

to say that the former method consists of an air-tight chamber eight feet high and seven feet wide, in which three patients can sit comfortably. The air is compressed gradually to one and a half atmospheres—a pressure of twenty-two pounds to the square inch—and the patient remains in the chamber about an hour and a half. One of the first and most complete arrangements of this kind was erected under the supervision of Dr. Liebig (not the chemist) at Reichenhall, Bavaria; and he has since communicated the results of his large experience to the *Aerztliches Intelligenz-Blatt* of Munich. The portable apparatus now most used is that of Waldenburg (*der transportable pneumatische Apparat*). This consists of an outer cylinder containing some water, and an inverted inner cylinder containing air, which fits into the outer one. Obviously the air within may be condensed or rarefied by lowering or raising the inner cylinder, which is easily effected by applying weights. A mercurial manometer indicates the degree of condensation, and a water-gauge the height of the water. With the air-chamber a flexible tube, having an oro-nasal mask attached, communicates. With this apparatus the patient breathes either condensed or rarefied air at the will of the operator. The author has had arranged for his own use a pneumatic apparatus which can be employed for inhalation of compressed or rarefied air, and for the atomization of liquids. It is only available in cities where a sufficient water-pressure can be obtained. It consists of a brass cylinder strongly made, and containing at the top a stop-cock and pipe for the admission of water, and at the bottom a stop-cock and pipe for drawing off the water. At the top, also, there is a stop-cock and pipe for the attachment of the flexible tube and oro-nasal mask, and a gauge for registering the pressure. The admission of water effects the compression of the air; its removal—all the stop-cocks being closed—effects the rarefaction. Precisely the same results can be attained as in the more complicated arrangement of Waldenburg. Furthermore the author's apparatus can be employed as an atomizer, using compressed air or steam.

The applications of compressed air are numerous and important. The results are chemical and mechanical. The chemical effects are due to the increased supply of oxygen; the mechanical, to the distribution of the blood-pressure. In *anæmia*, *chlorosis*, *amenorrhœa*, in the *neuralgia*, especially of the fifth nerve, *headache*, *epistaxis*, in *gout*, *diabetes*, *obesity*, etc., very excellent results are obtained by the use of compressed air—which means the increased consumption of oxygen. To achieve all that is possible to effect in these cases, the treatment must be continued for a considerable time.

It is, however, in certain cardiac and pulmonary affections that the pneumatic treatment is especially commended. *Acute catarrh*, nasal, faucial, bronchial, if early applied; *chronic bronchitis*, with or without *emphysema*, *capillary bronchitis*, *atelectasis*, *asthma*, *dilatation of*

the right cavities, and fullness of the venous with ischæmia of the arterial system, are conditions in which the compressed air is signally beneficial. Probably in emphysema, more than in any other malady, has the relief afforded by this treatment been most conspicuous; for this is a disease which has hitherto offered few results to therapeutical skill. "Die Expiration in verdünnter Luft ist das spezifische mechanische Antidot des Emphysems," is the dogmatic statement of Waldenburg—"Expiration into rarefied air is the specific mechanical antidote to the emphysematous affections."

The rules for the inspiration and expiration of rarefied and condensed air respectively may be formulated as follows:

As inspiration of condensed air increases the intra-thoracic air-pressure, it impedes the flow of blood to the right auricle, and lessens somewhat the pulse-rate, and is accordingly indicated in cases of dyspnoea having a mechanical origin, in incipient phthisis, in asthma, bronchitis, and in insufficiency of the mitral.

As inspiration of rarefied air has the opposite effects to those of condensed air, its use is indicated in the few cases in which increased inspiratory power is desirable, as in contracted thorax, the result of effusion.

Expiration into condensed air increases the expiratory power when deficient, and expiration into rarefied air is indicated in emphysema and chronic bronchitis.

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MASSAGE.

DEFINITION.—The term *massage* is probably derived from the Arab word *mass*, which signifies "to knead." The French word *massage* is equivalent to the term shampooing, and is applied to a process of rubbing, friction, and percussion of the body. *Masseur* is a male rubber, and *masseuse* a female rubber—that is, persons who make a business of massage.

METHOD.—Massage by friction consists in rubbing, rolling under the fingers, and gently pinching the skin, and rubbing, tapping, kneading, and exercising the muscles and joints. Beginning at an extremity, the foot for example, the skin is taken up between the thumb and

fingers and rolled and pressed; then the muscular masses are well grasped, rolled and pressed and kneaded, and rapidly tapped a quick succession of light blows; and then each articulation is in turn put through all of its motions. Even the muscles of the neck and the interossei may be subjected to the same treatment, with a little address and painstaking. In fact, no part of the body should be omitted except the face.

Massage by percussion alone consists in applying to various parts of the body a very rapid succession of short blows, not forcible enough to cause pain. The blows or taps may be made with a wooden spatula, with the fingers as arranged for percussion, or with the lateral margin of the hand fully extended.

Dr. Mortimer Granville has accomplished notable results in the treatment of neuralgia by rapid percussion over the trajectory of the nerves affected. He has devised a small instrument for this purpose, called *percuteur*. The curative results of this delicate percussion are attributed by Granville to a modification in the nerve-molecules.

PHYSIOLOGICAL EFFECTS.—The good effects of massage are popularly ascribed to electrical or supernatural agency. That electrical currents are induced by massage is true, but the curative effects are attributable to other agencies.

The effects of massage are: 1, local; 2, systemic.

1. The masseur or rubber puts forth more or less muscular power, which at the points of contact or friction develops or is transformed into another mode of motion—heat. The action thus induced in the constituent tissues of the parts operated on, also serves to elevate the temperature. The vessels dilate and an increased quantity of blood enters them, and the motion of the blood-current is accelerated. The immediate effect of these changes is to promote the nutritive energy of the tissues subjected to friction. This result is seen in the improved color, warmth, and volume of the parts.

2. A general rise of temperature, equal in most instances to one degree, has been observed to take place quite uniformly (Mitchell). The body increases in weight; all the organic functions are performed with more energy, and power is gained in every way. Massage in its several forms exercises peculiar effects on the nervous system, which should not be overlooked. When an inflamed part which can be manipulated, a joint for example, is rubbed with excessive gentleness, the sensibility, which was at first so acute that every touch gave pain, rapidly subsides, until, after an hour of friction, it may be handled with some roughness, without evoking painful sensations. When the local condition is that of pain merely, it is remarkable how the acutest suffering is alleviated by persistent friction of a gentle kind. Again, the state of spasm of a muscle is relieved and relaxation induced by persevering rubbing of the affected muscle. Results such as these are

explicable only on the theory that the gentle titillation of the cutaneous branches of the nerves (end-organs) has so far lowered their irritability that they cease to receive and transmit painful impressions. The rapid and long-continued transference to the centers of conscious impressions of the gentle titillation of the end-organs allays the irritability of the center, so that, if pain be transmitted, it excites no reaction, and therefore is not realized.

THERAPY.—Obstinate *wakefulness and nocturnal restlessness* may often be relieved by massage of pressure or percussion. Very gentle and long-continued friction of the extremities, especially of the lower extremities, is necessary, or corresponding tapping. Simple *headache*, even severe paroxysms of *neuralgia*, and the spasms of *tic douloureux*, are often most surprisingly relieved by, at first, exceedingly delicate frictions of the end-organs of the fifth—the skin of the face, forehead, neck, and the scalp—and subsequently stronger rubbing of the same parts. The same method has been effective in *hemicrania*, *migraine*, and *spinal pain* (Westerlund, Graham, Putnam, and others). Next to electricity, massage is the most useful remedy we possess in the treatment of *infantile paralysis* and other wasting palsies, after the acute symptoms have subsided. In *hemiplegia* and other forms of paralysis due to intra-cranial lesions, the indications for the treatment by massage are a lowered state of the nutrition of the paralyzed parts, coldness and blueness of the skin, wasting and contracted muscles, ulcerations, etc. In *progressive muscular atrophy*, much more may be accomplished by persistent frictions and kneadings of the wasting muscles. The treatment should be begun early, and the first indications—pain, fibrillary trembling, weakness, etc.—require the massage, without waiting for obvious wasting. Of course, any treatment is useless when the wasting has proceeded so far that no muscular elements remain.

Probably massage has accomplished more conspicuously good results in *chronic joint affections, synovitis, contractions and deformities, and thickening from inflammatory deposits* (Berghmann and Helleday, Billroth, Mosengeil, and others). It is in this class of cases that healers, natural bone-setters, and other empirics sometimes achieve surprising success in the face of failures by regular surgeons. The author therefore especially urges on young surgeons and physicians the extraordinary utility of massage in this group of cases, and the great results which can be achieved by it, when sections of muscles, tendons, and cicatrices may appear to be imperatively demanded. In many cases patient and long-continued use of the method may be required.

In the hands of Weir Mitchell, massage has proved of surprising benefit in cases of the so-called *spinal irritation*, with its protean manifestations in the nervous, muscular, digestive, and sexual systems.

He uses it as a means of promoting the nutrition of the body generally, and of the muscular system particularly, while he maintains the body in a condition of nearly absolute rest.

As the results obtained have been surprisingly great, it were better to indicate with some particularity the kind of cases to which massage seems best adapted, and we can do no better than employ the graphic language of Mitchell: "It includes that large group of women, especially, said to have nervous exhaustion, or who are described as having spinal irritation, if that be the prominent symptom. To it I must add cases in which, besides wasting and anæmia, emotional manifestations predominate, and which are then called hysterical, whether or not they exhibit ovarian or uterine disorders. Nothing is more common in practice than to see a young woman who falls below the health-standard, loses color and plumpness, is tired all the time, by-and-by has a tender spine, and soon or late enacts the whole varied drama of hysteria. . . . But no matter how it comes about, the woman grows pale and thin, eats little, or, if she eats, does not profit by it. Everything wearies her—to sew, to write, to read, to walk—and by-and-by the sofa or the bed is her only comfort."

"In the treatment of these, massage plays an important part. Rest, electrical excitation and exercise of the muscular system, systematic feeding, are employed in conjunction with massage."

How far the results in the treatment by massage are affected by psychical impression has not been ascertained. The separation of these patients from home influences and associations, the confinement to bed, and the novel treatment, combine to affect the imagination profoundly, and to arouse hope and expectation to the highest point. In the class of cases described by Mitchell, these mental influences are powerful factors both in causing and curing morbid mental states. In illustration may be quoted Davy's celebrated case of paralysis cured by the mere application of the thermometer, and the remarkable recoveries which occurred under the religious ministrations and prayers of Prince Hohenlohe.

The extraordinary effects produced by the application of certain metals in hysterical subjects (Burq's Metallotherapy) may also be quoted in illustration. The results obtained by Charcot from metallotherapy have been even more remarkable than the cures effected by Mitchell with massage.

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DIGESTION-FERMENTS.

Pepsin.—*Pepsina vel pepsinum*; *pepsina porci*; *pepsine*, Fr.; *Verdauungsstoff*, Ger.

DEFINITION.—A ferment obtained from the mucous membrane of the stomach of the pig. There are two processes worthy of mention for obtaining the ferment: Scheffer's, and Prof. Lionel S. Beale's. By Scheffer's process the mucous membrane is digested in a solution of muriatic acid, and the pepsin precipitated with chloride of sodium. Beale directs that the mucous membrane be first cleansed and then scraped strongly with an ivory knife, so as to remove the contents of the gastric glands. The pepsin is contained in the very viscid mucus which is thus removed. When spread on clean glass in a very thin layer, it is dried at a temperature not to exceed 100° Fahr., and in the vapor of hot water or over sulphuric acid.

PREPARATIONS.—*Pepsinum Saccharatum.*—Pepsin and sugar of milk. "One part of saccharated pepsin dissolved in 500 parts of water acidulated with 7.5 parts of hydrochloric acid should digest at least 50 parts of hard-boiled egg-albumen in five or six hours, at a temperature of 100° to 104° Fahr." Dose, ℥j—3 ij.

Liquor Pepsini.—Solution of pepsin is composed of saccharated pepsin in solution in water and glycerin, and acidulated with hydrochloric acid. Dose: a teaspoonful *ter in die*, usually after meals. The wine of pepsin is an unscientific preparation, and should not be prescribed. Boudault's (really Corvisart's) compound nutritive powder, consisting of pepsin, starch, and lactic acid, is an exceedingly uncertain preparation, and is often totally inert. Only those preparations of pepsin should be used, made by the processes above described, especially those of E. Scheffer, of Louisville, Ky. The saccharated pepsin and the glycerole are practically unchangeable.

INGLUVIN.—This is a preparation from the gizzard of the domestic chicken—*ventriculus callosus gallinaceus*. Dose, gr. v—℥j.

Ingluvin has the remarkable property of arresting certain kinds of vomiting—notably the *vomiting of pregnancy*. It is a stomachic tonic, and relieves *indigestion*, *flatulence*, and *dyspepsia*.

The author's experience is confirmatory of the statements which have been put forth regarding the exceptional power of this agent to arrest the vomiting of pregnancy. It can be prescribed in inflammatory conditions of the mucous membrane, as it has no irritant effect. Under ordinary circumstances, and when the object of its administration is to promote the digestive function, it should be taken after

meals. When the object is to arrest the vomiting of pregnancy, it should be given before meals.

Recent investigations have shown that ingluvin owes its curative effects, not to any ferment corresponding to pepsin, but to a *peculiar bitter principle*. This result is the more satisfactory, since such an organ as the gizzard could hardly furnish the necessary quantity of a digestive ferment to effect the changes now known to be produced by ingluvin.

PANCREATIN. PANCREATIC EMULSION. LIQUOR PANCREATICUS.—Pancreatin is the ferment of the pancreas. Under the name *pancreatic emulsion* it has long been used as a means of promoting intestinal digestion, especially the digestion of the fats. The most effective preparation is *liquor pancreaticus*, obtained by digesting minutely divided fresh pancreas with a weak alcoholic solution. As too much alcohol injures the ferment, and too little will fail to prevent decomposition, it is a nice point to determine the amount most suitable. Five per cent of alcohol is probably a near approximation to the proper amount. Pancreatin differs from pepsin in that its action is promoted by an alkaline condition, and destroyed by strong acidity. In the presence of an alkali it has the power to convert proteids into peptones, to emulsionize fats, etc. As acids destroy pancreatin, it follows that the liquor pancreaticus should not be given while stomach digestion is going on, but when the chyme has entered the intestine, in about three hours after the taking of food (Roberts).

In cases of very weak digestion, Roberts suggests the employment of "peptonized" foods—i. e., foods that have been acted on by pancreatin and the proteids converted into peptones. The following formulæ proposed by Roberts will be found useful in some conditions of disease :

"Peptonized Milk.—A pint of milk is diluted with one fourth water, and heated to 140° Fahr. Two or three teaspoonfuls of liquor pancreaticus, and ten to twenty grains of bicarbonate of soda, are then mixed therewith. The mixture is then poured into a covered jug, and the jug is placed in a warm situation under a 'cozy' in order to keep up the heat. At the end of an hour or hour and a half, the product is boiled for two or three minutes. It can then be used like ordinary milk."

"Peptonized Gruel.—Gruel may be prepared from any of the numerous farinaceous articles which are in common use—wheaten flour, corn-meal, oatmeal, arrow-root, sago, pearl-barley, pea-flour. The gruel should be very well boiled, and made thick and strong. It is then poured into a covered jug and allowed to cool to a temperature of about 140° Fahr. Liquor pancreaticus is then added in the proportion of a tablespoonful to the pint of gruel, and the jug be kept warm under a 'cozy' as before. At the end of a couple of hours the prod-

uct is boiled and finally strained." In this process the starch is converted into sugar, and the albuminoid matters are peptonized, whence the gruel assumes a thin, watery consistence. Peptonized gruel is administered with peptonized milk.

"Peptonized milk-gruel is prepared as follows : Gruel is prepared in the usual way, thick and strong ; to this while boiling is added an equal measure of milk. To each pint of the mixture add two or three teaspoonfuls of liquor pancreaticus and twenty grains of bicarbonate of sodium. It is kept warm for a couple of hours, then boiled for a few minutes and strained."

Papaiva or Papain.—MM. Wurtz and Bouchut have given this name to a ferment obtained from the *Carica papaya*. On incising the green plant, a milky juice exudes. This juice is white, slightly astringent, but not acrid, and contains the ferment *papain*, which being soluble in alcohol, may by this means be separated. Papain has very active digestive power, effecting the solution of albuminous substances in a short time. It is found to be an active solvent of false membrane ; of the intestinal worms, ascarides and tæniae. That it is a true ferment, with power to convert albuminoids into peptones, is denied by Catillon. Although it may not properly be substituted for pepsin in stomachal affections, it may be utilized as a solvent in the maladies above mentioned—false membrane of *diphtheria*, *ascarides vermiculares*, *tape-worm*, etc.

ANTAGONISTS AND INCOMPATIBLES.—Alkalies and the mineral salts which precipitate pepsin from its solutions (mercury, lead, zinc, and copper salts), tannic and gallic acids, creosote, etc., are incompatible. Alcohol and the various alcoholic liquors, in sufficient strength, destroy the activity of pepsin ; hence the wine of pepsin must be an uncertain preparation.

SYNERGISTS.—Lactic and chlorhydric (muriatic), acetic, citric, and malic acids, promote the digestive activity of pepsin. Certain ferments, as ptyalin, pancreatin, extracts of malt, etc., also increase its activity.

PHYSIOLOGICAL EFFECTS.—Ten grains of the saccharated pepsin, prepared by the process of Scheffer, will dissolve 120 grains of coagulated albumen in four to six hours, at a temperature of 100° Fahr. Pepsin is an essential constituent of the gastric juice, and possesses the property, especially in the presence of lactic and chlorhydric acids, of digesting the nitrogenous constituents of the food (casein, albumen, fibrin, etc.), and converting them into *peptones*.

THERAPY.—Pepsin is, of course, indicated in *stomach-disorders* characterized by a deficiency of this essential principle. As Fenwick has shown, the amount of pepsin secreted by the gastric glands undergoes great diminution in various morbid states, as in cancer, diabetes, typhoid fever, and heart-disease. In convalescence from *fever*,

therefore, pepsin is indicated, and in the incurable morbid states, mentioned above, it serves a useful purpose in maintaining the function of digestion. Fox "bears strong testimony in favor of pepsin" (p. 74) in cases of *atonic dyspepsia* and "irritative states of the mucous membrane." He prefers to administer it with chlorhydric acid. In the *atonic dyspepsia of phthisis* pepsin is highly beneficial, especially when given in connection with pancreatic emulsion. In other forms of dyspepsia, accompanied by imperfect solution of the fats and the formation of fat-acids, the addition of pancreatic solution greatly increases the activity of pepsin (Long).

In the *apepsia* of infants (Barthez), especially occurring in those artificially fed, great benefit is derived from the use of pepsin. Dr. Cummins has seen many apparently hopeless cases recover under its use, and he regards it as so valuable that he never recommends a wet-nurse, but relies on artificial food, the digestion of which is aided by the administration of pepsin. Corvisart used his nutritive powder (the so-called Boudault's pepsin) with happy effects in the same cases; and Barthez, who applied the term *apepsia* to this inability of infants to digest their proper aliment, has been equally successful in the same mode of treatment. The saccharated pepsin should be administered in these cases in doses of ten to thirty grains immediately after the child has taken its milk or other food, or thirty minims of the glycerole of pepsin at the same time. It is better, according to M. Barthez, to give pepsin without acid to infants (Trousseau et Pidoux).

Pepsin is one of the remedies which have been used with success in the *vomiting of pregnancy*.

By facilitating digestion, pepsin relieves the pain and distress caused by deficient elaboration of the foods; hence its utility in relieving the heaviness and torpor which are felt during the progress of digestion in some subjects, and also the *gastralgia* which is produced in this way.

According to Hollman, the use of pepsin is attended with beneficial results in *anæmia*, *chlorosis*, *atrophy*, and allied states, due, no doubt, to the better preparation of the peptones for absorption into the blood.

In *chronic ulcer* of the stomach and in *cancer* of this organ, pepsin, by facilitating digestion, will diminish the distress of the patient, and will contribute to the cure of ulcer and prolong life in cases of cancer.

Very great success has been attained in the treatment of *diarrhœa in infants* by pepsin. The form of diarrhœa amenable to this remedy is due really to an atonic state of the intestinal mucous membrane. Every motion contains half-digested food. Soon after taking milk or other food, the child becomes uneasy and a discharge takes place. Frequently undigested food is vomited as well. If this condition of

things continues for any considerable time, the child emaciates, and the skin wrinkles and becomes dry and harsh. The motions will be quickly changed in character, and the nutrition of the child improved, by giving pepsin immediately after each supply of food. Facts in illustration of this statement have been published by Corvisart, Barthez, Rilliet, Trousseau et Pidoux, Ellis, of Dublin, Davidson, of Liverpool, Hawley, of Brooklyn, and others.

In cases of entire inability of the stomach to digest food, or when surgical operations or accidental injuries prevent the introduction of aliments into this viscus, *pepsin is added to the nutritive enemata* in order to insure the preparation of peptones for absorption. Mr. Malcolm Morris reports the cure of an obstinate case of *eczema* by the administration of papain. It was due to indigestion, it is probable.

Pepsin and papain are also applied to certain local uses. After the publication of Broadbent's results from the injection of acetic acid into cancerous tumors, Thiersch and Nussbaum introduced the method of gastric-juice injections into the substance of morbid growths. The gastric juice of the pig carefully filtered, or a slightly acidulated solution of pepsin, may be employed for this purpose. The injection should be made with a hypodermatic syringe, and the solution should be deposited well into the interior of the tumor. This practice may be useful in cases of fatty tumor or other benign growths, when from any cause extirpation may not be practicable. That malignant tumors may be retarded in growth by this practice is also quite probable, unless the neighboring lymphatics are involved.

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ACIDS.

Acidum Lacticum.—*Lactic acid*; *acide lactique*, Fr.; *Milchsäure*, Ger.

PROPERTIES.—It is an acid, sirupy liquid, which contains 75 per cent of absolute lactic acid, and has a pale wine-color. Specific gravity, 1.212. It mixes in all proportions with water, alcohol, and ether.

INCOMPATIBLES AND ANTAGONISTS.—Alkalies and the mineral salts.

SYNERGISTS.—Pepsin, sodium chloride, vegetable acids, chlorhydric acid, etc.

Dose.—Fifteen minims to 3 ss in water before or after meals, according to the conditions present.

PHYSIOLOGICAL ACTION.—As lactic acid is a frequent constituent of the gastric juice, it has undoubtedly an important function in connection with digestion. Used medicinally, it promotes the appetite and facilitates digestion. In large doses (3 j) it gives rise to epigastric pain, flatulence, and loss of appetite. As lactic acid is one of a series of homologous acids, containing butylactic, valerolactic, and leucic acids, it is not improbable that some of these may result from its oxidation when administered in excess. It probably combines with bases and forms lactates, for it displaces not only the volatile but some of the mineral acids from their combinations. Chemical investigations have indeed confirmed this, for, besides free lactic acid, lactates have been found in the gastric juice. It is not known definitely whether free lactic acid occurs in the blood in the healthy state, but it certainly does in some morbid conditions. According to Lehmann, lactates are rapidly converted into carbonates in the blood. Free lactic acid, as was long ago shown by Berzelius, is found in muscular fluid, and has also been detected in the spleen by Scherer. Although it is not always a constituent of normal urine, yet, when the supply of lactates to the blood is considerably beyond the oxidizing power of the blood, it has been found (Lehmann). Scherer has shown also that lactic acid is present in the exudates of puerperal fever.

Lactic acid has the power to dissolve a considerable quantity of freshly-precipitated phosphate of lime.

The suggestion made by Prout, of a relation between an excess of lactic acid in the blood and rheumatic inflammation, received a remarkable confirmation in the experiments of Richardson, who produced endocardial inflammation by injecting lactic acid into the peritoneal cavity of dogs. Further confirmation of this connection has been afforded in the attacks of acute rheumatism which have occurred in subjects of diabetes treated by lactic acid.

THERAPY.—Solutions of lactic acid are of great utility as *solvents of false membrane*. Since the comparative demonstration of solvents

made by Bricheteau and Adrian, it has been employed successfully by Dr. Weber, of Darmstadt, and Dr. Dureau, in *croup*, applied by means of a *pulverisateur* in the strength of thirty to forty drops to the ounce (Waldenburg), and is also advocated by Morell Mackenzie and Lennox Browne. The following is the formula used by Mackenzie at the London Throat Hospital: ℞ Acidi lactici, ʒ ijss; aquæ destil., ʒ x. M. This may be used in a spray-producer, or be applied on a mop to the affected part. It is unquestionably an excellent solvent of the exudation of *diphtheria*, as the author has frequently observed. It may be used also as a gargle when the exudation does not extend beyond the tonsils and the pillars of the fauces. For this purpose sufficient acid may be added to water to give a distinctly sour taste. As the application is free from danger, it may be used as often as every half-hour. When used in the form of spray, care must be had to prevent the acid hurting the eyes.

It is chiefly in *atonic dyspepsia* that lactic acid is employed. In this condition lactic acid is, so to speak, a physiological remedy, for we supply it artificially because the stomach is unequal to the task of producing it. Generally, it is advisable to combine pepsin with it thus: ℞ Liq. pepsinæ, ʒ xij; acidi lactici, ʒ iv. M. A teaspoonful three times a day after meals is a proper dose for an adult. In the *apepsia* of infants, characterized by the presence of undigested aliment in the discharges, this combination is an excellent remedy. If a marked degree of acidity exists, the acid should be omitted, or given before the milk, when it may prevent the excessive production of acid. In *irritative dyspepsia*, when the pain and suffering are due to slow and imperfect digestion, lactic acid will often give great relief, either alone or combined with pepsin. Cases of *acidity* and *heartburn* are often quickly relieved by lactic acid given *before meals*. When the presence of an excess of the *phosphates*, *uric acid*, and *the urates*, and of *oxalate of lime*, in the urine, is due to imperfect digestion and faulty assimilation, as is frequently the case, lactic acid is serviceable. Dr. Deecke advocates the use of lactic acid in *chronic cystitis*, as a means of arresting the ammoniacal decomposition of the urine, a condition in which he holds it to be very effective.

Lactic acid has been used with varying success in the treatment of *diabetes*. The object to be gained is the prevention of sugar formation from the starchy and other elements of the food. Dr. Foster reports some cases apparently decidedly benefited, and Dr. Ogle gives an account of two cases in which no good results were attained. Cases have been lately reported in which the patients were improved by the use of lactic acid, but on the whole the utility of this agent in diabetes must be held to be as yet *sub judice*.

Disappointment in the use of lactic acid is frequently experienced from the poor quality of the drug.