a very important factor in the successful application of the antiseptic method. Not only is it invaluable as an absorbent of the discharges from the wound, but, according to Professors Koch, Tyndall and others, cotton fibre forms the best possible obstruction to the entrance of germs, after its natural oil has been extracted and it has been sterilized by being subjected to the proper degree of heat.

Moist Antiseptic Gauzes.—Bichloride, iodoform and carbolated. For remarks of the authorities on the defects and unreliability of dry gauzes, and methods of preparing moist gauzes, see page 23.

Combined Dressing (sheets of absorbent cotton between layers of antiseptic gauze) has lately come into extensive use at Bellevue Hospital as a substitute for cotton and gauze, used separately. It is prepared as bandages in various widths, and is cut by the nurses in the shape of a Maltese Cross, as shown in fig. 4. These crosses are made in sizes varying from 3 to 18 inches square. The larger ones constitute a convenient dressing for stumps after amputation, and the smaller ones for dressing wounds of the fingers, toes, etc.

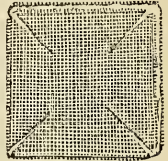


Fig. 4.

Lint is used antiseptically for a variety of purposes, but chiefly in the hospitals as a dressing for burns, in connection with antiseptic ointments.

Iodoform.—A small bottle of iodoform and an iodoform sprinkler are required. A small glass salt-sifter, or pepper box, such as may be obtained at any house-furnishing store, will answer for a sprinkler. Select one with the smallest holes through the top. Remove the top and keep the bottle corked when not in use. The hard rubber iodoform sprinkler, though more expensive, is preferable on account of its convenience.

Subiodide of bismuth is quite extensively employed as a substitute for iodoform. Its antiseptic value being considered about equal to the latter. The principal advantage claimed for it is that it is inodorous. Its cost is, however, double that of iodoform.

Prof. A. C. Bernays, of St. Louis, does not use iodoform in any case.

For remarks of Dr. Robert F. Weir, relating to the value of iodoform, see page 6.

Iodoform Collodion.—A 10 per cent. iodoform collodion will be found an excellent protective in small wounds, as those of the face, and in wounds upon which it is difficult to retain the ordinary dressings, as after excision of a portion of the scrotum.—*Prof. S. W. Gross.*

Sutures.—Sutures are made of silk, catgut, silkworm gut and silver, the last being employed only in exceptional instances. The material which we furnish for silk sutures are “Chinese twist” and braided silk. Before being used they should be boiled for half an hour, and then be immersed in the 1-1000 corrosive solution. Silkworm gut is sometimes employed; it is strong, smooth and of small diameter, but possesses no advantages over silk. If catgut be used, it should be chromicized by Macewen’s process, which renders it durable for seven days and upwards. This form of suture should be used in connection with iodoform collodion.

Ligatures.—For the purpose of tying blood vessels the only materials recommended at the present day are silk and catgut. The former is prepared in the same manner as the silk suture. Unless catgut be prepared with great care, minute precautions being taken to render it aseptic, it will defeat the object of antiseptic operations.

We furnish catgut in three sizes—1, 2 and 3—No. 1 being the smallest and No. 3 the largest. Smaller sizes cannot be relied upon on account of their brittleness. In their preparation we follow the process of *Prof. S. W. Gross*, who informs us that they are perfectly reliable, both antiseptically and mechanically.—*J. & J.*

“The commercial catgut is immersed for half an hour in a 1 per cent. alcoholic solution of corrosive sublimate, to which has been added 5 per cent. of tartaric acid. It is then transferred to, and kept permanently in, oil of juniper berries, in which it must remain at least ten days before being used. Previous to an operation the gut is wiped with a towel which has been wrung out of a 1-1000 watery corrosive solution, when it is placed in a similar solution, to which has been added 20 per cent. of alcohol. The alcohol prevents the material from swelling and untwisting. Made in this way, catgut is thoroughly aseptic, strong and pliable.”—*Prof. S. W. Gross.*

“I would prefer catgut, made by immersing the commercial catgut for ten days in oil of juniper, washing it with sulphuric ether and keeping it in a solution of alcohol and corrosive sublimate, 1-1000.”—*N. Senn, M. D.*

Sponges.—Selected reef sponges are generally used in hospitals, but they are quite expensive, and need considerable preparation to make them fit for use, as they are filled with sand, which must be washed out. The Linton antiseptic sponges, prepared from absorbent cotton and wood fibre, enclosed in fine antiseptic gauze, so as to give a soft and yielding mass, are preferred by many physicians in private practice, as they are very convenient and cheap enough to be thrown away after once using.

Kummel’s plan of washing reef sponges in green soft soap and water, then placing them in carbolic solution 1-30, or bichloride solution 1-1000, is a good one.”—*Hunter McGuire, M. D., Richmond, Va.*

Artificial aseptic sponges may be used for plugging cavities.—*A. C. Bernays, M. D.*

Gutta Serena Tissue—Is used to prevent the dressings on small wounds from drying too quickly, which allows the adhering of cutaneous margins before the discharge of serum from the deeper tissues has ceased. It is also used in connection with the rubber sheet to drain off the irrigating fluid.

Linton Moist Dressing Paper.—A preparation of strong parchment paper made impervious to water and air, flexible and antiseptic, is used by many

physicians as a substitute for gutta percha tissue and oil silk, as it is much cheaper.

"I endorse this, and would prefer this article to anything else."—A. C. BERNAYS, M. D.

Drainage Tubes—Are used to allow the escape of blood, pus and serum, from wounds and abscesses. They are made of decalcified bone, rubber or glass.

The bone tubes are said to be completely absorbed in the wound in about ten days, which allows the wound to heal without removing the dressing.

The experience of the majority of surgeons is, however, against bone drainage tubes. The glass and rubber tubes are the best.

Rubber tubes should be made of natural, not vulcanized, rubber.

Catgut drains are used for small wounds, and are made by bunching strands of catgut together.

"I use glass drainage tubes in exceptional cases, to the exclusion of tubes made of other materials. They are easily sterilized by boiling, and should be kept in a 1-1000 bichloride solution."—PROF. S. W. GROSS.

Esmarch's Bandage.—An elastic rubber bandage, usually $2\frac{1}{2}$ inches wide and 5 yards long. It is used for the stoppage of hemorrhage and the depletion of a part of blood. In amputations it is wound spirally about the limb, beginning at the distal extremity, each turn overlapping the preceding turn by one half an inch.

Other Necessary Requisites—Are: a narrow, sharp razor, for shaving off the hairs around a wound; a nail brush, cake of soap, assorted gauze bandages, towels, binder and safety pins.

Potash soap should be used exclusively, as it penetrates the epidermis more deeply than ordinary soap and is thus better adapted for securing an aseptic condition of the skin.—PROF. N. SENN, MILWAUKEE, WIS.

The green potash soap is by far the best; but as it possesses powerful caustic properties, only one part to 750 of water, a proportion which arrests the growth of the bacilli of anthrax should be employed.—PROF. S. W. GROSS.

Important General Directions and Precautions.

Before beginning an operation see that all things required are ready.

The operator and assistants should wear a clean white coat or apron.

A small table should be placed near the operating table, and covered with towels wrung out in a 1-2000 bichloride or 1-30 carbolic solution.

On this should be placed the dishes for holding the instruments, needles, &c., and these should then be filled with a 1-30 carbolic solution, into which the instruments, needles and sutures should be placed at least half an hour before being used.

Two or three gallons of bichloride solution will generally be required.

Instruments are not placed in the bichloride solution, as it dulls them.

Dressings should be prepared on towels wrung out in 1-2000 bichloride solution, and then rolled up in the towels until used.

Clean towels, wrung out in the above-mentioned solution, are placed around everything near a wound, so that the instruments, hands, sutures, sponges, &c., may not come in contact with anything that has not been rendered aseptic.

Hang the irrigator high enough above the operating table to make it convenient for use, and fill with the solution you are going to use.

“The water should be hot. I attach great importance to hot solutions applied to exposed surfaces, and should insist upon the hot throughout.”—STEPHEN SMITH, M. D., N. Y.

The skin about a wound should be invariably shaved, whether it be coarse and hairy or delicate.

The part which has been shaved should then be scrubbed with a stiff brush and soap-suds, and the soap-suds washed away with hot water, and afterwards with a 1-1000 bichloride solution.

Instruments should, whenever practicable, be made entirely of steel and be scrubbed and subsequently boiled for twenty minutes before being immersed in the carbolic solution.

The hands of both the operator and his assistants should be thoroughly washed and scrubbed in a 1-1000 bichloride solution before the operation begins, and rewashed when any unprepared object is touched, accidentally or otherwise, during an operation.

Professor Bernays lays particular stress upon the necessity for cleansing the hands, especially the nails, in a painstaking manner; 1st, with a brush and soap and water, then with antiseptic solution. Says Dr. N. Senu: “Pure spirits of turpentine should be used upon the hands in all important operations upon joints or where a serous cavity is to be opened.”

Sponges, dressings, instruments, etc., should be handled with great care both by the surgeon and his assistants.

Disinfected safety-pins are used to prevent drainage tubes from disappearing beneath the skin.

After inserting a tube, the part projecting above the skin should be cut off, and the safety-pin passed through the end at the surface.

Care should be taken to bring the parts into accurate apposition; also to avoid tension, especially of the edges of the wound of damaged or unhealthy tissues.

While the wound is open it should be kept wet with the irrigator controlled by an assistant.

A dressing should not be changed because serum has oozed through it. Place dry carbolized or other dry antiseptic absorbent cotton over the moist places and allow it to dry.

Dressings, in some cases, are not interfered with until the wound heals. They are, however, changed before the wound heals in the following cases: 1st, to remove drainage tubes; 2d, when high temperatures show that some antiseptic rule has been violated; 3d, when plastic operations are done; 4th, when secondary hemorrhage occurs, or when the patient suffers severe pain.

A temperature of 101 deg. F. will frequently follow an operation and remain for a few hours. Hence it is not advisable to change a dressing unless this temperature is shown 36 hours after an operation. If then marked inflammation about the wound exists, the antiseptic dressing must be changed daily, or even oftener. The main point to be observed in renewing dressings is, give the patient absolute rest as far as possible, not changing oftener than required.

When a rubber or glass drain tube is used, it should be gotten out in one or two days, and the wound redressed.

When dressings are changed the second dressing should be applied with the same care as the first, following the same general rules.

The patient's general health should be attended to. A supply of good food and fresh air should be given, in this way promoting the resisting and healing power of the tissues.

Iodoform is used to dust about the mouths of drainage tubes and over the surfaces of wounds that are to remain open; also along the line of sutures. It is not dangerous unless too much is used. In open wounds enough should be used to barely cover the surface, and no more.

It should be used very cautiously on the young and on granulating surfaces. Instead of dusting iodoform in a wound it is better to spray the surface with an ethereal solution of iodoform.—LEWIS A. STIMSON, M. D., N. Y.

If a sponge or a dressing fall to the floor it should not be used. If an instrument should come in contact with any unprepared surface, it should be again scrubbed and go back into the carbolic acid solution.

Bichloride Poisoning.—One observer says paradoxically: "Corrosive sublimate is not dangerous, if you know that it is dangerous." Like other toxic agents, both bichloride and carbolic acid must be used with care. With regard to the proper strength of bichloride solution for irrigation, the opinions of the authorities differ. At Bellevue Hospital a solution of 1-2000 is generally used, while according to Dr. Robert F. Weir "a solution stronger than 1-5000 is not deemed safe at all times" at the New York Hospital. Other eminent surgeons first wash out ordinary wounds with a 1-1000, and afterwards with a 1-5000 solution. In irrigating the peritoneal cavity, or large synovial cavities, or the interior of the uterus, a solution stronger than 1-5000 should never be used.

The success of the treatment depends upon the care used in keeping the wound absolutely free from septic material.

Recognition of these principles, their study and adoption, are of as much importance to a surgeon as a knowledge of anatomy or manual dexterity. By them you take surgery out of the region of chance and make it much more an exact science. If you happen to have an infectious case, let me impress upon you, gentlemen, not to look upon it as an unavoidable accident, but recognize it as being due to some mistake in your chain of treatment, to be found out and in the future guarded against. None of us are free from mistakes or accidents; the best surgeon is he who has the least number, who recognizes that he is not infallible, but strives to discover his mistake, and from them learns lessons for his future guidance.—DR. W. J. PENNY.

CASE I.

Illustrating the methods employed at Bellevue Hospital by Professor Stephen Smith, Surgeon to Bellevue, etc.

Incised Wound.—A butcher cuts himself severely in the fleshy part of the forearm, making a wound about five inches long. The wound is deep, and extends well down into the muscles of the part. In order to stop the hemorrhage, he had stuffed a dirty handkerchief into the wound, holding it in place by means of another rag tied around his arm. The arm is dirty and greasy, and in an excellent condition to cause suppuration in the wound if the antiseptic method is not followed in the treatment.

TREATMENT.

In a wound of this size an anæsthetic is usually necessary in order to keep the patient quiet while it is being attended to. The whole arm should be bared, the rags removed from the wound, which should then be washed out thoroughly with a hot sol. bichloride, 1-2000, and packed with antiseptic cotton. The hands of the surgeon and his assistant are first rendered aseptic by scrubbing as far as the elbow with soap and water, and immersing in sol. bichloride, 1-1000. The instruments necessary for the operation are placed in sol. ac. carbolic, 1-30. The hand, forearm and arm of the patient should next be thoroughly scrubbed with a hand-brush, using Castile soap and warm water, the parts far around the wound shaved with a sharp razor or scalpel, and then plentifully irrigated with sol. bichloride, 1-2000. A rubber sheet, which has first been rendered antiseptic by being thoroughly scrubbed with soap and water, and then washed off with sol. bichloride, should be arranged for drainage into a receiving vessel. The patient's hand and arm are enveloped in towels, which had been soaked in sol. bichloride 1-2000 and several carbolized towels spread under the arm to receive instruments when laid down. A large irrigating bag or pitcher, filled with hot sol. bichloride, 1-2000, should be placed in position. The antiseptic cotton should now be removed from the wound, the spouting arteries seized and ligated with No. 8 prepared antiseptic catgut and the wound constantly irrigated with the bichloride solution. If the radial or ulnar artery has been severed, each end should be ligated with prepared silk ligatures. In closing the wound divided tissues should be carefully united by sutures as nerves, tendons, muscles. A prepared drainage tube is placed with one end reaching to the bottom of the wound, and the other extending from its most dependent portion. Sutures of No. 7 prepared catgut should be used to bring the edges of the severed muscles together, and heavier prepared catgut to hold the edges of the skin and superficial fascia in apposition. Iodoform is then dusted on the wound and the dressing applied consisting of a thick pad of iodoform gauze, two inches wide, and an inch or more

longer than the wound, a hole being cut in one end to admit of the projecting end of the drainage tube to pass through ; a mass of fluffed bichloride gauze is placed over this, and the whole forearm wrapped with bichloride gauze padding ; this is enveloped in a thick layer of absorbent cotton, which is retained in position by several layers of moist bichloride gauze bandage. The first dressing should be removed in about eight days, the wound irrigated with sol. bichloride, and a second dressing similar to the first applied, and allowed to remain an equal length of time.

CASE II.

Contused Wound.—A man falls, striking his head upon the curb, and sustains a severely contused scalp wound about three inches long, and when seen it is filled with clotted blood, hair and dirt.

TREATMENT.

Suggested by Professor Lewis A. Stimson, Surgeon to Bellevue Hospital.

The hair should first be clipped away for a distance of an inch and a half all around the wound, and after that portion of the scalp has been thoroughly scrubbed it should be shaved, and irrigated with sol. bichloride, 1-2000. The clot should then be removed from the wound, the ragged edges of which should be trimmed away with a scalpel until a fresh surface remains. Care should be taken to remove all foreign particles, especially hairs, from the wound, which should be frequently irrigated with sol. bichloride. Several strands of heavy prepared antiseptic catgut may be introduced to the bottom, for drainage, if the wound is deep. The wound is then closed with interrupted sutures of No. 7 prepared catgut. A pad of iodoform gauze is then placed over the wound and over this a large pad of moist bichloride gauze, and the whole retained in place by a gauze bandage. This dressing should be removed and re-applied at the end of a week, unless the dressings become soiled, in which case they should be removed sooner.

CASE III.

Lacerated and Contused Wound.—A man is knocked down in the street and run over, the wheel of the wagon passing over his leg, without breaking any bones, but causing considerable laceration of the tissues in the region of the calf, and the wounds are filled with dirt and sand.

TREATMENT.

Revised by N. Senn, M. D., Milwaukee, Wis., Professor Principles and Practice of Surgery and Clinical Surgery, College Physicians and Surgeons, Chicago.

The patient should be placed upon the operating table and anaesthetised. The clothing should be removed from the limb, which should be scrubbed thoroughly with potash, soap and water; the leg shaved, and then irrigated with sol. bichloride, 1-2000. After the surgeon has arranged the antiseptic rubber sheet for drainage, his hands should be rendered aseptic; and the instruments necessary for the operation placed in sol. ac. carbolic, 1-30. The foot and thigh should be enveloped in carbolized towels, 1-30; several towels being placed to receive instruments when laid down. On making a thorough examination of the wound, it is found that although the external wounds are small, considerable damage has been done to the deeper structures, and there are several large accumulations of blood in pockets extending in different directions. These pockets should be opened freely under constant irrigation, and the clots turned out; prepared antiseptic sponges being used throughout the operation. Large antiseptic rubber drainage tubes should be introduced to the bottoms of all the pockets, and the edges of the wounds drawn together as far as possible by means of prepared antiseptic silk sutures. The wound is then dusted with iodoform, and an antiseptic dressing applied as follows: A large pad of iodoform gauze perforated with holes for the passage of the ends of the rubber drainage tubes is placed over the wound; this is covered with a large mass of dry bichloride gauze, and the whole leg, from ankle to knee, enveloped with a thick cushion of sublimated mass; over this, place a thick layer of absorbent cotton, the whole dressing being held in position by means of several layers of moist bichloride gauze bandage. This dressing should be left in position until the discharge begins to show through, when it should be renewed. The drainage tubes should remain in the wound until there ceases to be any discharge from the pockets. All subsequent dressing should be applied under the same antiseptic precautions as were taken with the first.

 CASE IV.

Punctured Wound.—A boy falls upon a rusty nail, which makes a punctured wound two or three inches deep on the anterior aspect of the thigh. The blood has clotted over the external opening, closing it entirely. There is some inflammatory swelling of the parts about the wound due to the retention of the secretions in it.

TREATMENT.

Suggested by Thomas G. Morton, M. D., Surgeon to the Pennsylvania and Orthopædic Hospitals, Philadelphia.

The patient is placed on a table and anæsthetised; the whole limb should be thoroughly cleansed and irrigated with sol. bichloride, 1-1000; and the instruments to be used placed in carbolic, 1-30. After the surgeon has rendered his hands perfectly antiseptic by scrubbing, and immersion in sol. bichloride, 1-1000, the limb for several inches above and below the wound should be shaved, the clot removed from the wound and the secretions allowed to escape. After the wound has been thoroughly irrigated with sol. bichloride, the external opening should be enlarged considerably, and all foreign particles carefully removed. The wound should then be thoroughly curretted, and perhaps a catgut drain carried to its bottom, no attempt being made to close it, the limb from the knee to the groin covered with moist bichloride gauze padding, over this a thick layer of absorbent cotton is applied, and the whole held in position by a well applied bandage of moist bichloride gauze.

 CASE V.

Compound Fracture.—The patient has sustained a compound fracture of the tibia and fibula. The projecting end of the tibia made a small opening on the anterior portion of the leg, about the centre. There is considerable extravasation of blood between the fragments of bone and the surrounding tissues.

TREATMENT.

Suggested by Thomas G. Morton, M. D.

The patient is placed on the operating table and anæsthetised, the clothing is removed, and the whole limb thoroughly scrubbed with soap and water, and the leg shaved, an antiseptic rubber sheet having been arranged for drainage. The surgeon's hands are rendered antiseptic in the usual manner; the instruments to be used are placed in carbolic, 1-30. The whole limb should then be irrigated with sol. bichloride, 1-1000; and the foot and thigh enveloped in 1-1000 bichloride towels; several towels being arranged under the limb to receive instruments when laid down. Prepared antiseptic sponges or little bunches of gauze should be used. The opening through which the tibia has projected should be enlarged sufficiently under constant irrigation, and the blood clots and bruised tissues removed by curretting and otherwise; the fragments, if necessary,

are approximated and held in position by very strong chromic gut or pure silver wire which has been boiled and then kept in sol. carbolic, 1-20. After thorough irrigation, small prepared catgut drains or drainage tubes should be introduced to the bottom of the wound, and the edges of the wound drawn together. The wound is then to be dusted with iodoform, a pad of bichloride gauze applied over it, and this in turn being covered with thick pads of moist bichloride gauze, a thick layer of absorbent cotton covers all, extending from the toes to the middle of the thigh; this is held in position by a moist bichloride gauze bandage. The limb should then be placed in either a fracture box or some form of easily removable fixed dressing. If all goes well the primary dressing may never need replacing; nevertheless the position of the bones must be carefully guarded without disturbing the dressings, if possible.

CASE VI.

Cold Abscess.—The patient has a deep-seated cold abscess on the anterior aspect of the thigh.

TREATMENT.

Suggested by Hunter McGuire, M. D., L.L. D., Surgeon to St. Luke's Hospital, Richmond, Va.

He should be placed on the table and anæsthetised, a rubber sheet arranged for drainage, the whole thigh thoroughly scrubbed and irrigated with sol. bichloride, 1-2000; the instruments to be used placed in sol. carbolic, 1-30. After the surgeon's hands have been rendered aseptic the skin over the abscess should be shaved and carbolized towels used to cover the leg and upper portion of the thigh. Under constant irrigation, a free incision should be made into the abscess and its contents evacuated. The abscess cavity should then be thoroughly irrigated with sol. bichloride, 1-2000, until the fluid which flows from the cavity is as clear as that entering it. A couple of prepared antiseptic drainage tubes are introduced into the bottom of the abscess and secured in place by safety pins, which have been made aseptic. Subiodide of bismuth is dusted into the wound and a large pad of carbolated gauze, in which are holes for the projecting ends of the drainage tubes, applied over it. This is covered with a large mass of fluffed bichloride gauze, and the whole covered with a thick layer of absorbent cotton, which is held in position by a moist bichloride gauze

bandage. If the discharge from the wound is considerable, it will have to be redressed every twenty-four hours, and at each dressing the abscess cavity should be thoroughly irrigated with bichloride, 1-2000.

CASE VII.

Amputation.—A brakeman has his forearm crushed between two cars. The injury to the bones and soft part is so great that amputation is considered necessary.

TREATMENT.

Suggested by D. Hayes Agnew, M. D., L.L. D., Professor of Clinical Surgery at the University of Pennsylvania.

The patient should be etherized, and the whole arm thoroughly cleansed and irrigated with sol. bichloride, 1-1000; carbolized towels wrapped about the hand, forearm and shoulder, leaving bare the portion of the arm through which the amputation is to be done; the necessary instruments placed in sol. carbolic, 1-20; and the hands of the operator and his assistants rendered thoroughly antiseptic before touching the wound by scrubbing with hot water and soap, and afterwards washing in a solution of bichloride, 1-2000. The operation should be done under constant irrigation with sol. bichloride, 1-2000; the arteries ligated with No. 7 prepared catgut. Silk worm gut, or silver wire, for suturing the flaps; prepared rubber drainage tubes being employed for drainage. Don't use bone; they will collapse and fail to drain. Prepared antiseptic sponges should be used throughout the operation. The wound, after being dusted with iodoform, should be covered with oil silk protective, which should be perforated with holes for the passage of the exposed ends of the drainage tubes. Cover this with either a pad of moist bichloride gauze or carbolized gauze, over which place a second dry pad of the same material, and lastly, a layer of absorbent cotton, and secure with bichloride or carbolized roller bandage. The dressing should be removed under the same antiseptic precautions as soon as the discharges show through or the temperature rises.

CASE VIII.

Illustrating the antiseptic method of treating burns and scalds, suggested by S. W. Gross, M. D., L.L.D., Professor of the Principles of Surgery and Clinical Surgery in the Jefferson Medical College, Philadelphia.

Burn.—A boy of twelve upsets a kettle and burns the left leg from knee to ankle with boiling water.

TREATMENT.

By far the most efficient and painless method of managing burns and scalds, is that practiced by Mosestig-Moorhof, and it is the one which I invariably employ. The vesicles having been opened and excised, the entire burned surface is smoothly covered with dry compresses of 20 per cent. iodoform gauze, over which gutta percha tissue is placed. The whole is then surrounded by a thick layer of sterilized absorbent cotton between layers of corrosive gauze, which is secured by a roller with a moderate degree of pressure. Such a dressing rapidly relieves pain, prevents contact of air and infection by septic pus, and by its infrequency keeps the part at rest. It should be allowed to remain from 7 to 14 days. In burns of the second degree, one dressing suffices. In the worst burns there is relatively little suppuration, and the eschars thrown off are aseptic.

For burns of the face iodoform ointment (1 part iodoform, vaseline 20 parts) is used, and covered with a gutta percha tissue mask. The ointment should be renewed daily.

The Bellevue Hospital Method of Treating Burns

Is ordinarily as follows: After the usual antiseptic precautions, such as irrigation with 1-2000 bichloride solution, etc., and removing all the cuticle covering the wound, the burned surface is covered with sheet lint, on which has been spread an ointment, iodoform and sub-nitrate of bismuth each 1 part, vaseline 20 parts. Bichloride gauze and absorbent cotton are then applied over this, as described above.

CASE IX.

Illustrating the Method of Using Antiseptics, Practiced by Prof. A. C. Bernays, of St. Louis, Mo.

A workman in a stamping shop is brought to the surgeon's office, having all the fingers of his left hand crushed and also the heads of the four metacarpal bones. The hand is black from the factory dust and soot;

the wound not bleeding much, has been tied up hurriedly by a fellow-workman with a dirty handkerchief.

The first thing done is the preparation of a warm solution of bichloride 1-1000, into which the hand is immersed, and where it is left for a few minutes, until one may safely assume that the solution has penetrated all the spaces of the lacerated wound. Next the forearm, wrist and hand are thoroughly washed with soap and a brush, using the warm bichloride water. While the now soapy and dirty water is allowed to run down the waste-pipe of the wash basin, and another bichloride solution 1-2000 is being prepared and other preparations for the operation and dressing are being made, the hand is kept enveloped in a towel wet with bichloride solution.

The patient is now placed on the operating table and is chloroformed. The Esmarch bandage is applied over the towel which covers the injured hand and the tourniquet fastened just above the elbow. The wet towel is next removed from the crushed hand and the necessary operation is performed while a stream of bichloride is constantly running over the field of operation. All visible arteries are tied with silk ligatures. The Esmarch tourniquet is loosened and the wound constantly irrigated until all hemorrhage ceases and during the application of the numerous skin sutures. Since the flaps can be accurately approximated and drawn together so as to scarcely leave a cavity at all, the drainage tube is dispensed with and the whole wound united by sutures so as to leave no spot uncovered by skin. A piece of the gauze about six inches long is unrolled, and this layer, composed of eight thicknesses, is accurately adapted to the line of suture and is fastened by a bichloride gauze bandage. Over this is placed a thick layer of absorbent cotton which extends just above the wrist, and over this, finally, a double layer of the moist parchment dressing paper is adjusted so as to hermetically seal the whole dressing two inches above the wrist by means of a bandage. This ends the antiseptic dressing, but let it be borne in mind that this is not sufficient, for we must now fulfill an indication which is of paramount importance with the antiseptic indication. We must place the injured limb in a splint which insures physiological and mechanical rest to the injured parts, since it is certain that without this precaution our antiseptic dressing would not prevent painful swelling and suppuration. This point has been somewhat crowded into the background by some of the enthusiastic antisepticians, and we desire most especially to emphasize it in this connection, in this "Epitome of Antiseptic Surgery." It is through neglect of this indication that great harm has been done by some who overlooked it because of their blind faith in the antiseptic panacea.

The patient is removed to his home with instructions to take a $\frac{1}{3}$ gr. of morphine at bedtime, if necessary, to stop pain, and to present himself at the surgeon's office the next morning. There being no pain and no elevation of temperature, the patient sleeping well and having a good appetite, the injured limb is left alone. On the 10th day there is a smell perceptible and the patient has no pain, but feels a sort of itching in his hand.

On removal of the dressing the whole wound is united, excepting about one square inch of the ball of the little finger, where a black gangrenous piece of skin is found ready to drop off, the line of demarcation having been completely formed. At the time of the operation this piece of skin seemed to be living, in fact it was thought that unusually good flaps had been secured. Under the antiseptic dressing the secretion attending the sequestration of the dead piece of skin and fascia had been taken up by the absorbent dressing and no symptom of fever or suppuration had ever been noticeable. This could never take place under a so-called dry antiseptic dressing, because the dry dressings rapidly become hard and their absorbent qualities are rendered purely illusory. The dressing used in this case formed a moist chamber around the wound in which an even temperature and an evenly distributed antiseptic vapor was constantly present. This explains the possibility of maintaining an absorbent dressing for many days by the moist method and also demonstrates the advantages of the latter in certain cases over the dry dressing.

After the sutures were removed a moist antiseptic dressing was reapplied daily and the granulating surface allowed to heal, which it rapidly did. The patient was discharged on the twenty-sixth day cured.

For simplicity, as well as efficiency, it is believed that this method is unsurpassed. It has been tried in hundreds of cases with but slight modifications to suit the exigencies arising from the different anatomical relations of the injured parts. The successes achieved are equal to the highest reported by any author, and comprise the entire domain of surgery, as it presents itself to a busy surgeon in metropolitan, private and hospital service. The method deserves the notice of all practitioners of medicine as one of the many modifications of the antiseptic system of treating wounds.

Small Wounds and Abrasions.

Dr. Bernays suggests that in small wounds and abrasions, and the so-called runarounds and felons, a simple antiseptic dressing is quite as much in place as in very large and serious wounds. The dressing should consist of several thicknesses of bichloride gauze, which may be held in place by rubber adhesive plaster.

CASE X.

An Antiseptic Amputation of the Thigh after a Railroad Crush—Method in use at the University, Philadelphia, and German Hospitals, by Prof. J. Wm White, Philadelphia.

Look after the general condition of the patient. Give stimulants in small doses, if necessary, and see that all hemorrhage is arrested by a

tourniquet or an Esmarch's bandage applied just below the groin. After this, proceed as follows :

1. Wash over the whole limb, first shaved clean, (*a*) with soap and water, (*b*) with alcohol, turpentine or ether, and (*c*) with 1-500 bichloride solution. The wound and crushed area may, with advantage, be washed with a chloride of zinc solution of 10 to 20 grs. to the ounce. These measures are especially necessary in such cases on account of the dirt ground into the recesses of the tissues.

2. Cover the bed with a rubber cloth wet with 1-500 bichloride solution, and encircle the sound part of the limb and all portions of the crushed regions with towels wet with 1-1000 bichloride or 1-20 carbolic solution.

3. Use only instruments which have been boiled after last use and have been lying in 1-20 carbolic solution not less than fifteen minutes.

4. During the operation a stream of 1-1000 sublimate solution, as nearly continuous as possible, is kept dripping on the wound.

5. Tie everything with catgut. Use rubber drainage tubes taken direct from bichloride or carbolic solution and put in place while dripping. Sew with catgut, or silver wire, or silkworm gut, but in either case the suture material must be taken direct from the antiseptic solution.

6. Dress with (*a*) protective over the line of wound, (*b*) iodoform on whole stump, (*c*) wet dressing of at least eight layers sublimate gauze, (*d*) moist dressing with iodoform over inner surface, (*e*) salicylic or sublimate cotton, (*f*) gauze bandage.

Antiseptic Dressings.

The importance of *reliable* dressings cannot be overestimated. Without these all the surgeon's skill is wasted. Joseph Lister prepared his own dressings, using as a base for the antiseptic a compound of resin, lard and paraffine. Into a hot solution of this compound was dipped unbleached non-hygroscopic gauze.

So long as the Lister method was confined to large hospitals, and the dressings so made were quickly used, they partially fulfilled antiseptic requirements, but were at best harsh, stiff, non-absorbent and unsatisfactory.

With a little age they became more or less inert and unreliable.

Dressings are still prepared as above by nearly all manufacturers.

Linton Moist Dressings.

The dressings now used by our leading surgeons and large hospitals differ from those prepared by the Lister method in many important particulars.

We have mainly followed the methods adopted at Bellevue and other New York hospitals, with the improvements suggested by Dr. A. C. Bernays, of St. Louis, Dr. S. W. Gross, of Philadelphia, and others.

Experience has shown that the best dressings should possess the following characteristics :

1st. They must be aseptic or sterilized.

2d. Absorptive and *moist*.

3d. Soft and pliable.

4th. So prepared that the antiseptic used shall be of known strength. Each pound of cotton, fabric or solution shall contain an exact measure of the antiseptic drug.

Says Dr. Bernays : " Besides the mechanical improvement in being absorptive, flexible, etc., moist dressings, where properly applied to a wound (under impermeable covering, such as Linton Dressing, paper, or gutta percha tissue), are vaporized in the chamber so formed by the temperature, and cause an evenly distributed antiseptic vapor about the wound."

A recent observer, Schlange, of Berlin, has developed the fact that defects of no mean order are to be met with in our supposed aseptic sublimate dressings. He has proven after examination that all dry antiseptic bandage materials contain, without exception, more or less microorganisms which are capable of liquefying gelatine—*i. e.*, producing putrefaction ; but that recently prepared moist gauze, or gauze that has been rendered sterile by heat or boiling water, can be considered free from germs.

Professor Robert F. Weir says, referring to bichloride gauze :

" Unless it is carefully kept in a damp condition, and properly wrapped up in an impermeable wrapper, such as rubber or gutta percha tissue, the bichloride will soon become changed into the comparatively inert calomel. In fact, even in quite freshly made but dry gauze, a large quantity of calomel will soon be found, and this and the remaining bichloride can perceptibly be shaken out of it ; also, germs find a lodgment in the dry gauze. By chemical tests I have found that well-preserved damp gauze had not appreciably changed its strength one month after its manufacture."—*Med. News.*

In preparing Linton moist gauzes or cotton, the following method is used, except where the drug is not soluble in solution of water and glycerine :

1st. Boil the fabric or fibre under steam pressure until the temperature is raised to 250 deg.

2d. The antiseptic solution is prepared with *distilled water*, to which is added the antiseptic to be employed, together with 10 per cent. of pure glycerine. The glycerine is added for the double purpose of keeping the dressing moist and of preventing crystallization of the drug.

3d. The temperature of the solution is then raised to the boiling point and the dressing is then dipped in. After removing the dressing the excess over the required amount of the solution is extracted by a machine specially adapted to the purpose.

4th. While still hot, the dressing is carefully wrapped in an impermeable cover.

In preparing corrosive sublimate dressing, distilled water is a necessity to prevent any precipitation or change of the mercury. As an additional precaution, to prevent chemical change, tartaric acid is used to make the solution complete and permanent.

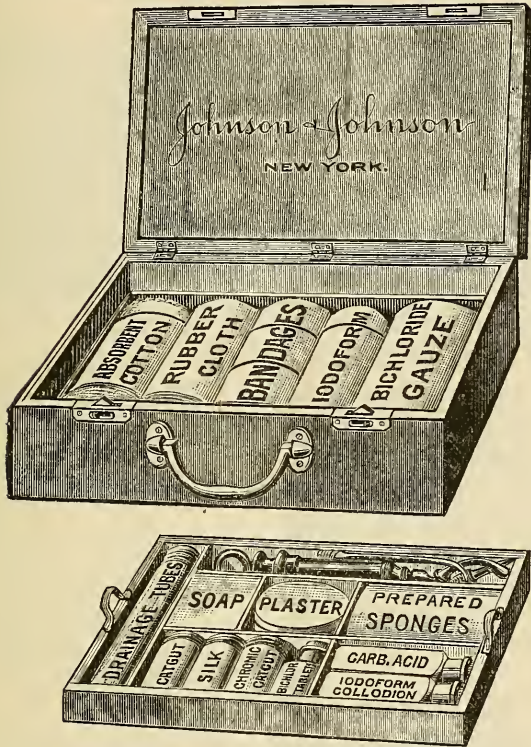
The preparation of *iodoform gauze* is attended with some difficulties, owing to the insolubility of iodoform. Our method is to take gauze of known weight, previously soaked in solution corrosive sublimate 1 to 5000. Carefully mix the percentage of iodoform to be used with glycerine in a paste. Scrape this over the gauze until the iodoform is evenly distributed.

Iodized cotton we prepare by placing absorbent cotton and iodine in an enclosed vessel and vaporizing the iodine by heat.

JOHNSON & JOHNSON.

SURGEON'S ANTISEPTIC DRESSING CASE.

AS SUGGESTED BY PROF. S. W. GROSS.



Containing 420 grs. carbolic acid in a bottle, s. add to 1 quart water for 3 per cent. solution. (For instruments.) Tablets of corrosive sublimate, 7.5 grs. in each; Ammonium chloride, 7.5 grs. in each; 1 tablet to pint of water, equal to 1-1000 solution. 5 yards bichloride gauze. 1 yard iodoform gauze, 20 per cent. 1 yard adhesive iodoform gauze, 20 per cent. $\frac{1}{4}$ lb. absorbent cotton. 6 prepared natural sponges. 3 roller bandages, 2, 2 $\frac{1}{2}$, 3 inch., 8 yds long. 1 yard dressing paper. 1 bottle, 3 sizes, catgut ligatures. 1 bottle, 3 sizes, silk sutures. 1 bottle, 3 sizes, chromicized catgut sutures (after Macewen's formula), 10 feet. 6 drainage tubes (red rubber or glass). $\frac{1}{2}$ oz. iodoform, in a hard rubber sprinkler. 1 razor. 1 nail brush. 1 yard gray rubber cloth (to put under part operated on, to keep things dry). 1 cake of soap. 1 fountain syringe. 1 three oz. hard rubber syringe, with different nozzles. 2 oz. bottle, 10 per cent. iodoform collodion. 1 large camel's hair pencil. 5 yds 1 inch rubber adhesive plaster. In a neat polished mahogany case, with metal handle for carrying.

PRICE, \$20.00.

Special prices will be quoted for cases containing assortments of articles differing from the above.

JOHNSON & JOHNSON, 23 Cedar Street, New York.

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Johnson & Johnson, NEW YORK.

The following List contains only the most important of the articles manufactured and sold by us. Our complete List will be found to embrace all varieties of Surgical Dressings and Medicinal Plasters.

BANDAGES.

ADHESIVE.—Adheres to itself but not to the skin.

$\frac{1}{2}$ in. x 10 yds, per roll	\$.50
1 in. x 10 yds, per roll	.60
2 in. x 10 yds, per roll	.75

COTTON.—Strong, Assorted Sizes, $1\frac{1}{2}$ to $3\frac{1}{2}$ in. per lb. .75

GAUZE.—Linton, Moist, Carbolated 5 per cent., Sublimated 1-2000.

2 in. x 10 yds, per doz.	1.50
3 in. x 10 yds, per doz.	1.80
4 in. x 10 yds, per doz.	2.25

GAUZE.—Linton, Moist Iodoform 10 per cent.

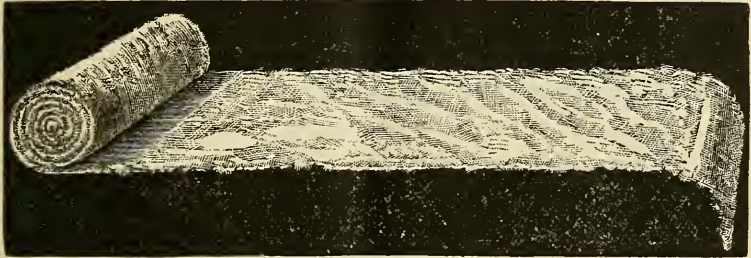
2 in. x 10 yds, per doz.	2.50
3 in. x 10 yds, per doz.	3.00
4 in. x 10 yds, per doz.	3.75

PLASTER PARIS.

$1\frac{1}{2}$ in. x 5 yds, per doz.	1.50
2 in. x 5 yds, per doz.	1.60
3 in. x 5 yds, per doz.	1.80
4 in. x 5 yds, per doz.	2.00

ESMARCH'S RUBBER.—Purified Gum, Assorted, 2 to 3 in. \$1.25 to 2.25

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COTTONS.

Our plain Absorbent Cotton is prepared in continuous layers, rolled with tissue paper between them, to keep the cotton from felting. By this method the cotton is furnished in even, flat layers, the convenience of which may be seen at a glance.

<i>PLAIN—ABSORBENT</i>	Dry.		Per lb.	.60
<i>BORATED</i>	Absorbent.....	Moist. 10 per cent.	Per lb.	.75
<i>CARBOLATED</i>	Absorbent.	Moist. 5 per cent.	Per lb.	.75
<i>CORROSIVE SUB</i>	Absorbent.....	Moist. 1 to 2000.	Per lb.	.75
<i>IODIZED</i>	Absorbent.....	Dry. 7½ per cent.	Per oz.	.25
<i>IODOFORM</i>	Absorbent.....	Moist. 10 per cent.	Per oz.	.25
<i>STYPTIC</i>	Absorbent.	Moist.	Per oz.	.25
<i>SALICYLATED</i>	Absorbent.....	Moist. 10 per cent.	Per lb.	.90

All rolled in thin layers. The above are also put up in $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, and $\frac{1}{16}$ lb. packages.

GAUZE. Linton, Moist, Antiseptic.

Wrapped in impermeable covering, and packed in sealed tin cans.

<i>CARBOLATED</i>	5 per cent.	1 x 5 yds.	Per roll..	.75	1 sq. yd.	.20
<i>CORROSIVE SUB</i> .	1 to 2000.	1 x 5 yds.	Per roll..	.75	1 "	.20
<i>EUCALYPTOL</i>	10 per cent.	1 x 5 yds.	Per roll..	.90	1 "	.25
<i>IODOFORM</i>	10 per cent.	1 x 5 yds.	Per roll..	1.30	1 "	.30
<i>IODOFORM</i>	20 per cent.	1 x 5 yds.	Per roll..	1.75	1 "	.40
<i>IODOFORM</i>	50 per cent.	1 x 5 yds.	Per roll..	3.00	1 "	.70
<i>NAPHTHALINE</i>	10 per cent.	1 x 5 yds.	Per roll..	.90	1 "	.25
<i>THYMOL</i>	10 per cent.	1 x 5 yds.	Per roll..	.90	1 "	.25

IODOFORM SPRINKLERS.

HARD RUBBER, each..... 1.00

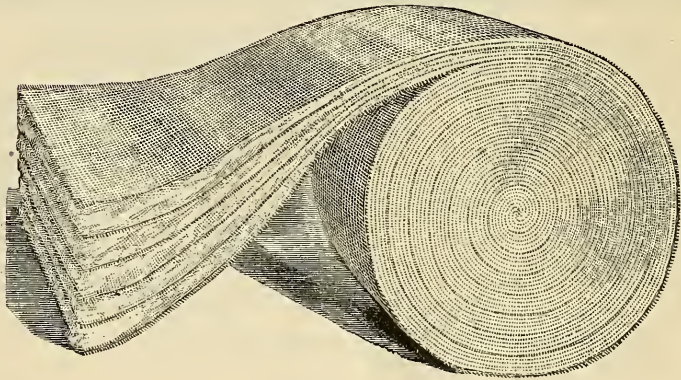
IODOFORM OINTMENT.....

IODOFORM COLLODION.....

PRICE LIST—JOHNSON & JOHNSON—NEW YORK.

LINTON COMBINED DRESSING.

(Absorbent Cotton and Gauze, as shown in illustration.) A substitute for both. Can be furnished any width or length required. See page 8.



<i>PLAIN</i> , Dry.....	per lb.	.90
<i>MOIST</i> , Carbol'd 5 per ct. or Bich. 1 to 2000, 3 in. x 10 yds,	per lb.	1.00
" " " " " " 4 in. x 10 yds,	per lb.	1.00

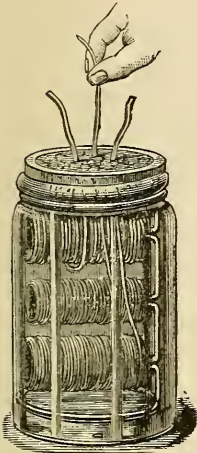
Special prices for 25 and 50 yard rolls, 15 inches wide.

JUTE.

<i>PLAIN</i>	Per lb.	.35
<i>CARBOLATED</i> . 5 per cent.	Per lb.	.40
<i>TARRED</i>	Per lb.	.45

PRICE LIST—JOHNSON & JOHNSON—NEW YORK.

LIGATURES.



SILK WORM GUT. Per bundle.....

CATGUT. Raw, per bundle.....	1.00
" Aseptic. Three spools on wire frame in each bottle. Assorted sizes, Nos. 1, 2 and 3, in oil juniper or a sublimate solution made with alcohol. Also, Chromized (Macewen's Process). Per bottle.....	1.00
NOTE—The experience of the majority of surgeons is in favor of juniper oil or alcohol for preserving catgut. For description of our method of preparing catgut see page 9.	
SILK, Aseptic. Three spools on wire frame in each bottle. Assorted sizes. Carbolated or Sublimated. Per bottle,	.75
Raw Chinese, twisted and iron dyed, 4 sizes, on boards, each....	.10
Raw Chinese, braided, four sizes, on boards. White, each.....	.25
Iron dyed, each.....	.30
SILK WORM GUT. Per bundle.....	1.25

LINT.

Perfect Absorbent, in pound rolls, per lb.....	.70
Prepared by J. W. Johnson's patent process.	
MACKINTOSH CLOTH. Am. Per yard.....	1.00
MUSLIN, OILED. Boxes. Per yard.....	.65
OAKUM. Pound boxes. Per pound.....	.25

PAPER.

LINTON MOIST. Carbolated, 1 yd. x 5 yds, per roll.....	.75
A strong, flexible, impervious parchment paper. A good substitute for Oil Silk, Mackintosh Cloth, or Gutta Percha Tissue. Some surgeons consider it preferable to all these.	

PAPOID	Per Ounce, \$3.50
PAPOID AND SODA TABLETS	" 100, 1.50
PAPOID AND BORACIC TABLETS	" 100, 1.50
PAPOID PILLS, 1 GRAIN, Compressed.	" 100, 1.50
" " " " Gelatine coated.....	" 100, 1.50

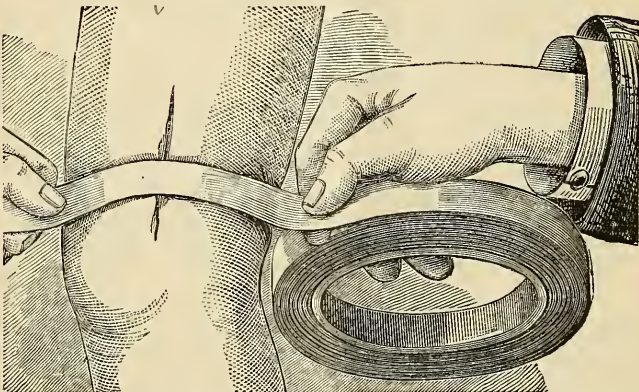
PRICE LIST—JOHNSON & JOHNSON—NEW YORK.

PLASTERS.

Prepared with Boracic or Salicylic Acid in the mass.

Medicated plasters should not be perforated, as shown by Dr. Unna, where absorption of an incorporated drug is expected. The rubber mass constitutes an impermeable back, which retains the moisture generated beneath the plaster. The moisture thus retained dissolves the drugs and in turn softens the horny layers of the skin, thus facilitating absorption, which is further aided by the addition of boracic or salicylic acid to the mass.

<i>ACONITE AND BELLADONNA.</i> 7 in. x 1 yd. Per yd.....	.70
<i>AMMONIAC AND MERCURY, U. S. P.</i> 7 in. x 1 yd. Per yd.....	1.00
<i>BELLADONNA WITH BORACIC ACID.</i>	
Ext. Belladonna, 18 per cent.; Adhesive Mass, 72 per cent.; Boracic Acid, 10 per cent. The Extract Belladonna used contains 4.4 per ct. Atropia.	
7 in. x 1 yd. Per yd....	.75
<i>BLISTERING.</i> (Cantharidal). 7 in. x 1 yd. Per yd.....	.75
<i>CAPSICUM.</i> 7 in. x 1 yd. Per yd70
<i>MERCURIAL.</i> (Mercury & Chalk). 7 in. x 1 yd. Per yd.....	.75
<i>MUSTARD.</i> 6 in. x 1 yd. Per yd.....	.25
<i>MUSTARD LEAVES,</i> 10 in box. Per box.....	.25
<i>OPIUM, U. S. P.</i> 7 in. x 1 yd. Per yd.....	.75
<i>RUBBER ADHESIVE,</i> On Hollow Cylinders.	



The convenience of Rubber Adhesive Plaster Tapes, on hollow cylinders, is shown by the above illustration.

PRICE LIST—JOHNSON & JOHNSON—NEW YORK.

PLASTERS.**RUBBER ADHESIVE.**

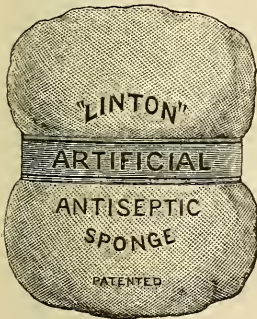
“	“	½ in. x 5 yds. Per roll, on hollow cylinders..	.15
“	“	1 in. x 5 yds. Per roll, “ “25
“	“	2 in. x 5 yds. Per roll, “ “40
“	“	3 in. x 5 yds. Per roll, “ “60
“	“	7 in. x 1 yd. In box, each.....	.30
SURGEON'S SILK, Isinglass. 7 in. x 1 yd. Per yd.....			.50
SURGEON'S MUSLIN, Isinglass. 8 in. x 1 yd. Per yd.....			.40
THAPSIA. 12½ per cent Resin Thapsia. Per yd.....			.70

RUBBER.

CLOTH.	Per yard.....	1.00
---------------	---------------	------

SILK.

OILED.	28 in. x 1 yd. Per yard.....	1.00
“	Lister's Protective. Per yard.....	1.25

SPONGES.

LINTON MOIST.	Aseptic plain, doz.	.55
“	“ Carbolated 10 per cent, doz.....	.70
“	“ Corrosive Sub, 1 to 1000.....	.70

TISSUE.

GUTTA PERCHA,	heavy, per yard.....	.65
“	“ “ light, per yard.....	.50

PRICE LIST—JOHNSON & JOHNSON—NEW YORK.

TABLETS.



ANTISEPTIC. — Corrosive Sub., gr. 7.5; Ammonium Chloride, gr. 7.5. Prepared so that 1 Tablet to 1 pint of water equals Solution 1 to 1000. By increasing or diminishing the amount of water, the strength of the solution may be altered at pleasure. For example:

1 Tablet to Oss =1 in	500.
1 Tablet to Oj =1 in	1000.
1 Tablet to Ojss=1 in	1500.
1 Tablet to Oij =1 in	2000.
1 Tablet to Oiiij=1 in	3000.
1 Tablet to Ov =1 in	5000.
1 Tablet to Ox =1 in	10000.
Per bottle, containing 25....	.35
Per dozen.....	3.00

Dr. Bernays' formula, Corrosive Sublimate, gr. 7; Citric Acid, gr. 3.48; 1 tablet to 1 pint of water, makes a solution of 1-1000. Per bottle..... .35
Per dozen..... 3.00

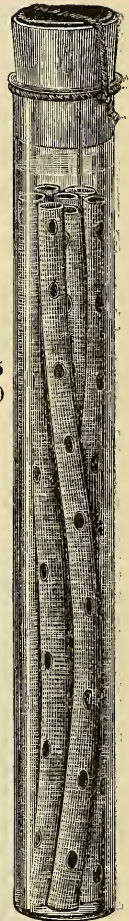
TAMPONS.

LINTON MOIST. —Boro Glyceride, 10 per cent. Per doz.....	1.20
Belladonna, 5 per cent. Per doz.....	1.20
Eucalyptine, 5 per cent. Per doz.....	1.20
Iodine, 5 per cent. Per doz.....	1.20
Pinus Canadensis, 7½ per cent. Per doz.....	1.20

TUBES.

DRAINAGE. —Decalcified Bone each.....	.50
Purified Rubber, 5 sizes in each bottle, in Carbolyzed Solution 5 per cent. Per bottle.....	1.00
Glass Drains, 7 sizes, each.....	

At the suggestion of Prof. S. W. Gross, we have recently had made for us seven sizes of Glass Tubes, which vary in length from two and one half inches to five inches, and in diameter from seven to ten millimeters, with openings one-third the diameter of the tube, which are ovoidal, with perfectly smooth edges, and which are placed one-half an inch apart. One end of each tube is provided with two smaller openings, for the insertion of a safety pin. A number of authorities state that these tubes are preferable to any they have ever seen.



WOOL.

LAMB'S —Aseptic, per lb.....	2.50
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On the Action of Papoid in the Treatment of Dyspepsia and Diphtheria — Recent Experiments, Notes and Comments.

In response to many inquiries from the profession regarding the nature of the Carica Papaya, from which Papoid is made, we print the following from *Chamber's Encyclopædia*, Vol. 6, page 52:

“**CARICA PAPAYA.**—A South American tree of the natural order Papayacia—of which about thirty species are known—which has been introduced into many tropical countries. It grows to the height of fifteen to thirty feet, with leaves only at the top, where, also, the fruit grows close to the stem. Leaves grow twenty to thirty inches long.



*Fruit of the Carica
Papaya.*

The fruit is of green color, very similar in appearance to a small melon, and with a somewhat similar flavor. It is eaten raw or boiled. The seeds are round and black, and when chewed have in a high degree the pungency of powdered cresses. The powdered seeds and the unripe fruit are most powerful anthelmintics. The milky juice of the tree is very acrid. The leaves are used by the negroes instead of soap to wash linen. The juice and fruit of the tree have the singular property of rendering the toughest beef tender in a short time. Even the exhalations of the tree have this property, and joints of meat, fowl, etc., are hung among its branches to prepare them for the table. It is a tree of exceedingly rapid growth, bears fruit all the year, and is extremely prolific. It is cooked in various ways. The Chambura (C-digita), another species of the same genus, a native of Brazil, is remarkable for the extremely poisonous and acrid character of its fruit and the disgusting stercoraceous odor of its flowers. All parts of the plant have a rank smell.”

It will be seen from the above that there are many species of carica papaya; that the fruit of some is edible and of others not; and that the juice of the tree and its fruit has the property of dissolving fibrine similar to that of the human digestive ferments. It may be added that some species possess this property to a much greater degree than others. In fact, the juice obtained from some of the species is almost inert, while that obtained from other species is so corrosive as to attack living tissues, hence cannot be used. The manufacturers of Papoid have spent four years experimenting with the juice of the trunk, leaves and fruit of nearly every known species of the plant, and believe that in Papoid is to be found the purest, most powerful, and at the same time demulcent preparation obtainable.

Comparative Experiments Between the Action of Papoid and Pepsin.

BY DR. D. FINKLER, Professor at the University of Bonn, Germany.

[*The Therapeutic Gazette, Philadelphia, Aug. 15, 1887.*]

Papoid is a ferment which is manufactured from the plant called *Carica Papaya*. It is an albuminous body, which, under certain conditions, can change albumen into peptone. The conditions which produce this change are very different to those under which pepsin and pancreaticine produce the same effect.

In order to demonstrate the effect of Papoid I shall indicate various experiments made by myself, which will give an exact insight into the conditions of the effect and also a comparison of the effect of pepsin

For these comparative trials I used a pepsin of known best quality, most of the commercial pepsin being decidedly weaker than that I used.

First question: Has Papoid really a digesting property?

EXPERIMENT 1.—*a.* 5 grms, raw meat minced, 50 c.c. water, 5 c.c. of a one per cent. Papoid solution (1 gm. in 100 c.c. water). This mixture was put into the oven, and kept for twenty-one hours at 38 deg. C. It was then filtered. The filtered portion contains the albuminous substance of the meat turned into peptone, which is not precipitated by nitric acid, nor by potassium ferrocyanide and acetic acid. It is precipitated by tannic acid, and the xanthoproteic and biuret reactions are well shown. The non-peptonized residue of the meat weighs when dried 0.1 gm.

Therefore ninety per cent. of the solid portions of the meat had been dissolved in water. Of the albuminous substances of the meat eighty-seven per cent. was peptonized, which shows a very energetic degree of digestion.

b. For comparison, 5 grms. raw meat minced, 50 c.c. hydrochloric acid (0.2 per cent.), and 5 c.c. of a one per cent. solution pepsin were treated as above.

After twenty-one hours 70.6 per cent. of the albuminous substance of the meat was peptonized.

EXPERIMENT 2.—*a.* 5 grms. meat, 50 c.c. water, 0.5 c.c. of a one per cent. Papoid solution.

After forty hours the non-peptonized residue of the meat weighed 0.19 gm.

Of the albumen of the meat 77.7 per cent. was dissolved in the water as true peptone.

b. 5 grms. meat, 50 c.c. hydrochlor. acid (0.2 per cent.), 0.5 c.c. of a one per cent pepsin solution.

After forty hours the non-peptonized residue weighed 0.19 gm. Of the albumen of the meat 77.7 per cent. was peptonized.

EXPERIMENT 3.—*a.* 10 grms. meat, 20 c.c. water, 1.5 c.c. of a one per cent. Papoid solution.

After thirty-six hours 73.5 per cent. of the albumen of the meat was changed into true peptone.

b. 10 grms. meat, 20 c.c. hydrochlor. acid (0.2 per cent.), 1.5 c.c. of a one per cent. pepsin solution.

After thirty-six hours eighteen per cent. of the albumen of the meat was changed into true peptone.

RESUME OF THE THREE EXPERIMENTS.

Ferment.	Digested albumen of the meat.	Time.	Proportion of the quantity of ferment to the meat.	Proportion of the quantity of meat to the liquid.
Papoid 1.....	87. per cent.	21 hours.	1 to 100	1 to 10
Papoid 2.....	77.7 per cent.	40 hours.	1 to 1000	1 to 10
Papoid 3.....	73.5 per cent.	36 hours.	1 to 600	1 to 2
Pepsin 1.....	70.6 per cent.	21 hours.	1 to 100	1 to 10
Pepsin 2.....	77.7 per cent.	40 hours.	1 to 1000	1 to 10
Pepsin 3.....	18. per cent.	36 hours.	1 to 600	1 to 2

Papoid, therefore, shows a more energetic peptonizing power than pepsin, and specially so when the proportion of the liquid to the albumen is small—*i. e.*, in the proportion of concentration in which food generally exists in the stomach and in the intestines. The great variability in the quality of commercial pepsin (some of which will, under the most favorable circumstances, not peptonize more than twenty per cent. of the albumen of the meat), gives Papoid also the preference, as it is made of one uniform quality.

Second question: What effect can be obtained by the ferment in the human body?

a.—CONCENTRATION OF THE SOLUTION IS OF FIRST IMPORTANCE.

It is impossible to create in the stomach and intestines such amount of liquid as would be favorable to the effect of pepsin. The conditions, therefore, are very much in favor of Papoid.

b.—IMPORTANCE OF THE REACTION.

Pepsin acts in the stomach, but not in the intestines, as in the latter, the reaction is neutral or alkaline. Papoid has little effect in the stomach, as the reaction there is acid. When, however, the stomach is neutral or alkaline, Papoid will peptonize, while pepsin will be useless. The degree (amount) of acid reaction in the stomach differs greatly, especially in case of a stomach out of order; in which case the reaction can be so highly acid or alkaline that pepsin would be of no value at all. In the

treatment of stomach-catarrh we will, moreover, find that, as a general rule, the contents of the viscus have been rendered artificially neutral or alkaline by the administration of remedies, so that in these cases pepsin will have absolutely no effect. Papoid, on the contrary, will act energetically.

c.—REGARDING THE TIME AVAILABLE FOR THE DIGESTIVE FERMENT TO ACT IN THE BODY.

In the case of pepsin this is necessarily very short, as the action ceases when the food enters the alkaline reaction of the intestines. In the case of Papoid, which can act well in alkaline reaction, the time is practically unlimited, as it continues acting on the food during the whole time it remains in the body. For all these reasons the conditions for the effect in the human body are far more in favor of Papoid than pepsin, and especially as under existing circumstances (high degree of concentration) Papoid has been shown to act much more energetically. It is only too clear that the preference should be given to Papoid as a digestive ferment, for the treatment of dyspepsia. Papoid is also of great importance in the treatment of diphtheria.

Its effective power consists in the circumstances that no free acid need be present in the application, and further, that the moisture of the diphtheritic membranes is quite sufficient to allow the ferment to dissolve the solidified substances of the membranes. No other ferment has so far been able to obtain these results. It is on this account that many competent experimentalists and specialists have lately made observations as to these points.

From all these circumstances there is no doubt that in Papoid we have a ferment which has a great future before it. I have had the satisfaction of obtaining the most favorable results from its use in the treatment of disease.

Some Laboratory Notes on Papoid Digestion.

By R. F. RUTTAN, B.A., M.D., Lecturer on Chemistry, McGill University, Montreal, Canada.

For some time it has been known that the stems, leaves and unripe fruit of a plant called *Carica Papaya* contain a ferment capable of digesting proteids. This plant is found in the East and West Indies and in South America. The natives of many localities where this plant is indigenous make a practice of rolling their fresh meat in carica leaves to make it tender and easier of digestion. From the juice of this plant is made an albuminous preparation containing the ferment, which is now attracting much attention under the name of Papoid.

About 90 per cent. of commercial Papoid is soluble in water; the residue consists chiefly of coagulated albumen. The solution contains globulin, but it is highly probable that the ferment is quite independent of this albuminoid, as the globulin may be precipitated, leaving in the solution a large part, if not all, of the ferment.

As Papoid contains a ferment and also some albumen on which it may act, care must be taken to keep it dry. The unsatisfactory results obtained by some in its use are no doubt due to previous exposure of the sample to moisture. A solution of Papoid will always give the peptone reaction on standing a few hours.

In each of the following experiments the digestion mixture consists of 1 gramme of pure dry fibrin in powder, which was boiled in 20 c.c. of water and allowed to stand for 12 hours to soften. To this was added 10 c.c. of 1 per cent. solution of the ferment to be used and standard acid or alkali to required strength, making the whole mixture up to 50 c.c. The digestions were carried on in an incubator kept at a constant temperature of 37–38 deg. C., and at the end of a variable time the undissolved fibrin was filtered off on a small, tarred filter, and after thorough washing was dried at 100 deg. to constant weight. Thus the undigested fibrin could be weighed in the same condition as before it was submitted to the action of the ferment, and any experimental error caused by the presence of a variable quantity of moisture was eliminated.

EXPERIMENT I.—Digestion mixture consisted of 1 gramme fibrin. 10 c.c. of a 1 per cent. solution of Papoid or pepsin in a neutral medium; time, 20 hours; temperature, 37–33 deg. C. Experiment done in duplicate:

	<i>Undigested fibrin.</i>	<i>Per cent. digested.</i>
Papoid (a).....	.187 gm.	81.3 per cent.
Papoid (b).....	.13 “	87.0 “
Pepsin (a).....	.903 “	9.7 “
Pepsin (b).....	.883 “	11.7 “

EXPERIMENT II.—Conditions the same as in I, but in an acid medium of .3 per cent. hydrochloric acid; time, 20 hours; temperature, 37–38 deg. C.:

	<i>Undigested fibrin.</i>	<i>Per cent. digested.</i>
Papoid (a).....	.972 gm.	2.8 per cent.
Papoid (b).....	.923 “	7.7 “
Pepsin (a).....	.08 “	92.0 “
Pepsin (b).....	.04 “	96.0 “

EXPERIMENT VII.—The action of Papoid in neutral solution on diphtheritic membrane compared with that of pepsin :

(a) Papoid digested completely .3 grm. of diphtheritic membrane in 20 hours.

Pepsin had only partially dissolved the same weight of membrane at the end of 36 hours.

(b) Papoid dissolved completely .5 grm. of membrane in 23–24 hours.

In these experiments a 5 per cent. solution of Papoid or of pepsin was added to the undivided membrane, and the whole kept wet during the time specified. The membrane was reduced to a clear fluid jelly by Papoid, but only partially attacked by the pepsin under the same conditions.

EXPERIMENT VIII.—Does acid destroy the proteolytic action of Papoid as it does that of trypsin ?

To ascertain this, .2 grm. of Papoid was added to 1 gramme of fibrin in a .3 per cent. solution of hydrochloric acid in duplicate. Both mixtures were made up to 50 c.c and left in the incubator for three hours. At that time one mixture was estimated and the other made faintly alkaline with sodium carbonate and left in the incubator for 13 hours longer.

The acid mixture showed no digestion—no reaction indicating peptones could be obtained.

At the end of 13 hours the other mixture gave a residue of .23 grm., showing that 77 per cent. had been digested.

The proteolytic ferment of Papoid is therefore not destroyed by being kept in an acid medium for three hours at blood heat ; its action is only suspended.

The conclusions to be drawn from these experiments are obvious. Papoid evidently contains a powerful proteolytic ferment which resembles trypsin both in the conditions under which it is most active and in its mode of digestion. It corrodes the fibrin, dissolving each piece away from the surface to the centre, and does not gelatinize the whole mass like pepsin. Moreover, one can readily obtain leucin in the products of digestion. Tyrosin could not be obtained by the writer, but its presence was determined by Dr. Martin, who worked with larger digestion mixtures.

Papoid, as shown in Experiment II., is quite inactive in small quantities in an acid medium of .3 per cent. hydrochloric acid. A certain amount—3 to 7 per cent. of the fibrin—was dissolved by it, but no true digestion occurred, as peptones in any quantity were absent.

The results of Experiment VIII, however, show that although it is inactive in acid its functions are only suspended—the ferment is not killed. This is interesting, in view of the frequent use of Papoid for treatment of dyspepsia. If the stomach be normally acid, its activity will probably be suspended entirely ; if, however, the acidity be very slight, Papoid will probably act. Its greatest action, however, takes place in the small intestines, where the medium is alkaline or neutral. The ferment is most en-

ergetic in a faintly alkaline medium, about .2 per cent. of sodium carbonate. In a neutral medium its activity is far greater than that of pepsin.

Papoid is especially useful for removal of diphtheritic membrane. The conditions present in the pharynx are just those which retard the action of pepsin and pancreatin, but do not influence Papoid. The medium in which it is required to act is practically a neutral one and the temperature low; there is present, besides, a large excess of the products of digestion which does not affect Papoid—indeed it is most energetic in a concentrated medium. Moreover, Papoid has been shown clinically to lessen very greatly the disagreeable foetor of the disease. Painting on a 5 per cent. solution, freshly made, every two or three hours, has been found to give the best results: the foetor disappears in a few hours and the membrane in from 12–18 hours becomes thin and glairy.

It would seem to be especially indicated in these forms of dyspepsia in which peptic digestion is greatly impaired and where the secretion of gastric juice is very weak.

Papoid, therefore, promises to be a powerful auxiliary in combatting those two great diseases—diphtheria and dyspepsia.

DECEPTIVE PEPSIN TESTS.

RYAN HOTEL, St. Paul, Jan. 28, 1888.

MESSRS. JOHNSON & JOHNSON, NEW YORK.

Gentlemen:—I have been informed that a representative of Fairchild Bros. & Foster, New York, manufacturers of pepsin, etc., has recently been here, visiting physicians, and attempting to show by the usual tests the superior digestive power of F. Bros. & Co.'s pepsin over Papoid. His experiments invariably resulted in apparently proving the almost worthless character of Papoid. I should be glad to learn what you have to say on this subject.

Yours truly, D. J. BROWN, M. D.

NEW YORK, Feb. 2d, 1888.

D. J. BROWN, M. D., CARE RYAN HOTEL, ST. PAUL, MINN.

Dear Sir:—Replying to yours of 28th ult., we would say that if the attempt to prove the relative value of Papoid and pepsin was made as stated by you, it was a species of deception which we should scarcely think any reputable house would sanction. It should be remembered that pepsin and Papoid are different drugs, and that ordinary tests in

which a solution favorable to pepsin is invariably used, do not apply to Papoid. We send you herewith the reports of recent experiments made by Prof. Finkler, of the University of Bonn, and Prof. Ruttan, of McGill University, Montreal. You will note that in these tests three facts regarding Papoid are developed.

First—That it has greater digestive powers than pepsin in neutral and alkaline solutions, especially when the solutions are concentrated.

Second—That in acid (3 per cent.) solutions it is apparently nearly inactive.

Third—But its action is, however, merely suspended, not destroyed, by acid, hence while the action of Papoid upon food in the stomach may be relatively weak when the reaction there is acid, yet when the food enters the intestines, where the reaction is alkaline, Papoid acts upon it energetically so long as it remains in the body.

You can readily see from the above facts that if Papoid and pepsin has been tested in a neutral or an alkaline solution instead of the usual acid medium, the results would have been exactly the reverse.

Finally, it has been shown by many eminent authorities that Papoid has a remarkable pathological action which laboratory tests do not altogether explain.

Yours truly,

JOHNSON & JOHNSON.

PAPOID IN DIPHTHERIA.

An extract from the report of the proceedings of the Montreal Medico-Chirurgical Society, Nov. 25th, 1887 :

“Dr. Geo. Ross said he was trying the local application of Papoid in diphtheria. It was applied by means of a brush in five per cent. solution every half hour. In hospital (Montreal General) he had treated 26 cases, many of them severe, and some of them very severe. Of these, 13 were discharged well ; 12 remained under treatment, but he thought, without doubt, would all recover ; *one only died*. He was certainly favorably impressed with the action of the drug, but could not say more than this until extended observations had corrected or confirmed first impressions.”—*Canada Medical and Surgical Journal*, Feb., 1888, pp. 424.

REPORT OF FIVE CASES OF DIPHTHERIA.

230 DUFFIELD STREET, BROOKLYN, N. Y., November 21, 1887.

MESSERS. JOHNSON & JOHNSON:—I hand you herewith a summary of five cases of diphtheria treated by me. When I had filled out the last certificate of death, making the third life for one father to hand to the undertaker within four days, I determined to risk the trial of Papoid in the next case, which I did with the results given. Of course my treatment of the first three cases might, on reflection, have been different. Of the many drugs one may use, there are none which are not condemned by eminent men and praised by others equally eminent, and exceptions are taken to the dose. It may be too large or it may be too small. But suffice it to say that I have used Papoid, and am satisfied that it is a very valuable remedy in the treatment of diphtheria. Its power to dissolve the diphtheric patches is remarkable, and I will go further and state that I believe that if I had used it in cases one, two and three, I should have had recovery instead of death.

GEO. EVERSON, M. D.

Case.	Name.	Age.	Address.	Nationality.	Character.	Treatment.	Result.	Condition of Premises.	Duration.	Termination.	Date.
1	Frida B.	7	Brooklyn.	German.	Tonsillar and nasal.	Tr. ferri potass. mixture, bichl. sol. and acid bor. sol. in spray; diet, milk.	Bad; vomiting and collapse.	First class.	17 hrs.	Death.	Oct. 17, 1887.
2	Henry B. ...	6	Brooklyn.	German.	Tonsillar and nasal.	Tr. fe. chl. zss. doses; tr. fe. applied to throat; carbolic spray; diet, milk and brandy.	Bad; vomiting early, but patient soon went into collapse.	First class; same room as Case 1; disinfected by Health Dept. Oct. 17.	18 hrs.	Death.	Oct. 17, 1887.
3	Christina B.	4	Brooklyn.	German.	Tonsillar and nasal.	Quinia in pulveris, mistura, soda sulphite, glycerin et water, sol. hyposulphite of soda et glycerin to patches.	Exhaustive. Diet, milk.	Removed to the same room after disinfected by Health Department.	3 days.	Death.	Oct. 18, 1887.
4	Edward S. ...	6	Brooklyn.	American.	Tonsillar and nasal.	Patches painted every half hour with sol. Papoid, 4 grs., zi. of water for 3 days; Papoid internally I gave in iss. gr. doses every hour for 3 days.	Good; fever reduced. Diet, milk.	First class.	7 days.	Recovery.	Oct. 21, 1887.
5	Laura S.	5	Brooklyn.	American.	Tonsillar and nasal.	Patches painted with sol. Papoid every 15 minutes for 6 hours; after, every hour for 84 hours; then every hour till 7th day; internally, gr., 1 every hour, 7 days.	Good; fever reduced. Diet, milk.	First class.	11 dys.	Recovery.	Oct. 21, 1887.

Directions for the Administration of Papoid in Dyspepsia.

BY PROFESSOR FINKLER.

PAPOID, when taken into the stomach has the following action:—

1. It converts five times as much albumen into peptone, bulk for bulk, as the best pepsin.
2. It increases the flow of gastric juice, by stimulating the peptic glands.
3. It prevents the decomposition and fermentation of the contents of the stomach by its antiseptic action.
4. The action commenced in the stomach is continued after the food has passed into the intestines, as it acts in the presence of an alkali.
5. It is perfectly harmless.
6. It dissolves any unhealthy mucus sheathing the walls of the stomach and intestines, and
7. It relieves pain, either caused by the presence of irritating ingesta, or due to local neuralgia.

It is thus evident that the drug will prove useful in all cases where there is either deficient secretion of the peptic ferments, abnormal fermentation, or a combination of both conditions.

In practice, excellent results have been obtained in the following conditions:—

1. Gastric or intestinal pain.
2. Vomiting, persistent, especially the morning sickness of chronic alcoholism, and that incidental to pregnancy.
3. Anorexia, simple loss of appetite without other symptoms.
4. Acid dyspepsia.
5. Chronic catarrh of the stomach, especially that due to alcoholism.
6. The chronic stomach catarrhs of children. Here it apparently acts by dissolving the unhealthy mucus which sheaths the walls of the stomach and prevents the proper absorption of the food.
7. Cases of ordinary slow digestion.
8. And lastly, that form of irritative dyspepsia which is the common result of rapid eating and imperfect mastication.

From this long list we see that it will prove beneficial in most of the disorders of the digestion, in some, its effects being so marked as to make it appear a veritable specific.

DOSE OF PAPOID.—The ordinary dose of this drug is from gr. ss—gr. jss for children, and gr. jss—gr. v. for adults. Larger doses have been given without injurious effects in certain cases, but in the usual run of cases it has not been found necessary to exceed gr. v. as a rule. In most instances gr. jss to gr. ij will be found quite a large enough dose.

METHOD OF ADMINISTRATION.—Either in powder, pill or mixture. It is very hygroscopic, and will not keep its activity long except in a dry state. So when ordered in a mixture, only a few doses should be put up at a time.

TIME OF ADMINISTRATION.—During or after a meal, except in cases of catarrh, where its local action on mucus is required when it should be given just before, or half the dose may be given before the meal, and the remainder during its progress.

Where there is abnormal fermentation of the contents of the stomach, its antiseptic action may, with advantage, be increased by the addition of another drug, by preference Boracic Acid, which acts very well with it, or a dose of pure Glycerine may be given immediately before the meal, and the Papoid afterwards. This latter mode of treatment is especially useful in those cases of "Irritative dyspepsia" due to rapid eating. The usual symptom in such cases is distress coming on half-an-hour or an hour after meals. There is also duodenal catarrh and dyspepsia, with, perhaps, slight jaundice and other symptoms, referable to, and explained by, the irritated mucous membrane of the stomach and duodenum. The indications in such cases are well defined: (a), we must prevent the food from undergoing mischievous chemical changes before it can be acted on by the enfeebled digestive organs; (b), a remedy must be given which will soothe the irritated mucous surface, these two indications being fulfilled by the Glycerine; and (c), we must supplement the poverty of the gastric and pancreatic secretions by the administration of Papoid.

The following are a few eligible formulæ for the administration of the drug in the cases mentioned above:—

R. Papoid gr. jss.
Sod. Bicarb. gr. iiij.
Pulv. Trochisc.,
Menth. Pip. gr. iij M. fiat pulv. j.

To be taken three times a day after meals in a little water.

(Powdered Peppermint lozenge is the nearest approach we have to the Oleo-Sacch. Menth Pip. of the Pharm; Germanic.

In cases of very delicate stomach it may be given in a mixture, as follows:—

R. Papoid gr. xvij—gr. xxxvj.
Mucilag. Acac. oz. j.
Aq. ad oz. vj M. fiat. mist. cujus cap. coch. mag. unum
ter die post cibum.

When there is fermentation and decomposition of the contents of the stomach, we order—

R. Papoid gr. jss.
Acid Borac gr. jss M. fiat pulv. j Bis terve in diem
sumend.

When there is distinct anæmia we may combine it with reduced iron or quinine, and in cases of atony of the stomach and dilatation, with strychnine. In these cases it is best given in pill form. For example :—

R. Papoid gr. ij.

Quin. Sulph. gr. j.

Saa. Lactis. gr. j Mucil. Tragac. q. s. ut fit pil j ter die sumend post cibum.

Sugar of Milk, with a little Mucilage of Tragacanth, has been found to be the best excipient to use, and pills made with it, well dried, and coated with a solution of Gum Sandarach in absolute alcohol, will keep indefinitely, as the interior cannot absorb moisture, owing to the impermeable coating. In cases of great acidity, large doses of an alkali, such as Sod. Bicarb., may be combined with the Papoid, as, unlike pepsin, its action is not interfered with thereby.

In some cases of hyperacidity of the stomach, due to the formation of fatty acids in the process of digestion, the best result is sometimes obtained by giving a dose of Papoid with the meals, and following it after an interval of about an hour by 15 min. of dilute Hydrochloric Acid, as Leube has found in these cases a distinct deficiency of the latter in the stomach secretion.

For children, the following formula has been very successful, given before meals, when there has been catarrh of the stomach :

R. Papoid gr. jss—gr. j.

Sac. Lactis gr. j.

Sod. Bicarb. gr. v. M. fiat. pulv. j. Ter die sum.

For the immediate relief of Vomiting, give gr. iiij. of Papoid in half a tumbler of soda water on an empty stomach.

1. RELIEF OF PAIN: *a*, GASTRIC; *b*, INTESTINAL.—Papoid relieves, and sometimes entirely removes, gastric pains, which have their origin in the irritation of the mucous membrane of the stomach. It is especially useful in extreme acidity, chronic catarrh, and also in dyspepsia of nerve origin. It will completely remove that heavy feeling of pressure so often experienced by dyspeptics after a full meal. For the relief of pain it is most effective in combination with Sod. Bicarb. and .01 Menth. Pip.

2. RELIEF OF VOMITING.—The distressing vomiting which so often occurs in attacks of gastric catarrh, and particularly the morning sickness of chronic alcoholism, is almost invariably relieved. The drug is contra-indicated in cases of actual ulceration of the mucous membranes.

3. One of the most striking effects observed in patients who are taking the drug is the very great *improvement in appetite* which invariably follows the exhibition of it after even a few doses.

In cases of ordinary dyspepsia following excess, either in eating or drinking, Papoid relieves at once the pressure and heavy feeling in the stomach. In the treatment of such cases I give a small dose of the Carls-

bad Sprudelsalz in the morning in a small tumbler of an effervescing mineral water, and after lunch and dinner I give Papoid, gr. iss-4, dissolved in a little water and taken a quarter of an hour after the meal.

In chronic gastric catarrh I give the following prescription:—

R. Papoid gr. iss.

Sod. Bicarb.

Oleosacch. Menth. pip. aa. gr. iii. M. Ff. pv. i. Ter die sumend.
in aqua post cibum.

The indications for the administration of the drug in these cases are acid eructations, pyrosis, and gastric pain and pressure. In cases of dilatation of the stomach one employs, in addition, the ordinary treatment of washing out the stomach and the application of electricity, as the two modes of treatment do not interfere with each other.

Another advantage that Papoid has over pepsin lies in the fact that the percentage of HCl in the stomach is always very much increased in chronic catarrh, and as pepsin only acts in the presence of a constant amount of acid (.02 per cent.), and is inoperative at high or low percentages, and as the state of the stomach in chronic catarrh usually varies between the state of hyperacidity and the state of slight alkalinity induced by the efforts of the patient to obtain relief by taking large doses of neutralizing alkalies, pepsin has no effect whatever, while Papoid commences to act at once. In other words, Papoid has the advantage over pepsin that in cases of stomach disease accompanied by great excess of acid in the stomach it can be given with a sufficient quantity of alkali to neutralize the excess aforesaid without impairing its own action. I believe that the action of pepsin taken internally has been very much overrated. The further advantages of Papoid are in its other properties. Firstly, its effect upon the sensitive nerves of the stomach; this has been proved practically, and also by experiments on animals by Rossbach. Its soothing effect in gastric pain no doubt arises from this. And secondly, Papoid has also a tonic effect upon the mucous membrane of the intestines. This has been experimentally proved on animals, and points out indications for its employment in many diseases of those organs. In cases of anæmia Papoid is best given in combination with small doses of quinine, or with Rhizom. Calami.

R. Papoid gr. iss.

Rhizom. Calami gr. ivss. M. Ft. pv. j. Capiat ter die ante cibum.

In many chronic cases, and especially in those where the cause of the disease cannot be removed, such as carcinoma and stricture of the pylorus, I have given Papoid for months without observing any untoward effect.

DIRECTIONS FOR THE USE OF PAPOID IN DIPHTHERIA.

The action of the drug upon which we depend for its use in diphtheria, is the same as that which makes it so valuable in the treatment of the disorders of digestion, viz., its power of dissolving and peptonizing fibrin. When applied to the diphtheritic membrane it—

1. Dissolves and detaches it in a few hours.
2. It destroys the infective organism of the disease by its germicidal action, and thus prevents any fresh infection of the system.
3. It causes an almost immediate fall of the body temperature, with the simultaneous disappearance of the diphtheritic membranes. The rationale of this being that the organisms which are already in the system soon perish, and no fresh ones being absorbed, there is nothing to keep up the abnormal fever.

4. It adheres persistently to fibrin. Some experiments made by French *savants* prove that fibrin once in contact with Papoid does not give up the latter, in spite of most energetic washing with water, so that when once applied to a diphtheritic membrane, *nothing* can prevent the latter from being completely destroyed.

We shall now pass to the consideration of the best manner of using the drug in the treatment of this disease. As all my readers may be assumed to be practically familiar with the ordinary modes of internal medication, and as they will not be interfered with by the Papoid treatment, but may and should be carried on *pari-passu* with it, I shall confine my remarks to the few practical points which have arisen in the recorded cases, and the conclusions that have been arrived at by their consideration as to the best method of administering the drug. **IT MAY BE APPLIED IN SOLUTION** ; then—

1. The best strength to use is a 5 per cent. solution.
2. It should be applied at least every half-hour.
3. In mild cases, where the false membranes are confined to the pharynx, it may conveniently be applied with a soft brush.
4. In severe cases, or where there is the slightest indication that the membranes are spreading to the larynx, or nasal passages, I would advise the use of a spray. If the patient is old enough he should be made to open the mouth, and the spray directed to the back of the pharynx, but if too young to do so the solution should be sprayed in front of the nose and mouth so that the drug will be carried into the respiratory passages by the acts of breathing. This application of spray must be done by the use of a spray-producer that acts by atomizing the liquid, as in the ordinary scent-spray, and not by means of a steam-spray apparatus, which will dilute the solution, and thus make it less efficacious.

5. Early tracheotomy is to be advised in suitable cases ; and besides the application of the spray over the orifice of the tracheotomy tube, a few drops of the solution should be allowed to trickle down the tube. The Papoid solution must be warm, this being conveniently effected by standing the spray apparatus in a vessel of water about 100 deg. Fahr.

6. For diphtheria of the nasal passages it is most convenient to use a spray-producer with a conical nozzle, which fits in the orifice of the nose tightly, as it can be applied with ease to a struggling child. That form known as Leffert's is one of the best. In diphtheria of the naso-pharynx, if the patient is old enough, a post-nasal spray tube should be used.

OR IT MAY BE USED AS A THIN PASTE OR STRONG SOLUTION.

Professor Finkler now uses the following method, to the exclusion of all others, and says that he obtains much better and quicker results. He rubs up gr. v. of the drug with a spatula, with as much water as will dissolve it into a thin paste, and applies it to the membrane with a brush every hour, or half hour. The physician should prescribe it in powders, as follows, each powder containing sufficient for one or more applications—

R. Papoid gr. v.
Ft. chart, j.

Sig. One powder to be rubbed up with sufficient water to dissolve it, and applied with a brush to the throat as often as directed. **Dispense in waxed paper.**

One should never mix more than is required for one, or at the most two, applications at a time, as in lengthened contact with water the drug loses some of its power of dissolving membrane.

Whenever there is reason to think that the membranes are spreading downwards towards the larynx, or upwards towards the nasal passages, the 5 per cent. spray should be used in addition to the above brushing with strong solution.

Papoid Tablets and Compressed Pills.

In order to have these formulæ in a convenient form for the physician, we have prepared compressed tablets, each containing:

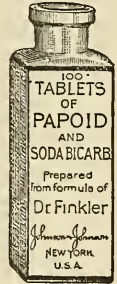
Papoid gr. i
Sod. bicarb. gr. ii.
Sac. lacti qs.

Also, compressed tablets, each containing:

Papoid gr. iss.
Acid boracic gr. iss.

Also, Papoid Pills, 1 gr. each, compressed or gelatine coated.

May be procured from your pharmacist.



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TO THE PROFESSION.

Since we became agents for Papoid many thousands of ounces have been consumed in the United States and Canada.

It is now being used in all the larger cities and in most of the small towns.

Many of our leading medical journals have published reports from physicians regarding its value, which, with one exception only, are favorable. During the past three months our correspondence with physicians regarding the article has been large, and of the reports thus received eighty-nine per cent. have been unqualifiedly favorable, six per cent. partially so, and five per cent. state that the results obtained were unsatisfactory.

On the whole, the reports confirm the opinions of the foreign authorities lately published, and lead to the conclusion that Papoid will largely displace pepsin, pancreatine and other digestive ferments.

Special attention is called to the convenience of Papoid and Soda and Papoid and Boracic Acid Tablets, made after Prof. Finkler's prescriptions, for use in the treatment of Dyspepsia.

Having received complaints regarding the price of Papoid, we would state that it is as low as it can be made under the existing conditions of manufacture, and that as the dose of Papoid is only about one-third that of Pepsin, the former will be found quite as cheap, if not cheaper, than the best quality of the latter article.

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INCREASED ACTION.

Several years ago our attention was called to a wild belladonna root. Repeated tests proved that not only did the root yield a greater per cent. of solid extract, but that the extract itself was much richer in atropia, yielding uniformly over 4 per cent. of the alkaloid, and from 10 to 40 per cent. more than could be obtained from extracts, made from ordinary commercial belladonna root.

It can readily be seen that the great difference in the yield of atropia from the ordinary belladonna extracts, made the task of preparing belladonna plaster of uniform strength very difficult. By the use of wild root, obtained from one locality, uniformity in the percentage of atropia in the plaster at all times is secured.

That the addition of boracic acid to belladonna plaster decidedly increases the therapeutic action of the drug, is shown by the experiments of Drs. John V. Shoemaker, D. H. Agnew and others.

Says Dr. Shoemaker, in a paper read before the Pennsylvania State Medical Society, June 28th, 1887:

"The addition of boracic acid in the proportion just named to belladonna has some action upon the fatty matter of the skin, and renders the effect of the former drug more decided.

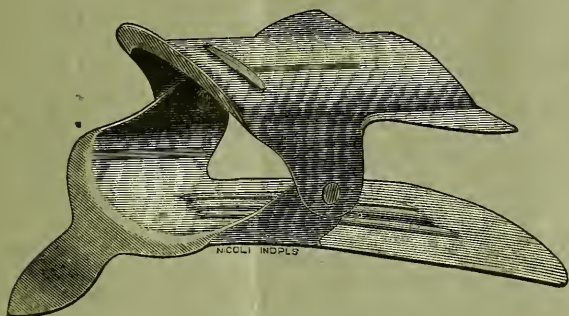
"It is one of the most effective plasters for relieving recurrent patches of herpes, herpes zoster, neuralgia, and exalted and diminished sensibility of the skin. In isolated spots of erythema, subacute and chronic eczema, it often relieves the accompanying obstinate itching and removes the infiltration.

"Local sweating in different parts of the body may be often relieved or cured by the application of this plaster. It is particularly serviceable in both excessive and fetid perspiration of the hands and feet. In cases in which the feet sweat the epidermis peels off, the skin cracks and becomes tender. The continuous application of belladonna and boracic acid plaster for days is frequently followed by a complete removal of all the symptoms.

"In the same way fissured eczema, especially of the fingers and toes, may often be controlled and healed by encircling the parts with the plaster every two or three days. Localized, obstinate and irritable patches of vegetable parasitic diseases, especially ring-worm and favus, may yield readily to the use of this plaster. The boracic acid in the combination is one of the most effective anti-parasitic agents for the destruction of vegetable organisms, and the belladonna acts well in relieving cutaneous irritation. The action of belladonna plaster in arresting the secretion of milk and in relieving inflammation of the breasts, is in this combination still more enhanced in its effect by the boracic acid. The absorption of the belladonna is found to take place more rapidly, and the secretion of milk and the inflammation yield more promptly to the application of the two drugs in the form just suggested. Abscesses, boils and carbuncles, inflamed subcutaneous glands, irritable scalds, frost-bites, wounds and ulcers may be benefited, and at times speedily induced to heal, by the local anodyne action of the belladonna and the antiseptic properties of the boracic acid."

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