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# PEPSIN:

ITS

## PHYSIOLOGICAL AND THERAPEUTICAL ACTIONS.

REMARKS MADE BEFORE THE NEW-YORK MEDICAL  
JOURNAL ASSOCIATION.



By J. S. HAWLEY, A.M., M.D.,

GREENPOINT, N. Y.

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# AMERICAN PEPSINE.

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TO  
PHYSICIANS  
AND  
DRUGGISTS.

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The subscriber begs leave to call your attention to his preparations of PEPSINE, which, to distinguish from the almost universally used French and English preparations, he will call American Pepsine.

Pepsine is useful in all cases of indigestion from debility of the stomach, from general debility, from excesses in the use of food and stimulants; in convalescence from all prostrating diseases, in inanition, diarrhœa, and marasmus of infants; in cases of habitual vomiting of food and in the vomiting of pregnancy. In fine, in all cases in which nutrition does not keep pace with the degeneration of tissue.

The preparations now offered to the profession are made by a process differing essentially from that practiced by M. Boudault, of Paris, and to be preferred, in that it is more economical and yields a product less disagreeable and more fully representing gastric fluid. When it is remembered that the organic principle PEPSIN is destitute of color, and possesses but a faint odor, the absence of these qualities in American Pepsine will need no explanation.

As no OFFICIAL standard for the strength of Pepsine is recognized, the preparation of M. Boudault, the most favorably and extensively known of all preparations, will be assumed as a standard of comparison.

The following are the forms in which the remedy will be offered :

## 1st. POWDERED PEPSINE.—Dose, 15 grs.

This, the analogue of Boudault's "Poudre Nutrimentive," is the most active preparation of Pepsine ever yet offered to the profession, as well as the lowest in price. Its superiority in digestive power over the most popular and most approved article of foreign Pepsine will appear from the following comparative test:

In each of three test tubes were placed two drachms of finely minced beef one ounce of water, five drops of hydrochloric acid, and respectively five grs., of American, French (Boudault's), and English (Morson's Pepsina Porci) Pepsine. The tubes were then placed in a water bath at 100° F. frequently shaken. When digestion was supposed to be completed, the Peptone and nearly digested portions of beef were washed away through a sieve, and the residue desiccated to dryness, to avoid any error in estimating the moisture. The amount of undigested beef remaining after digestion in

American Pepsine was.....	5 grains.
French " .....	10 "
English Pepsina Porci was.....	10 "

This test has been repeated many times with similar results. As the only value of Pepsine is its digestive power, clearly that which digests the most is the best.

## 2d. PULVERIZED PEPSINE IN DOSES,

Is put up in boxes containing 16 and 32 powders of 15 grs. each, equivalent, respectively, to half an ounce and one ounce.

## 3d. PEPSINE LOZENGES.--Dose 3.

These are put up in boxes containing 4 dozen lozenges, or 16 doses.

## 4th. LIQUID PEPSINE.--Dose 2 to 4 drachms,

This is a very active and convenient preparation and a true equivalent of the gastric juice. It is prepared after a modification of Dr. Pavy's method. One drachm is equal to five grains of Pepsine.

## 5th. WINE OF PEPSINE.—Dose 2 to 4 drachms.

This is not rennett wine produced by the maceration of the stomachs of animals, but a true wine of Pepsine, made by dissolving pure, freshly made Pepsine in sherry wine, in fixed and constant proportions. It is an efficient and agreeable form for the administration of the remedy, particularly where a stimulant is indicated. Each drachm equals five grains of Pepsine.

## 6th. GASTRIC PEPTONE,

This is the name given by physiologists to albuminous substances after they have undergone gastric or pepsine digestion, and thereby become fitted for absorption into the circulation, and to perform their office in nutrition.

This article of Peptone consists of fresh lean beef artificially digested by American Pepsine. It differs from beef tea and other extracts of meat, in that it contains ALL the albumen and fibrin of the beef (of which they are destitute), and all its other elements DIGESTED, in other words ready to be received into the circulation and perform their office in nutrition without further digestion. It is therefore adapted for the nourishment of the sick in all cases of extremity, viz., the lowest stages of typhus and typhoid fevers; in marasmus, rachitis, and the emaciating stage of consumption; in cancer of the stomach, and where it becomes necessary to support life temporarily by injections. In fine, Peptone is useful in all cases in which the functions of the stomach are greatly impaired by disease or destroyed by local organic affections.

It is obvious, therefore, that it may be the means of prolonging and even saving life in cases where the result depends upon nutrition.

## DESCRIPTIVE PRICE LIST.

### AMERICAN PULVERIZED PEPSINE

Is put up in one oz. bottles, which are packed in paper boxes, containing a half or a whole dozen.

1 Ounce.....	\$1 50	} Net.
1 Dozen Ounces.....	15 00	
3 Dozen Ounces.....per doz.	12 75	
6 Dozen Ounces, or more.....per doz.	12 00	

1 lb. and  $\frac{1}{2}$  lb. packages 5 per cent. less than the above rates on equivalent quantities.

### PULVERIZED PEPSINE IN DOSES.

1 Ounce (32 powders) in one box.....	\$1 60	} Net.
1 Dozen Ounces (12 boxes).....	16 20	
3 Dozen Ounces.....per doz.	13 95	
6 Dozen Ounces, or more.....per doz.	13 20	

### PEPSINE LOZENGES.

1 Box (4 doz. lozenges), 16 doses.....	\$0 80	} Net.
1 Dozen Boxes.....	8 10	
3 Dozen Boxes.....per doz.	7 00	
6 Dozen Boxes.....per doz.	6 60	

### LIQUID PEPSINE AND WINE OF PEPSINE

Are put up in pint and half pint bottles each in a separate box.

Single pints.....	\$2 00
One Dozen Pints.....	20 00 Less 20 per cent.
Half Pints, 5 per cent. additional.	

Any of the above preparations will be put up in bulk, and sold 5 per cent. less.

## GASTRIC PEPTONE.

1 Pint.....	\$2 25	
1 Dozen Pints.....	22 00	Less, 20 per cent.

One of the greatest obstacles to the general use of Pepsine in medical practice, has undoubtedly been its high price. Physicians can see by the above list at what prices dispensing druggists can obtain my preparations, and can easily judge at what price they ought to be dispensed.

Druggists should remember that Pepsine is a remedy which requires to be administered **FREELY**, and often for a **LONG TIME**, therefore it should be dispensed at a less profit than other remedies which are more sparingly given.

The writer has placed his preparations far below the price of similar articles, for the purpose of encouraging their general introduction into practice. That they are **SUPERIOR** as well as **CHEAPER**, may be demonstrated in practice by any observing physician, or in the laboratory by any careful pharmacist.

American Pepsine has already been introduced into the principal hospitals of New York and Brooklyn with satisfactory results, and numerous physicians have taken pains to express their high appreciation of its value.

Each batch of these preparations is subjected to a digestive test before it is put into bottles, and if not up to standard is increased in strength.

J. S. HAWLEY, M. D.,

GREENPOINT, BROOKLYN, N. Y.

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### FOR SALE BY

- JAMES S. ASPINWALL, 86 William street, New York.  
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PETER, POWERS & COOPER, 272 Maine street, Louisville, Ky.

# PEPSIN;

## ITS PHYSIOLOGICAL AND THERAPEUTICAL ACTIONS.

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THE primary object of these remarks is to bring together, in compact and available form, what is known of Pepsin, physiologically and therapeutically. Although modern physiologists have elaborated the subject to a high degree of completeness, yet the physiological knowledge is purely scientific and has no relation to practical medicine.

I purpose, on this occasion, very briefly to enumerate the .

### PHYSIOLOGICAL FACTS,

and then somewhat more at large to develop the therapeutical relations, and relate a sufficient number of cases, not only to elucidate the subject, but to afford a guide to the practical application of Pepsin to the treatment of disease. No originality is aimed at, only the humble task of collecting, in a somewhat connected form, what is really known, and of putting the labors and experiences of others into an available shape.

Secondarily, it is my desire to call the attention of this Association, and through it, of the medical profession, to an article of Pepsin of domestic manufacture believed to be of good quality and superior to the foreign.

The fact that food taken into the stomach was reduced to a pul-taceous condition by a solvent fluid poured out from the walls of the organ, was demonstrated by the experiments of Reaumer and Spalanzani in the latter part of the eighteenth century. Previous to that time the food was supposed to be triturated by the contractile movements of that viscus. This discovery gave a new direction to investigation. It was at length ascertained that the gastric fluid performed the office of digestion only for a portion of the aliment, viz., the albuminoids. This fluid, although the principal, not the only digester, has been found to be a compound substance, the most important elements of which are a peculiar organic substance called Pepsin and an acid secretion. The acid is now believed, by recent physiologists, to be the hydrochloric,

though there are not wanting respectable names who still advocate the view that the lactic is the natural acid of the stomach. The organic body or ferment is in itself destitute of digestive power, its activity being developed only by the addition of this acid. Experiment, however, has proved that any acid will awaken this dormant quality of the Pepsin, and we may therefore infer that the acid compound is not necessarily the same under all circumstances in the living organism. The proportion of Pepsin in the gastric juice is very small (17 parts in 1,000); in other words, a small amount of Pepsin gives digestive activity to a large quantity of acidulated fluid.

Pepsin is a protein body, differing from other protein substances in the greater amount of nitrogen it contains. It differs from albumen in not being precipitated from its solutions by the same reagents. It is entirely soluble in cold water, but, according to Dunglison, not in hot water. It is precipitated from its watery solution by alcohol and by the salts of lead without impairing its activity.

The temperature has a remarkable influence over the activity of Pepsin. Low temperatures suspend its action. At the ordinary heat of the atmosphere it acts feebly. At about  $100^{\circ}$ , or the temperature of the body, it acts vigorously. Above that temperature its action is temporarily increased and finally destroyed. The degree of heat which will destroy its activity is supposed to be about  $120^{\circ}$ .

Certain substances suspend its digestive power. Among these are alkalis, strong alcohol, concentrated acids, and bile; this latter substance completely and permanently destroys its activity.

Another remarkable quality of Pepsin is its inaptitude for putrefaction, as well as its ability to arrest the putrefactive process when it has already begun. The manner in which Pepsin effects the solution of albumen is not definitely settled. That it is not a chemical process is evident from the fact that albuminose or peptone does not differ in chemical composition from albumen, and that the Pepsin remains after the act of digestion has been completed; that is, neither substance is destroyed and no new substance is formed, which is always the result of a chemical combination. Dr. Brinton believes the change effected in albumen by the action of Pepsin to be of the nature of hydration—not a simple solution, but an intimate alliance between the albumen and the water, which the presence of Pepsin alone is able to produce. That it is a chemical union of *very low grade*, which

does not alter the composition of either substance, but produces a union so intimate as to create new qualities without change of composition.

On the other hand our eminent countryman, Prof. J. C. Dalton, regards the process as a catalysis; the contact of the Pepsin with the food inducing a change of quality by rearrangement of particles, but not a change of composition. After an acidulated solution has become saturated by albumen, or in other words has digested all the albumen it is capable of, the peptone may be separated by dialysis, and the same Pepsin will again digest another equal amount of albumen, and so on indefinitely. This is supposed to be measurably the case in the stomach. The peptone produced by the digestive process is absorbed to some extent by the walls of the organ, thereby setting free the Pepsin to be reacidulated and to enter anew upon the digestive process.

The foregoing statements substantially set forth in very few words what is at present known of the nature and office of Pepsin in the animal economy.

We now proceed to consider Pepsin

#### THERAPEUTICALLY.

The use of this substance as a remedial agent preceded the physiological knowledge of its existence. Infusions of stomachs were in use in the time of Galen, and used by himself for indigestion. The coagula found in the stomachs of sucking animals had a place in the pharmacopœias of the 18th century, and the lining membrane of the chicken's gizzard remained officinal up to 1746, and is even now extensively used as a domestic remedy for dyspepsia.

The medical profession is indebted to the sagacity and enterprise of Dr. Lucien Corvisart, for conceiving and developing the happy thought of aiding nature in her embarrassments by the use of her own agents.

Having established the truth that aliment is converted into nutriment principally by the agency of a certain substance produced in the stomach, he conceived the idea of extracting that substance from the healthy stomachs of animals, and using it to aid the defective digestion of those in whom this function had become impaired or destroyed.

As a foundation upon which to base his clinical observations, he lays down the following propositions:

1st. That aliment is an inanimate substance, without nutritive power of itself, which would allow to starve one who could not digest it; that it is digestion which gives it vital fitness, and by virtue of which it thereafter imparts life.

2d. That the only thing necessary to perform this transformation of aliments into nutriments is acidified Pepsin.

3d. That under the influence of this physiological agent, nitrogenous aliments undergo the same physical, chemical and organic modifications as they would under the influence of the gastric juice in the stomach itself.

4th. That artificial Pepsin, aside from a different degree of force, has the same power of transforming aliment into nutriment as the gastric juice in the stomach of either carnivorous or herbivorous animals; that is to say, its digestive power is always similar; a demonstration of the highest order of interest, and upon which there rests no doubt, whether tested by physiological experiments or therapeutical results. Further, that if digestion by the aid of Pepsin can be successfully carried on in an inert bottle or pouch, so much the more in the living stomach, which imparts the natural motion and heat, although it may not secrete the digestive principle. He closes his arguments by this general proposition: "If these physiological experiments, infinitely varied, demonstrate that there is but one agent for producing digestion; that under its influence aliment always becomes assimilable; and that by the vital power which Pepsin contains, we can transform anywhere aliment into nutriment, one ought, then, by the use of the same agent, to cause those to digest and be nourished whose stomachs, by a vice of secretion, are deprived of this agent, this vital force which is indispensable." "If each paroxysm of intermittent fever interrupted by quinine, is proof of its antiperiodic power, then is each difficult or impossible digestion made easy and complete by Pepsin—a proof that it is a true digester."

In support of these conclusions, the following cases of common chronic dyspepsia, due to impaired tone of the stomach and consequent vitiated or diminished secretion of gastric fluid, are recited:

CASE 1.—Mad. M., aged fifty years, for many years troubled with a gastralgia; sense of weight and fulness in the epigastrium after meals; a severe pain in that region; acid and acrid regurgitations, and finally obstinate constipation. This lady was long treated for gastritis by free blood-letting, as well as leeches to the

epigastrium. Since I have had the care of her, I have employed bitter and iron tonics, as well as anti-spasmodics, without much success. On the 22d of August I ordered two doses of Pepsin during the day, at the beginning of each meal.

On the 23d, revisited the patient. She had suffered less indigestion; was easier; and the sense of weight diminished.

Ordered to continue the Pepsin every four hours, wishing to assure myself that the improvement was due to the Pepsin.

From the 23d to the 26th, Mad. M. had taken four doses a day, and during this time her digestion was easy, and she suffered neither sense of weight nor acid eructations. From the 26th to September 5th, she took no Pepsin. Revisited her September 2d. She said she was suffering again; the digestion was not good, and the epigastric pain had reappeared, and she demanded again the remedy before prescribed. On the 6th of September Mad. M. resumed the use of Pepsin, and continued it six successive days. September 13, her sufferings had ceased. She digested well, and visited the closet without inconvenience. From this time her digestion was always good; her sufferings never returned, and her health was perfectly restored.

The following case, reported by Dr. Landry, may be condensed into few words:

CASE II.—A young country girl, twenty years of age, had suffered from a gastro-intestinal fever, whereby her digestion became much impaired. She suffered after each meal from epigastric swelling, sensation of suffocation, eructations and gastralgia; her appetite failed, and symptoms of chlorosis appeared.

The administration of calcined magnesia after each meal, and of ferruginous preparations, produced little effect. At length I tried Pepsin. Twelve doses were given, one after each meal. After the first the digestion was without pain, and the administration of the remaining eleven was followed by the same result.

The appetite was restored, and the digestion being good, the remedy was discontinued.

The next case is one reported by Bartelot, of Paris:

CASE III.—M. D., aged thirty-six years, of a bilious-nervous temperament, and a great smoker, has suffered two years from painful digestion, and vomits every day after dinner. Light nourishment and moderation in the use of tobacco were recommended without benefit. I then directed a dose of Pepsin to be taken at breakfast and dinner, in the first spoonful of soup or

porridge. This treatment was followed ten days, and the vomiting ceased. The treatment was discontinued. Fifteen days after he came to thank me, and assured me that he was very well, vomited no more, and digested perfectly.

The following case is kindly furnished by Dr. W. F. Sanford, of the City of Brooklyn, and is of recent occurrence :

CASE IV.—Mr. S——, aged thirty-five years, called on me August 1st, 1868. He complained of most severe pain after meals, lasting sometimes for hours, a feeling as if “lead food was in his stomach,” as he expressed it, and other symptoms of severe dyspepsia.

He had some five months before been laid up for three months with a wound in his ankle, which, with his indigestion, had reduced him greatly. His surgeon had prescribed various tonics, etc., with little avail as regarded the old disease, which he said had troubled him for years. He did not regain the flesh lost during his confinement from the injury, since he was again at his business. He was to return in a day or two to the country, where he had been engaged. I ordered two ounces of American Pepsin to be taken with him, and a twenty-grain powder to be taken before each meal. Knowing him to be a most temperate and careful man in his manner of living, I gave him no directions in regard to his diet, but only to follow his own judgment. He was to report to me after he had finished the two bottles, unless better. I heard nothing of him until December 1st, when I met him, looking like a new man and joyfully expressing himself as well. I could attribute the wonderful result to Pepsin alone, since there had been no change in diet or manner of life, and no other remedy had been taken. He had even less exercise than usual, as his foot still troubled him. Dr. Sanford further says, I remember several other instances which have come under my observation, but of which I have taken no notes, in which Pepsin has produced most marked and permanent results in cases of chronic dyspepsia. One especially, in Dr. Clark's clinic in 1865, in which the results of the use of Pepsin wine were made very apparent to the Professor and class, in the case of a girl about seventeen years who had severe vomiting, etc. One week from commencing the remedy she was much better, and at the end of two weeks the vomiting had ceased and she was almost well.

CASE V.—The following case occurred recently in my own practice: George Hankinson, aged forty-six years, had been troubled with dyspepsia from early life, as shown by eructations of food,

water-brash, sense of weight at epigastrium after eating, frequent diarrhœa, with portions of undigested food in stools.

November 1, 1868.—R Am. pulv. Pepsin, grains xij. ; subnit. bismuth, grains v., before each meal.

November 4.—Is better ; less sense of weight ; less undigested food passes.

November 9.—Has had no eructations since last visit ; except on one occasion after eating fried potatoes ; no undigested food is found in the dejections.

November 18.—No symptoms of indigestion are present ; bowels regular.

More or less of flatulence continued to annoy this patient after the last date, for which neither Pepsin nor Pepsin and bismuth proved effectual.

Contempt is sometimes thrown upon the use of Pepsin as a medicine, in consequence of the small quantity of the remedy given in comparison with the large amount secreted during digestion. The force of this objection is much diminished, when we remember that a very small amount of the organic principle, Pepsin, is sufficient to give digestive activity to a large amount of acidulated fluid, and that the same Pepsin may accomplish repeated digestions after successive absorptions of peptone by the gastric walls.

Moreover, it is not necessary to suppose that Pepsin relieves indigestion only by as much as it digests food. In administering other remedies for indigestion, we do not estimate their usefulness by their digestive power, for the simple reason that they have no such power, but by their indirect influence, their effect upon innervation, thereby restoring functional activity. Is there any improbability that the natural agent of digestion should not only *supplement* the digestive power of the stomach, but also *arouse* it to activity? So far as physiological reasoning is concerned, this is much more probable than that foreign substances, as cinchona, nux vomica, and quassia, should do it. That Pepsin has an influence upon digestion far beyond its simple power to digest, is made apparent by clinical observation. How otherwise can we account for its influence over the vomiting of pregnancy? Dr. Lees, physician to the Meath Hospital, Dublin, makes the following remark: "Where there is a disgust of food you will find much benefit from Pepsin, which generally causes an appetite." Had this been said of iron, or quinine, or nux vomica, we should have

regarded it as so much evidence of their tonic effects, and why not so in the case of Pepsin?

Corvisart early called attention to the fact that Pepsin exerted a favorable influence over

### VOMITING IN PREGNANCY,

and which so often leads to disastrous effects.

CASE I.—A very remarkable case was related in 1856, by M. Teisier, Professor of Clinical Medicine at Lyons, showing the immediately beneficial effect of a dose of Pepsin in a case of vomiting during pregnancy. In this case the symptoms resisted all the ordinary methods which were employed, and the patient was unable to retain in her stomach any substance whatever. Under these circumstances the patient was brought to M. Teisier, who found her in the following condition: The vomiting had continued for two months, and she was at the end of the fourth month of pregnancy; she presented all the appearance of a skeleton, having the aspect and the cough of a phthisical subject; the pulse was 140, and M. T. thought at first that the case was one of pulmonary tubercle; finding that all treatment had hitherto been inefficacious, and that the lady was actually dying of inanition, he was seriously meditating the propriety of procuring abortion as a means of saving her life; but at last he determined to employ Pepsin. He accordingly prescribed one gramme, to be divided into two doses, and taken every day in a spoonful of broth. At the first dose the broth was retained, and from that moment the vomiting never returned. On the third day the lady ate some chicken, and then some beefsteak. She was continued in the same manner for three weeks, and at the end of that time the cure was complete, the emaciation was replaced by embonpoint, the fever and the cough ceased with the vomiting, and at the end of the ninth month the lady was safely delivered.

Dr. Gross relates six other cases in which Pepsin was employed with the same success, and thinks himself warranted in concluding that Pepsin doubtless produces good effects in the vomiting which attends pregnancy.

CASE II.—Dr. J—des Saintes writes, March 3d, 1859, that his own wife was reduced to the last degree of weakness by the sympathetic vomiting of pregnancy. May 12th, he writes: "the Pepsin which you sent produced the happiest results. The first dose entirely removed the vomiting."

CASE III.—Dr. P——, of Paris, says: Thanks to Pepsin, my pregnant patient, advanced one month and a half, and who found nothing to relieve her extreme and continued pains of gastralgia, was immediately cured. You remember I came to see you December 7th, P. M. An hour after that my patient was greatly relieved, and on the following morning even cured.

Geo. Selwin Morris, Esq., Guisbro, says: I have used oxalate of cerium in six cases lately, where sickness and retching were most urgent in pregnancy. I cannot say that I am at all satisfied with its results. It is true, three of the cases were relieved by it; but in order effectually to stay the urgent vomiting, I *was obliged to have recourse to my favorite drug (Pepsin)* in ten-grain doses.

In my own practice recently, a case occurred favorably illustrating this part of my subject.

CASE IV.—Mrs. C——, in the early stage of her first pregnancy, found herself entirely unable to retain food, even the blandest. I prescribed Am. pepsin, ten grains three times a day. Visited her on the following day, and learned that the vomiting had ceased from the time of taking the first powder. So far as I know, the vomiting never returned.

The next use of Pepsin to which I will call your attention, is in

#### DIARRHOEA OF INFANTS.

I may be excused for enforcing this part of my subject by a few extracts from a short paper written by me on this subject during the summer of 1868.

Premising that the great predisposing cause of infantile diarrhoea, is the state of evolution which the digestive system and its dependencies are undergoing during the period of dentition, the question of therapeutics becomes one of comparative simplicity, and the evident duty of the physician is to allay the irritation of the organs which is exhibited in vomiting and purging; first, by the removal of all extraneous sources of disturbance, such as food improper in quantity and quality; by protecting the skin from too sudden and frequent changes of temperature. Secondly, by sedatives to subdue the excitement which the foregoing causes may have induced, and which, in the enfeebled condition produced by the transition state, are self-propagating; and lastly, to impart to the struggling and overwhelmed digestive apparatus that assistance which will enable it to convert food from the character of a foreign, and therefore irritant material, into nutriment which

will reinvigorate the natural forces, and enable them to accomplish successfully the great and necessary evolution through which they are passing.

As sedatives to the over-excited mucous membranes and glandular system of the stomach and bowels, the preparations of opium and the salts of bismuth stand pre-eminent. When irritation without pain exists, bismuth most promptly and satisfactorily allays it, but when accompanied with pain, the addition of a minute portion of opium becomes a necessary complement to its effectiveness.

We have now briefly noticed, in outline, the first two conditions of treatment, viz. ; the removal of external causes of irritation and allaying the morbid excitement which has sprung from their agency ; and it may be asked, if the natural functions will not now resume their offices and the health of the patient be restored? Doubtless such would be the case did not the system labor under the combined effects of the transition state of dentition, and the impairment of strength due to the morbid causes above enumerated.

The *ingesta* themselves become, for want of digestive and assimilative power, irritants to the sensitive and debilitated organs. Instead of affording nutriment to fortify the system against the dangers of the crisis through which it is passing, the food going through the intestinal canal in an undigested form becomes itself an irritant, and adds another morbid cause to those already existing. This is not all ; the food does not always remain a simple, foreign substance, inducing irritation, but undergoes putrefactive decomposition, adding new and more active sources of disease.

Here the happy thought of Corvisart comes to our relief. The very function which is crippled we can replace ; the very strength which is exhausted, we can supply. By the administration of Pepsin, we at once convert the *ingesta* into nutriment. They not only cease to be irritants to the digestive organs, but are absorbed into the circulation and become sources of power instead of weakness.

A few cases will illustrate this part of my subject. The first case is one reported in the *Revue Medico-Chir. de Paris*.

CASE I.—M. X——, aged four years, was admitted into the Hospital of St. Eugénie, on the 23d day of November, 1854, under the care of M. Barthez.

For many months this child had suffered from frequent diar-

rhœa, until it was emaciated and debilitated to the last degree. The appetite was voracious, and the stools contained much undigested food. In the first place, M. Barthez tried the effect of properly adjusted diet, with small doses of trisnitrate of bismuth, but without avail. He then tried the Pepsin, giving a dose (grs. v.) at the commencement of a meal composed of the ordinary food of the hospital. On the following day, the 1st of December, the stools were of a better color, and in other respects more natural than they had been before. Encouraged by this result, the same quantity of Pepsin was ordered to be given before each meal. December 3, no stool. This was the first day, without a motion, for many months. December 4, still no stool; Pepsin discontinued. December 5, two somewhat fluid motions, although there was no change in the diet. There was, however, no undigested matter in the motions. The child was much better in every respect. Three weeks afterward the child was discharged cured.

CASE II.—Alexander Lang, born on the 2nd of August, was seized on the 25th of October with diarrhœa, after a very obstinate attack of erythema and eczema. This diarrhœa was accompanied with frequent hiccough and vomiting. On the 3d of November 8 grs. of Pepsin were given night and morning. On the 4th the same treatment was continued, and now the vomiting and purging have disappeared; the stools have become natural. Pepsin discontinued.

Nov. 22. The vomiting and purging have returned. Recourse was again had to Pepsin.

Nov. 23. The vomiting and purging have ceased, and the stools are natural. From this time the little patient went on well.

CASE III.—July 19, 1868. Thomas Kennedy, aged 15 months, has had diarrhœa a week; is fed; passages watery and contain undigested food.

℞ Am. pulv. Pepsin, subnit. bismuth, aa. grs. v. every three or four hours. The single prescription terminated the disease.

CASE IV.—July 20, 1868. John Kniester, aged 18 months, is teething; diarrhœa has existed ten days; passages very watery and frequent, and contain undigested milk.

℞ Am. Pepsin, and subnit. bismuth, aa. grs. v. every four hours. This case was also relieved by a single prescription of ten powders.

The following case has been kindly furnished by Dr. R. E. Van Giesen, of Brooklyn :

CASE V.—January 5, 1869. Called to see Mary N., aged 7 months. She has had a diarrhoea during the last two weeks. The stools are greenish fluid, of a bad odor, and number as many as four or five in twenty-four hours. The child is free from pain, has no vomiting and is tolerably well nourished, nursing from the breast. The mother has suffered from chronic diarrhoea some eighteen months; is better at times, but never entirely well. Prescribed for the child *mistura cretæ*, with bicarbonate of potassa and tinct. of kino. Under this treatment the passages were diminished in frequency, but their general character remained about the same; when the child ceases to take the remedy the passages increase in frequency.

At the end of a week, seeing no radical improvement, and suspecting that the diarrhoea might depend upon disordered digestion rather than undue acidity, the treatment was abandoned and the following prescription substituted:  $\mathcal{R}$  Pepsin (Am.)  $\zeta j$ . bismuthi subnit.  $\zeta$  ss. Make 12 powders. S. one every 3 hours. This single prescription cured the case. The mother informed me to-day (February 20), that the child had been perfectly regular ever since.

As an experiment I placed the mother upon the same treatment for her long-standing diarrhoea, having no doubt that it was to some extent aggravated by indigestion, although I do not regard this as the remote cause. The result has thus far been satisfactory; the discharges have been reduced to two in 24 hours, and her general health is decidedly better. On account of the high percentage charged for her powders, she has not carried out the treatment with regularity. I am therefore about to give her the remedy in bulk, and feel confident that she will experience much relief from its use.

The writer by no means desires to exalt Pepsin to the dignity of a specific in the diarrhoea of infants, but to bespeak for it a fair and impartial trial. It has physiological reasons in its favor, and has to some extent borne the test of experience.

Another most valuable use to which Pepsin may be applied, is as an

#### ADJUVANT TO OTHER REMEDIES

in the treatment of disease. More particular reference is now had to its power in improving and producing tolerance of cod-liver oil

in cases of pulmonary tuberculosis and other developments of the scrofulous diathesis.

I am not able to give any cases illustrating this part of my subject, but have been informed by good observers that much success has attended its use in such cases.

The last use of Pepsin, to which I will invite your attention, is in the promotion of

### ALIMENTATION IN DISEASE.

The following quotation from a lecture by Prof. Austin Flint, Sr., sets forth forcibly the importance of alimentation in disease: "The importance of this object in the treatment of individual cases of disease is to be estimated by the amount of impending danger from starvation as an incidental element. If to die by slow asthenia be often virtually to starve to death, then, no matter what the disease may be, *it is an object of fundamental importance to promote, as far as practicable, the assimilation of food.*"

"In acute disease the failure of the vital powers is forestalled in proportion as nutritive supplies are assimilated. This is simply saying that, *the assimilation of nourishment is indispensable for the preservation of the powers of life.*"

"No matter what may be the seat or nature of the chronic affection, a diet fully up to the capacity of the organism for nutrition promotes recovery, if recovery be possible; and if recovery be not possible, by increasing the ability of the system to endure the affection, contributes to prolong life. The limitations to alimentation, therefore, relate wholly to the *physiological processes* which are *preliminary to nutrition*, namely, *digestion*, and the other processes by which aliment is converted into food."

To whatever degree starvation may be a cause of death in disease—to whatever extent disease may overwhelm the power of life in *consequence of insufficient nutrition*—to that degree and to that extent is artificial digestion important. The only question remaining to be answered, to complete the argument, is this: Can artificial digestion be successfully accomplished by the administration of Pepsin? Undoubtedly it can. This is now a matter of recorded experience, sufficiently extensive to remove all doubt.

This use of Pepsin is the *most important of all*, and affords the *largest field for its use*. Cases for this application of the remedy are of daily occurrence in every physician's practice.

The following cases reported by Dr. Longet, and quoted by Corvisart, are to the point:

CASE I. Typhoid Fever.—On the twenty-fourth day, *the patient could not support any food, even the lightest.*

The administration of Pepsin produced immediately easy digestion. On suspending the remedy as a test, the old symptoms re-appeared, with violent pain in the stomach and diarrhoea. The treatment was continued for ten days, when the patient digested without any help.

CASE II.—Miss —, aged fifteen years, on the twenty-fourth day of a serious typhoid affection, although convalescent, was in an alarming state of debility, because she *could not bear any food, not even the lightest.* I ordered her Pepsin in powders. The first half dose, which was administered in tapioca broth, acted so well that a second was given to the patient three hours after the first, and was digested without difficulty. The second day, the same result was obtained with three broths and a raw egg. The third day the dose was intentionally omitted from the broth in the morning, and this caused violent pains in the stomach and intestines, and a watery stool. The two others, however, which were administered the same day, and contained each half a dose of Pepsin, resulted in a complete and easy digestion. The fourth day of the administration of Pepsin, the patient ate soups and chicken. After this a more and more substantial food could be given, but every time the dose was suppressed for a meal, the digestion was more or less painful. This state lasted ten days, when the digestion became normal.

CASE III.—Dr. Rilliet, of Geneva, contributes a case of chloro-*anæmia* depending upon dyspepsia. After detailing the daily treatment by Pepsin from the eleventh to the nineteenth of July, he closes by saying the patient left Geneva in a satisfactory state of health, and although he desired to be informed if the disease returned, he had received no communication to that effect.

The following case, kindly furnished by Dr. Sanford, of Brooklyn, very well illustrates this point.

CASE IV.—Fannie R. had capillary bronchitis, following scarlatina, which reduced her greatly. Thursday and Friday, February 12 and 13, vomiting set in, which grew more and more severe, in spite of my remedies. Having taken but little food before, she was growing rapidly weak, and I knew that she would be able to endure but a short time, unless her stomach could be quieted. Liquid bismuth seemed to produce a good effect, but would not enable food to be retained, except at very long intervals and in

very small quantities. Saturday I prescribed as follows: ℞ Pepsin (Am.) ℥ j., bismuthi subnit, grs. xv., in six powders.—Mix one powder in a tablespoonful of beef essence, and give a teaspoonful every half hour.

The food thus mixed with the powder was retained from the first, and given every half hour all Saturday night.

Sunday I found her much stronger. During the night she had taken four ounces of beef essence.

I then ordered the food without the Pepsin, which I found at my visit in the evening had been retained several hours, but then vomiting had returned, but in a much lighter form. I ordered the Pepsin powders as before, and found, Monday morning, that the food was retained immediately on their use.

Monday Evening.—Still continue the powders, and give quinine every three hours.

Tuesday.—Discontinued the Pepsin.

Wednesday.—Food and tonics acting perfectly; has a little appetite; other food taken this morning was digested without the least trouble.

Thursday.—Child improving very rapidly; no further trouble with the stomach.

CASE V.—July 28, 1868.—D. N——, an infant, two weeks old, said to have been born in a plump and healthy condition. Its present state is one directly opposite. Its face is thin and skinny, exhibiting, painfully, the bony outline. It has thin, muddy, but not frequent alvine discharges, and vomits whatever it swallows, even to half a teaspoonful of its mother's milk. It lies stupid, with its eyes closed, and refuses the breast. It has also an intense muguet. In this extremity, I ordered three grains of American Pepsin to be given every three hours, and half a teaspoonful of its mother's milk to be administered with great frequency. The following morning I found the mother, through utter hopelessness, had greatly neglected my directions. It was only through much persuasion and the co-operation of a friendly neighbor that she was induced to pursue the treatment. During that day the vomiting ceased, and on the following day the child took the breast, and retained and digested its nourishment. From this day it steadily improved in condition, and its diarrhoea and muguet disappeared.

On the 8th, one week after my last visit, I was called to see its mother, and hardly could have recognized the infant which so

lately had seemed in the last stage of inanition. Its face had acquired a comparative fullness, its color was restored, it nursed well and freely, and seemed as likely to live and thrive as any infant.

This child was simply starving to death. What led to its condition of inanition I could not satisfactorily learn, but its state seemed most hopeless. This case illustrates, in a remarkable manner, how little assistance will restore the digestive faculty to its normal activity, and enable it to perform its functions unassisted.

I have now briefly indicated the chief uses of Pepsin in the treatment of disease; each particular use has been illustrated by a few appropriate illustrative cases, collected from various sources. It seems to the writer that the therapeutical value of the Pepsin as a remedy has been abundantly established by the experience of the medical profession. High authority has declared in its favor. Dr. S. King Chambers, in speaking of it in diseases in which there exists "an anæmic condition of the alimentary canal which results in a disgust for food," says, "I do not know any remedy which more *readily, obviously, and directly* does what it can towards checking such a state of things than Pepsin. It acts *immediately and surely.*"

In another place he says: "On the whole, then, I cannot but conclude that we have, in Pepsin, a *valuable and safe remedy*, and an important aid to rational medicine." I cannot refrain from quoting one more case from Dr. Chambers on Indigestion. Amelia D., aged 20, was admitted to St. Mary's, June 19, 1857. She was well fed and not overworked, but her employment necessarily confined her a good deal to the house. The thorax was healthy, though she told a tale of having had cough and hæmoptysis. She complained of pain in the left side and sickness in the morning, especially after breakfast. Her appetite was very bad, and the sight of food made her gorge rise at it; but still she forced herself to eat.

"She was at first dieted on milk guarded with lime-water, rice pudding, and ice, and took a grain of opium every night.

"After five days she was no better, so the opium was left off, and ten grains of Pepsin powder three times a day substituted for it. In three days her appetite had returned, the vomiting and nausea had ceased, and she spontaneously asked for meat. She continued taking that without vomiting. It would be easy to cite cases where drugs had effected the same purpose, but I chose

rather to select an instance of the simplest form of restorative treatment, in order to direct the reader's thoughts to the *true* theory of healing."

Much contrariety of opinion has existed as to the

#### USEFULNESS OF PEPSIN AS A REMEDY.

This is sufficiently explained by the following paragraph from Dr. Chambers: "But I think, since its introduction to general use through the ingenious preparation of Dr. Corvisart, it has caused more disappointment than satisfaction. This is because it has been *given in unsuitable cases and because impossible expectations have been founded upon it.*"

Another reason why Pepsin has in many instances caused disappointment and consequently lost favor, is made apparent by the following extract from Dr. Pavy, of Guy's Hospital, London: "Now, speaking from the examination of several specimens of Pepsin procured from some of the largest pharmaceutical establishments in London, the bulk of that which is sold is totally devoid of any active property. Whether this arises from too much heat having been employed in its preparation, or from whatever cause, the fact remains that the chief portion of the Pepsin sold and administered, being perfectly inert as a digestive principle, is destitute of any real value as an agent for affording assistance towards the performance of digestion."

It would appear, therefore, that the successes and failures which have attended the introduction of Pepsin into the *Materia Medica* are easily reconcilable; the successes have been real and in accordance with physiological reasoning; the failures are to be attributed to improper use, extravagant expectation, and inert Pepsins.

It is believed that the facts and reasons set forth in this paper are sufficient to prevent the repetition of the former, and the production of a domestic and efficient Pepsin may obviate the latter cause of failure.

This article called *American Pepsin*, is a true and veritable representation of the gastric fluid obtained from the stomach of the ruminant animals and prepared without the aid of heat. It is, of uniform strength and capable of being kept indefinitely. Its superiority to the best and most approved foreign articles will appear from the following comparative experiment: Two drachms of fresh beef were subjected respectively to the digestive action of the three following varieties of Pepsin, viz.: Bou-

dault's, Morson's pepsina porci and the American Pepsin. The conditions in each were precisely the same, and the duration of the process alike in all. After the completion of the digestion the following residua were left by each respectively: After digestion in American Pepsin, 5 grs. dry; after each of the others, 10 grs. dry. Now one drachm of fresh beef desiccated to dryness weighs about 15 grs., so that one grain of completely dried beef represents 4 grs. of fresh beef. It therefore follows that American Pepsin digested 100 grs. or  $\frac{5}{3}$  of the beef; while each of the foreign articles digested 80 grs. or  $\frac{2}{3}$  of the beef.

In conclusion, I would commend Pepsin to the Association as a valuable addition to our therapeutical agents, capable of an extensive application in the treatment of disease, and American Pepsin, as a reliable substitute for all articles of foreign production.











