On pain after food : its causes and treatment / by Edward Ballard.

ON PAIN AFTER FOOD:

ITS

CAUSES AND TREATMENT.

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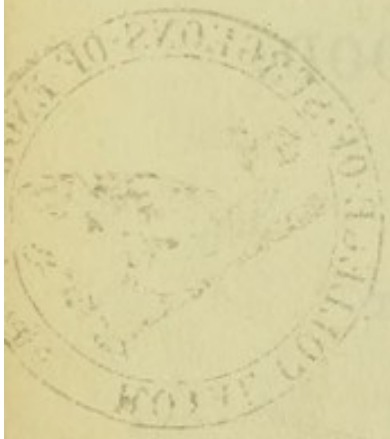

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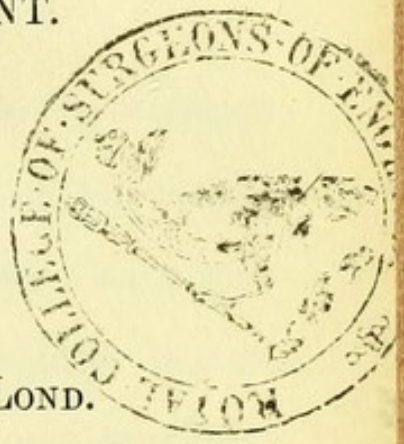

BY

EDWARD BALLARD, M.D. Lond.

LICENTIATE OF THE ROYAL COLLEGE OF PHYSICIANS AND FELLOW OF THE ROYAL MEDICAL AND CHIRURGICAL SOCIETY OF LONDON; LECTURER ON THE PRACTICE OF MEDICINE, AND ON MATERIA MEDICA AND THERAPEUTICS, AT THE SCHOOL OF MEDICINE ADJOINING ST. GEORGE'S HOSPITAL; PHYSICIAN TO THE FARRINGDON GENERAL DISPENSARY, ETC.

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PREFACE.

It is not to be denied that an accurate appreciation of individual symptoms lies at the base of all success in the diagnosis and cure of disease; and this appreciation is evidently important in the highest degree, where a symptom, such as *pain*, is so prominent that it cannot be overlooked either by the patient or the physician.

In discussing the subject of "*pain after food*," I have preferred the tabular form while pointing out the several causes out of which that symptom may arise, because it enables me in the smallest space, and with the fewest words, to exhibit, I hope clearly and intelligibly, their mode of action, their mutual relations, and the various modifications of treatment demanded,

according as they operate separately or combined in producing painful digestion.

All that relates to diagnosis is placed in the Commentary, and in this portion of the work, also, the application of remedies is considered at greater length, when necessary, than the limits of a Table could permit.

42, Myddelton Square,
Oct. 1*st*, 1854.

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ERRATUM.—Page 104, line 20, *for* "seldom" *read* "sudden."

ON PAIN AFTER FOOD.

INTRODUCTION.

1. The natural process of gastric digestion consists in *mechanical and chemical alterations in the food* introduced into the stomach, by which it is fitted for absorption, or for *discharge through the pyloric orifice into the duodenum;* and it is accompanied by certain movements of the stomach itself, and of the intestines, and by the secretion into the cavity and admixture with the food of fluids necessary to effect the alterations referred to. It is *unaccompanied by pain or uneasiness.* After the ingestion of some matters, it is true, sensation may be perceived, but this is not of a painful character, and arises only in the instance of such as are very hot or cold, and which would produce the sensation of heat or cold if applied to the integument or mouth, and in the instance of stimulant liquids, such as alcoholic drinks, or of stimulant condiments.

2. The *substances adapted for food* are derived from the animal and vegetable kingdoms, and consist of

organised substances and of various products of vegetable life: the flesh, fat, milk, and eggs of animals, the roots, stalks, leaves, flowers and fruit of vegetables, together with oily, starchy, gummy, or saccharine matters, derived from various parts of plants.

3. Few of these substances, however, are adapted for food in the condition in which they occur naturally; they are either too hard or too tough, or their elements are combined in a manner which requires that they should be separated, in order to be readily acted on in the process of gastric digestion. Hence it is essential that, with few exceptions, food should be subjected to various *processes of manufacture or cookery* before ingestion. *Some articles can be fitted for food by no process whatever;* such as the elastic or bony tissues of animals, and the older and tougher parts of vegetable fibre, those in which hardening substance has been deposited, as the stones of fruits. From the harder and tougher tissues of animals, however, the prolonged action of heat and water extracts gelatin, which may be used as food. Among the manufacturing processes the preparation of the fruit of the cereals in the *manufacture of bread* should be specially mentioned. The object is here to separate and diffuse uniformly through a mass the elements of which flour consists, to convert them into an artificial spongy membranous substance, of such a character that it may be readily broken down by the teeth, and at the same time to swell up and burst the starch granules so as to fit them for the digestive process. When any of these

objects are not gained in the preparation of bread, the latter is, *pro tanto*, unfit for food. In the *preparation of puddings or other dishes* similar objects should be held in view, and various articles of food are mixed in such a manner as to form a soft, digestible, nutritious, and palatable article of diet.

4. In softening and adapting for food crude articles of animal or vegetable matter, *the agency of heat and water* is had recourse to, either separately or conjointly. The *water* softens the material by being imbibed, it dissolves the substance which connects its constituent tissues, and it dissolves out matters which are either deleterious or unpleasant to the taste. *Heat* assists in these proceedings; and, besides, with the aid of the water naturally contained in the crude substance or added to it, converts some less digestible tissues into chemical products, such as tendon or ligament into gelatin, or starch into amidin; and in this way, too, it may aid in loosening the connection between elementary tissues. Heat also coagulates the albuminous principles of animal and vegetable substances; and then, the albumen thus altered, can, like any other solid matter, be finely divided by mastication, before it enters the stomach. These several effects are illustrated in the roasting or boiling of meat; and the perfection of either consists in ensuring, without loss of any of its elements, softening of the muscular fibre, gelatinisation of the cellular and tendinous structures, and coagulation of the albumen equally throughout the mass. Meat in which the

muscular rigidity is great, and has not yet passed off, is less readily softened than that in which the rigidity is on the point of diminishing; and hence *the advantage of keeping meat*, especially that of wild animals, who use great muscular exercise, for some days before it is cooked.

5. Another legitimate object of cookery is the *preparation of palatable dishes* from the crude substances furnished by nature. This preparation consists, in addition to the simple operation of heat and water, in mechanical division for the most part, and in admixture with salt, sugar, and other *sapid or stimulant substances*, as herbs, pepper, capsicum, lemon-juice, vinegar, or even alcoholic liquids, such as wine or brandy. These matters are very commonly used in the preparation of broths and soups, which, being merely the soluble constituents of meat and vegetables with gelatin, extractive matter and coagulated and more or less finely divided albumen, require some addition to recommend them to the palate.

6. Besides the animal and vegetable decoctions just mentioned, *other liquid matters*, warm or cold, are commonly taken. Water, milk, and infusions of vegetable substances, such as tea or coffee, which yield active principles to water, are the most important of these. Liquids, however, containing alcohol, sugar, and acid matters, in various proportions, must also be mentioned as occasional drinks.

7. *Chemically, alimentary matters are divisible* into those which contain nitrogen as one of their elements and those which do not, and a *proper meal* consists of articles containing azotised and non-azotised principles

in due proportion and quantity, together with as much liquid as shall render the meal agreeable and no more, and as much condiment as may suffice to impart a pleasant taste to the food.

8. *Liquid articles of food*, water, infusions, decoctions or solutions of animal and vegetable matter, oily matters, alcoholic drinks, etc., are allowed to *pass directly into the stomach*, merely stimulating, in proportion to their amount of odour or sapidity, the mucous membrane and salivary and buccal glands, and carrying with them the secretions poured out: but *solid food demands* and receives a more elaborate *preparation in the mouth*. It is previously subjected to more or less *manual subdivision*. In the mouth it is reduced by *mastication* into fine particles, a process which is assisted by the softening the food undergoes by admixture with saliva. The tenderness, size, and dryness of the morsel determine the duration of mastication and insalivation. The *saliva* is an alkaline fluid containing a principle stated by Miahle to be analogous to diastase and named ptyalin. The alkalinity of the saliva, according to Dr. Wright, is proportional to the simultaneous acidity of the gastric juice. The flow of saliva freely into the mouth during mastication appears chiefly due to the presence of the food in the mouth, partly to the movement of the jaws, and in great measure also to the mental impressions which the anticipation, *odour and taste of food*, give rise to. The customary use of condiments, such as sugar, salt, peppers, etc., with tasteless varieties of food, is probably of service in this way.

Its flow does not cease with the swallowing of the morsel, saliva continuing to be secreted and swallowed subsequently to the meal. The principal use of the saliva is clearly to assist in mastication and deglutition, but as it has been found to possess the chemical property of rapidly converting starch into dextrine and grape-sugar, it is believed to be also of *importance in digestion* by effecting this transformation in the instance of the amylaceous varieties of food. The remarkable property, possessed by saliva, of *entangling air* when mixed with it, is perhaps, also, not without a use; perhaps it is a *provision for the more ready permeation of each morsel* by the gastric fluids.

9. Arrived at the stomach in *successive morsels*, an interval of time being, in the case of solid food, interposed from the necessary mastication, *each morsel undergoes admixture with the secretions of the stomach*, which is aided by its movement from one part to another of the cavity by the muscular contractions of the organ itself. Part of the food is absorbed and part is transmitted, sooner or later, through the pylorus into the duodenum. This gradual admission of food permits the thorough admixture of each morsel, and thus at last of the entire meal, with the gastric secretions. Previous to its admission, the stomach contains, normally, little or no gas, but the air swallowed with the food, together with any gas accidentally present, is after a full meal eructated without pain during one of the occasional relaxations of the cardiac orifice.

10. The *contact of food with the mucous membrane* of

the stomach, ensured over a considerable space by *the movements of the organ and its freedom from gas*, is followed by the secretion, by the tubular glands of the membrane, of an acid fluid, the *gastric juice*, which is accompanied by a certain increase in the afflux of blood to the membrane. Its *secretion is dependent*, chiefly, upon the *contact* of food with the mucous membrane, but judging by Blondot's observations,* the *sapid impressions made by the food in the mouth* also promote the flow. Like the saliva, the free secretion of gastric juice is also under the influence of *mental impressions*. The gastric juice is *acid* in its reaction, and as this acid can only be derived from the saline matter of the blood which furnishes the secretion, an explanation is afforded not only of the marked alkalinity of the saliva (8) during digestion, being proportional to the acidity of the gastric fluid, but also of the interesting fact to which Dr. Bence Jones† has drawn attention, that *the acidity of the urine* too, a secretion also separated from the blood, lessens after meals, becoming three or four times less than before the meal, and even under some circumstances being replaced by positive alkalinity. These variations in the acidity of the urine may be observed and noted with accuracy, with the assistance of a graduated tube filled with a test solution of carbonate of soda of known strength. The decrease of the acidity of the urine was found to be greatest three hours after breakfast, and five or six hours after dinner, when it

* "Traité analytique de la digestion," 1843, p. 221.

† "Animal Chemistry," p. 46.

reached its lowest point. After digestion is completed and the acid reabsorbed, the acidity of the urine increases again, gaining its maximum just before meals. In Dr. Bence Jones' experiments it was observed that, when animal food only was taken, the diminution of the acidity after food was more marked and more lasting, but the acidity before the subsequent meal not quite so great, as under a mixed diet; and that when vegetable food only was taken, the decrease in the acidity was not so great as under an animal diet, while the increase of the acidity was greater before food. But in addition to acid, generally believed to be the hydrochloric, the gastric juice contains a highly nitrogenous matter known as *pepsin* or *ferment-matter*, and both this and the acid are essential to its efficiency. Lactic acid may also be present in the stomach during digestion, certainly in part resulting from the metamorphosis of starch-sugar, but believed also by Lehmann to be a result of secretion.

11. *The change which is effected upon the food* in the stomach is partly mechanical and partly chemical. Organised matters are broken up into their elementary tissues, and in great part dissolved, some, however, passing unchanged from the stomach and even being capable of recognition in the fæces. *Muscular fibre almost completely disappears* in this way, much more completely than the cell-membranes of vegetable tissue, which, according to Rawitz, are often discoverable in plenty in the fæces. Oily matters undergo no change. The casein of milk and liquid albumen are

coagulated, and together with the protein matters of animal and vegetable food, are probably converted into a low form of albumen. Soluble starch is converted into dextrin and grape-sugar, probably by the continued operation of the saliva which had been swallowed with it.

12. The *free secretion of gastric juice is aided by the muscular action* of the stomach bringing the food into contact with an extended surface of the mucous membrane. Perhaps, as the motion of the jaws in mastication favours the flow of saliva, so the movements of the stomach itself may in some way more directly promote the free secretion of gastric juice. The movement is reflex in its character, and is excited by the contact of the foreign matter with the surface of the mucous membrane. The stomach, however, is not the only part of the alimentary canal where muscular action is excited by the ingestion of food, since *peristaltic movements are also promoted in the intestines.*

13. During the early part of gastric digestion the pyloric valve is closely contracted, but as chymification proceeds, *the valve relaxes,* so as to permit of the passage through it of digested matters *propelled by the muscular action of the adjoining portion* of the stomach. After a time even undigested matters are permitted to pass. The *rapidity with which meals of different articles of food were digested* and passed from the stomach was determined by Dr. Beaumont,* from

* "Experiments and Observations on the Gastric Juice and Physiology of Digestion," p. 33.

observations on Alexis St. Martin. These observations show that *vegetable substances generally are digested less rapidly than animal,* and that of individual articles, veal and pork are digested most slowly; mutton, beef, and fowl with greater rapidity; turkey, lamb, young pig and potato still more readily; fish, milk, pearl barley and tapioca more quickly than these; and that gastric digestion was completed in the shortest time in the instances of rice, eggs, salmon, tripe and venison. Fatty matters are long retained in the stomach. The *stomach may become empty* in periods varying from two to four or five hours according to the bulk and character of a meal.

14. *Part of the food* introduced into the stomach *is absorbed by the veins* of that organ: the matters thus more or less taken up are water, alcohol, salts, gelatin, pectin, and gummy and saccharine matters; probably under some circumstances muscular fibre and other protein compounds dissolved by the gastric juice may likewise be thus absorbed. The rapidity of absorption of watery matters is proportional to the want of liquid in the system, and is less when the venous system is full from general plethora, or when the veins of the stomach are over-full from causes interfering with the return of blood by the liver and through the right side of the heart.

THE SYMPTOM—PAIN AFTER FOOD.

15. The single symptom whose discussion is the object of this little work, is pain or distressing sensation referred to the region or neighbourhood of the stomach, though sometimes to another part of the abdomen or to the chest or back, and occurring either immediately after the ingestion of food or within a short time or a very few hours of its reception, and during the period usually allotted to gastric digestion.

16. The most frequent *seat of the pain*, is the epigastrium or lower half of the sternum and neighbourhood of the ensiform cartilage. It is thus referred in considerably more than half the cases which are met with in practice: sometimes the seat of pain is so circumscribed that it may be covered with the point of the finger. The next most frequent seats of pain are the region of the umbilicus, and the entire upper portion of the abdomen, stretching from one hypochondrium across the epigastrium to the other. In some, it is referred to the lower part of the interscapular region, and in others to the situation of the heart or to a spot below the left mamma, and near the situation of beat of the apex of the heart; in a few, to the lower

region of the abdomen or hypogastrium. It is occasionally complained of as commencing at the epigastrium and extending up the chest to the throat, as seated only at the top of the sternum, or as confined to some limited spot in the abdomen, which may be in the neighbourhood of the margin of the false ribs on either side, opposite the spinous process of one of the ilia, etc. In comparatively a very few cases, and those often the most alarming, the pain extends over the whole abdomen, involving the epigastrium, hypochondria, central and lower abdominal regions and the back. Pain is also often referred to the situation of some solid tumour or enlargement within the abdomen; and where it is complained of as occurring in an unusual locality, attention should be given to the physical examination of the part, with a view to the discovery of any such abnormity. Such tumours are commonly connected with the stomach itself, but in some instances have no anatomical connexion with that organ, being dependant on disease in the kidney, spleen, ovary, liver, etc.

17. In more than half the instances which present themselves, the *character of the pain* is described by the patient as a "weight," "oppression," "tightness," "fulness," or "tension," and all these terms imply a *dull* kind of pain and uneasiness. The patient sometimes uses some special simile to illustrate his meaning, and the pain is most frequently compared to "a cord drawn tightly round the body," to "a heavy load lying" upon the part or internally, or to a sensation of "being blown up" with flatus. Other kinds of dull pain are

designated as "aching," occasionally as "throbbing," and sometimes as "sinking." Next to the dull pains, in order of frequency, come those which are described as "spasmodic," "twisting," "pinching," "tearing," "dragging," "gnawing" and "scraping," all of which, with the "darting or lancinating pain," "like a knife or sword running through," are to be enumerated under the head of *acute* pain. In addition to these must be mentioned, pain described simply as "a sense of soreness," or as "burning," or "smarting."

18. The *intensity of these kinds of pain* varies in degree from a simple uneasiness, which only becomes important from the frequency of its recurrence, up to the most intolerable agony, which renders the patient oblivious to all outward occurrences, and completely absorbs him in his own suffering. Perhaps, on the whole, the most difficult to bear of all the varieties of pain are the acute, and when both are intense these are, for the time, also the most distressing. The dull pains are most wearing to the sufferer when their duration is prolonged. When pain constantly recurs after food, a patient, rather than endure it, will occasionally voluntarily abstain from nourishment for a considerable period of time. Both kinds of pain are now and then associated with some *mental delusion*, the special character of which is modified according to the nature of the bodily suffering undergone; and the delusion may be so prominent that the patient is to be regarded as insane. Thus, in the case of a female patient, the tearing, dragging, and burning pain at the

epigastrium was attributed to demoniacal possession, and the unhappy woman would fall upon her knees and beg that "Satan, who raged within her," might be "cast out." In another instance, a female, who suffered from painful sensations with borborygmi after her meals, did not describe them in ordinary language, but came complaining that she had "two large animals in her belly," which she believed arose from eggs she had swallowed with some water-cresses, and which, immediately she had eaten her food, she felt come up to her stomach and consume it. Delusions of this kind ought always to direct the practitioner's attention to the functional and structural condition of the digestive organs.

19. The several varieties of pain described (17) are not confined, each to its own locality; but yet it is possible, in a general way, to make some sort of *topographical distribution* of them. Thus the dull kinds of pain are, with few exceptions, referred to the sternum, epigastrium, ensiform cartilage, interscapular region, or upper part of the abdomen, rarely to the hypogastrium or inferior regions. The more acute kinds of pain are mostly located at the seat of palpable tumours, at the ensiform cartilage, the region of the heart, the iliac regions, the parts about the umbilicus, the lower part of the abdomen, or the abdomen generally. Those pains which patients describe as "gnawing," or "scraping," affect the epigastrium, and lower end of the sternum, and neighbourhood of the ensiform cartilage much more

frequently than any other part; while those described as "soreness," "smarting," or burning," are most frequent at the epigastrium, lower part of the sternum and upper part of the abdomen generally, sometimes also being referred to the situation of a palpable tumour.

20. The occurrence of the pain is often distinctly *connected with the quantity of food* taken. In a small proportion of cases the smallest quantity of any alimentary matter, such as a single mouthful of solid food, or a few teaspoonfuls of the most bland and unirritating liquid, induces pain. In other and much more numerous cases, the pain only occurs when food enough has been taken to deserve the name of a moderate meal; while, in a third class of persons, no inconvenience is perceived till the limits of moderation as to quantity have been exceeded. Too short a period elapsing between one meal and another is likely to produce the same effect as a single immoderately large meal. In a certain number of instances pain is only complained of after a meal, when the individual has permitted himself to continue for an unusual length of time without food; but, in this case, the symptom is often apt to arise out of the inordinately large meal which succeeds, rather than from the condition of the system induced by the fasting.

21. In the majority of cases which are met with, pain is complained of quite irrespectively of the *quality of the food* taken; meat, vegetables of all kinds, bread, and pultaceous substances, each and all inducing it,

although often with unequal degrees of severity. In many of these patients, simple liquids in moderation, such as water, or cool tea, or broth, are unproductive of inconvenience; but, in a certain number, even these are sure to be followed by similar painful sensations to those which result from the use of solid food. The nature of the alimentary matter, however, in many cases, determines distinctly the occurrence of pain after its reception. In a large proportion of cases, and especially among the poorer classes, *meat* has been the chief or sole article of diet which has occasioned pain during digestion, a circumstance which may partly be dependent upon its being eaten too fresh, or being derived from animals which, from age, are unfitted for food. Of all the special kinds of meat, beef and pork have been chiefly blamed. In some instances I have noticed roasted meat alone to have been followed by pain, while boiled meat has produced none; and, in others, the reverse of this has been observed. On the other hand, in about an equal number of cases to those in which meat disagrees, it happens that all kinds of meat properly cooked are digested without pain, while *other articles of diet* give rise to more or less inconvenience; amongst these, flour-puddings are most frequently blamed, and in some instances pain only follows the use of vegetables, or a meal of bread and butter, or cheese. In one case which occurred to me, everything could be taken without inconvenience but bread, the smallest portion of which occasioned, as surely as it was eaten, a "sense

of roughness and soreness" at the epigastrium. Of all vegetables the potato, well cooked and eaten in moderation, is least frequently accused of inducing pain; beans and peas, especially if not young and tender, the most frequently. Many individuals also who digest other substances with pain, can eat the ripe, pulpy summer fruits with impunity; but apples, especially if sour, the several kinds of nuts, and such uncooked vegetables as salads, especially if eaten immoderately, are pretty sure to occasion pain.

22. Quantity, temperature, and quality have also much to do with the occurrence of *pain after the use of liquids.* In many instances pain only occurs when the *quantity* drunk has been immoderate. In a few, and these cases are comparatively rare, the smallest quantity of any kind of liquid of any temperature is productive of pain. As respects *temperature*, hot liquids more frequently occasion pain than those which are cold or tepid; in fewer instances it is observed that cold liquids produce more pain than warm, and occasionally a single mouthful of cold water has been followed by excruciating agony or burning pain. In some instances, hot and cold liquids alike give rise to pain, while those of a medium temperature have no such effect. Sometimes it is only *certain kinds of liquids* which produce distress. Of all liquids water, unless the temperature be very high or low, is least frequently accused; while tea, coffee, beer, or other alcoholic beverages, are more commonly complained of than other liquids of a similar temperature.

23. Mostly, in persons subject to pain after food, the uneasiness arises after every *meal* that the patient takes; a difference in its intensity, however, is commonly observed, depending partly on the quantity and nature of the food taken at each meal, as well as on other circumstances, to be noticed hereafter. In some individuals the pain is only complained of after a certain meal, which is sometimes breakfast or tea, but more frequently dinner, and often supper, when the pain may prevent the patient sleeping at night.

24. *The period of time which elapses between the ingestion of food and the occurrence of pain* varies. In some cases the pain is perceived the instant food is swallowed; in many others a few minutes, or half an hour, are permitted to elapse; and in many, one, two, or three hours, or a longer time still, may intervene. When pain already present is exasperated by taking food, the effect usually succeeds rapidly.

25. The *duration of the pain* is subject to as much variety as any other circumstance connected with it. It may last for the brief period of only a few minutes, or it may continue during all the early period of gastric digestion, passing off as the process becomes completed. The latter is the usual progress, at all events, of the less intense varieties of pain. I have sometimes noticed it to occur regularly at the commencement of a meal, but passing off as the individual proceeded with eating. In numerous cases, however, and those in which the pain is most intense, its duration is determined by the occurrence of some

event, either spontaneous or induced artificially, which constitutes a *means of relief.* Amongst these *vomiting* is frequent: it may occur spontaneously at periods varying from a few minutes to several hours from the commencement of the pain; but when the sufferer is of an impatient and irritable temper, he soon learns to induce the act which experience has taught him is remedial, either by tickling the fauces, or by the use of some of the officinal emetics (30). Another frequent termination of the pain is the eructation of flatus; relief is sometimes experienced where the amount of gas expelled has been trifling, but generally a more or less considerable quantity must be got rid of, either in one volume, or in divided portions, before the desired effect results. Occasionally some of the liquid or solid contents of the stomach are eructated simultaneously with the flatus. The patient sometimes induces the flatulent eructation artificially by drinking hot water or tea, or liquids rendered stimulant by spirit, essential oils, ginger, etc. In some instances the pain continues till an act of defecation occurs, or till flatus has been expelled by the anus.

26. The *pain is sometimes relieved* by firm pressure upon the part at which it is situated; and to render this effectual, the patient either lies upon the abdomen with one or both arms between the painful part and the couch, or he adopts a peculiar posture, either sitting or lying, the knees being elevated as high as possible, the trunk bowed forwards, and pressure being made upon the abdomen by the arms tightly clasped

across it, or embracing the knees. Sometimes the patient makes additional pressure by clasping a book, or a pillow doubled up between the arms and the seat of pain; in other instances, the requisite pressure is made by leaning over the edge of a table or bedstead. The act of stretching the trunk backwards, or walking erect, in some similar instances gives relief, or the pain fails to occur at all if the individual walks gently after a meal, but ensues immediately upon his sitting down. This relief is probably the effect of the pressure exerted by the abdominal muscles when the patient is erect or walking. In some instances it only occurs if the patient assumes the recumbent posture after food.

The pain which ensues after food, and during gastric digestion, is often associated with other phenomena, of which the following are the most important:—

27. *Tenderness* on pressure may be perceived over the seat of pain, only during the time that the pain is present, or it may be observed as a constant symptom, which is exaggerated after food. In some severe cases the slightest pressure upon the painful part cannot be borne; in other instances, no increase of pain is perceived till the pressure becomes tolerably firm. In many, the pressure of the clothes increases the pain so that the patient loosens them with a view to obtain relief. In some cases, when moderate pressure increases pain, very firm pressure will relieve it.

28. *Thirst* is a common symptom in cases of painful

digestion. It is mostly present while digestion is not in progress, and is merely increased during the pain which succeeds a meal; its occurrence only during the period of pain is, I believe, unusual. Sometimes it is observed only at the termination of a paroxysm of severe pain.

29. *Feverishness*, indicated by heat and dryness of skin, with flushed countenance, quickened pulse and general sense of discomfort, is no uncommon accompaniment of painful digestion. The heat of skin is not always general, but may be limited to the cheeks, palms of the hands, and soles of the feet, and may be associated with a sense of chilliness, or shivering. Occasionally the flushing and hot skin precede the pain; but, in other instances, follow within a brief period of its commencement.

30. *Vomiting* may occur spontaneously at longer or shorter periods after the accession of pain. Sometimes the interval is only a few minutes; in other cases the vomiting does not ensue, until the pain has lasted a considerable time, and this difference bears no relation to the degree of severity of the pain, although the more intense the latter, the earlier the patient induces it by tickling the fauces, etc., (25). Vomiting is altogether a more frequent accompaniment of pain which is acute and overwhelming, than of that which is dull and less intense. During the early stages of some diseases of the stomach, it may only accompany the pain, when this results from eating something less digestible than usual, but, once brought on in this

manner, it may continue ever after as its constant associate. The discharge of the contents of the stomach mostly relieves the pain (25), but not constantly, since sometimes it continues unabated, or even becomes more severe after the act than before it. In some instances the pain is relieved only temporarily, recurring after the lapse of a few minutes. The *matter vomited* may consist merely of the food, but it is commonly evacuated with more or less liquid matter, the result of secretion—the proof of which lies in the fact that the quantity of liquid thus expelled, may greatly exceed that of the liquid drunk. The aspect and character of the matter may be merely that of the food swallowed, more or less altered by digestion; but where the digestive process has been delayed from any cause, this alteration may be but trifling in amount, special articles of food little changed in appearance being readily recognised. In other instances the matter may have a yeasty appearance, or it may be yellow or greenish, and bitter to the taste, especially when the act of vomiting is effected with much straining. In another class of cases the vomited matters may be dark-coloured, sooty-looking, brown or chocolate-coloured, and contain altered blood, or even pure blood may be evacuated: these dark-coloured liquids sometimes gelatinise when left to stand for a short time; their odour and taste is often highly fœtid. These, however, as well as other matters, may be odourless, or present merely the taste and odour of articles of food and drink which have been

taken; or they may be sour both to odour and taste, and exhibit a high degree of acidity when tested with litmus. The highest degree of acidity is remarked in the yeasty-looking matter in which sarcinæ are discoverable by microscopical examination. *Nausea* occurs under similar circumstances to vomiting, and often precedes it; but it sometimes terminates in the eructation of a watery fluid, the latter in some cases occurring when the pain is less severe, and the vomiting when it is more so.

31. The *eructation of watery or alimentary matters* sometimes accompanies or precedes the pain. In general the quantity eructated is not considerable, being confined, perhaps, to a mouthful once or twice; or the eructation may occur repeatedly after a meal, completely removing the pain, or it may at length terminate in vomiting. Unless sufficiently frequent and abundant, these eructations give no relief to the pain. It often happens that the matter from the stomach merely rises into the throat, being immediately swallowed. The eructated matter may consist of alimentary matters, and possess merely the taste of the latter, or it may consist of a watery or mucous fluid. Its taste and re-action are often highly acid, "setting the teeth on edge," or it may be so acrid as to produce a burning sensation in the pharynx, down the spine, in the interscapular region or epigastrium.

32. *Temporary abdominal swelling* may accompany the pain experienced after food; it may be general, or it may be confined to the epigastrium or hypochondrium

of either side. It usually commences with the pain, and terminates with it; but sometimes the pain ceases, leaving the enlargement of the abdomen undiminished. The enlargement is often associated with dyspnœa or palpitation.

33. *Flatulent eructation* often affords immediate relief both to pain and abdominal swelling, especially where the volume of gas expelled is large, and the alimentary matters have had time to leave the stomach: in other cases no relief at all is experienced, or the abatement of the pain is only of temporary duration. Sometimes the act of eructation relieves the pain with which it was associated, but is immediately succeeded by a different kind of pain or sense of dragging. This same "sense of dragging" is sometimes experienced when the flatus is not expelled, but is felt "working about" the upper part of the abdomen. Flatulent eructation often relieves not only pain after food, but also associated palpitation and dyspnœa.

34. *Borborygmi* are associated chiefly with those pains which are "twisting" and "gnawing" in character, and situated about the epigastric, middle and lower regions of the abdomen. They sometimes precede the pain, but mostly commence and terminate with it, and both are often relieved by the discharge of fæces or flatus from the bowels.

CAUSES AND TREATMENT OF PAIN AFTER FOOD.

In the annexed scheme I have endeavoured to tabulate the several causes out of which the symptom under consideration may arise. It is only by a correct appreciation of these causes that remedies can be applied in any individual case with prospect of benefit. I have consequently arranged the several measures of treatment which experience has shown to produce good results in such a manner, in connection with the causes of pain, as to show under what circumstances and in what pathological conditions the employment of each is indicated. The Roman numerals and the letters, wherever they occur in the Table or Commentary, refer to the different portions of the former; the other numbers in parentheses refer to the paragraphs of the work, chiefly to those of the Commentary.

CAUSES OF PAIN AFTER FOOD.	REMEDIAL MEASURES.
I. Unusual Irritation (35).	
A. *Ingesta naturally irritant* (36).	Promote vomiting by gentle means* (38).
from their temperature being too high or low (37).	Avoid food, especially liquids, too hot or cold—use it tepid.
alcoholic liquids	Avoid alcoholic liquids.
stimulant condiments	Avoid stimulant condiments.
B *Ingesta not naturally irritant, but irritating by their delay in the stomach, from not undergoing, or undergoing too slowly, their appropriate changes by digestion* (39).	In severe cases promote vomiting by gentle means (38).
a. Food too hard for digestion (40).	Avoid hard and tough articles of food. Select articles of food soft, porous, and most easily digested (13).
originally hard and unalterable by cooking (41).	Select tender parts of animals, which are to be properly hung before dressing. Avoid all uncooked vegetable substances, but succulent, soft fruits.

* Except where a remedy is palliative of distressing pain, it is to be understood that the remedies appropriate for the removal of each of the conditions mentioned under each subdivision, are the more important in the treatment of pain arising out of each of them, and where at variance with, are to be used in preference to those mentioned as applicable to a whole class of causes. In many instances, however, both may be brought fully into use. The remedies mentioned as appropriate to a class of causes are to be understood, with the above proviso, as applicable to pain from all the conditions enumerated in connection with it. Where the cure of the painful digestion is dependent upon the removal of diseased states of other organs than the stomach, I have, for the most part, contented myself with pointing out the direction in which remedial efforts are to be made. To have entered further into the diagnosis and treatment of these affections would have carried me beyond the limits I had proposed to myself in this treatise.

CAUSES OF PAIN AFTER FOOD.	REMEDIAL MEASURES.
hardened by such processes as salting or drying (42).	Avoid salted or dried meat.
hardened by bad cooking (43).	Avoid animal or vegetable food not scientifically cooked (3, 4), *e.g.* new or heavy bread, puddings or other pastry, or meat hardened by boiling, etc.
b. Food imperfectly prepared by mastication.	
from deficiency of the teeth (44).	Restore teeth artificially. Give abundant time to the act of mastication. Use soft or finely-minced food.
from disease rendering mastication painful (45).	Appropriate remedies for the diseased condition of teeth, mouth, etc., *e.g.* for caries of teeth, tenderness of gums, etc. Use soft or finely-minced food.
from disease interfering with movements of mastication (46).	Appropriate remedies for disease present. Use artificial means, if necessary, to bring food between teeth (46). Use soft or finely-minced food.
from too hasty eating (47).	Avoid excessive hunger by taking small quantities of food between meals, if the interval be long (48). Take principal meals at most leisure times of the day (48). Avoid eating hastily.
c. Food imperfectly prepared by insalivation (49).	
from imperfect mastication and its causes, I. B. *b.*	*See* I. B. *b.*
from mental anxiety, distraction, or emotion (47, 75).	Avoid mental distraction, etc., during meals, *e.g.* business, reading, etc.
from catarrh, etc., affecting taste and smell.	Appropriate remedies for catarrh, etc.

CAUSES OF PAIN AFTER FOOD.	REMEDIAL MEASURES.
from habit of spitting (49).	Discontinue the habit, and smoking or chewing tobacco, especially before or after meals.
from disease in salivary apparatus.	Appropriate remedies for diseases of salivary apparatus.
d. Defective secretion of gastric juice (50).	Quantity of food at one meal to be small. Use articles of food which are the most digestible (56). Remedies, if necessary, for defective mastication and insalivation, I. B. *b. c.* Take but little liquid with meals (59). Moderate bodily exercise between meals (78). Avoid full meal late in evening. Breakfast to be a substantial, nutritious, and digestible meal (53, 56). Mild stimulant with mid-day meal, (56). Hydrochloric or other mineral acid (57). Medicines which promote gastric secretion, *e.g.* capsicum, ipecacuan, rhubarb (57).
from too large a meal (51, 47) or from too short interval since previous meal (51).	Avoid taking too large a meal; taking no more or even less than satisfies the appetite. Regulate quantity and frequency of meals by quantity and quality of previous meal, appetite, and amount of bodily exercise taken. Avoid prolonged intervals between food (48). Avoid hasty meals (48).
from too hasty eating (47).	Avoid hasty meals (48).
from mental distraction, anxiety, or emotion (52, 75).	Avoid taking full meal when mind is engaged with cares or anxieties of business (48). Avoid, as much as possible, causes of mental disturbance during or shortly after full meal. Cultivate moral self-control, cheerfulness, and contentment (52).

CAUSES OF PAIN AFTER FOOD.	REMEDIAL MEASURES.
from bodily fatigue, or exhaustion, immediately before or after meal (53).	Avoid excessive bodily fatigue just prior to full meal. Avoid much bodily exertion immediately after full meal. In weak individuals, if exhausted, and in excessive fatigue, a short sleep before the principal full meal of the day (53).
from atony (60)	*See* I. B. *f.*
from anæmia (54).	Removal, where practicable, of causes of anæmia, *e.g.* by change of residence from town to country, cessation of lactation, and cure of passive hæmorrhages, fluxes, etc. (55). Supply nutritious and animal food. Tonics, preparations of iron, and chalybeate mineral waters (55).
from hyperæmia of mucous membrane of the stomach, II. B.	*See* II. B.
from structural changes involving the mucous membrane of stomach (82, 83).	
from deficient impression on nerves of taste, in consequence of insipidity of food, catarrh, etc. (47, 52).	Avoid insipid food, or use with it appropriate condiments in moderation. Appropriate remedies for catarrh, etc.
from flatulent distension of stomach (60, 87), IV. B.	*See* IV. B.
e. Excessive dilution of food (59)	
from too free use of liquid food or of liquid with food (59).	Avoid use of "slops." Take little liquid with meals (59).
from defective power of stomach in absorbing liquid from hyperæmia (59).	*See* II. B. *f.*
from disease impeding expulsion from stomach into intestine, I. C.	*See* I. C.
f. Defective movement of food within stomach (60).	

CAUSES OF PAIN AFTER FOOD.	REMEDIAL MEASURES.
from atony (60).	Avoid and remove, where possible, local causes of debility (60), *e.g.* hyperæmia or inflammation (II. B.), distension of stomach (IV.), spasm (V.), hæmorrhage. Relinquish or avoid the use of excessive quantities of warm diluents, especially tea (60). Careful selection, preparation, mastication, and insalivation of food. *See* I. B. *a. b. c.* Favour by every means the free secretion of gastric juice, *See* I. B. *d.* Remove or avoid, where possible, the several causes of general atony, *e.g.* :— By removal of anæmia and its causes (55). By supply of nutritious and digestible food (56). By removal to or residence in a healthy and bracing climate (61). By relinquishing and avoiding excessive fatigue, mental, sedentary, or unhealthy occupations. By withdrawal from cares and anxieties of business, etc. (61). By early rising and retirement to rest. By relinquishment of debilitating habits, etc. (60). Avoid bodily exertion shortly before or after meals (53). Take sufficient sleep at night, and sleep, if exhausted, in middle of day (53). Remedies adapted to cure of general or local atony (61), viz. : Cold shower, plunge, or sponging bath. Mineral acids. Cold or iced water. Vegetable tonics, quinine, strychnia, bitter infusions and decoctions, etc.

CAUSES OF PAIN AFTER FOOD.	REMEDIAL MEASURES.
from atony (60)—*continued.*	Metallic tonics: chalybeate mineral waters. Stimulants. Aperients. Medicines calculated to promote gastric movements, *e.g.* rhubarb, ipecacuan, etc. (58).
from flatulent distension of stomach, IV. B. (87).	*See* IV. B.
g. Altered quality of gastric juice (62).	
from causes noticed under I. D. (69).	*See* I. D.
from renal disease (62).	Hydragogue cathartics, (62). Warm water or vapour bath. Mineral acids.
from hyperæmia and inflammation, II. B.	*See* II. B.
C. *Ingesta irritating by their delay in the stomach, in consequence of derangement of apparatus for expulsion* (63).	In severe pain, promote vomiting by gentle means (38). Use lean tender animal food chiefly, in small quantities at a time, and well masticated: small quantities of bread or milk (68). Avoid oily and starchy or saccharine articles of food (68, 72). Avoid taking liquid with food (59). Injection of nutritive liquids, *e.g.* good beef tea, into rectum (68). *See* also I. E. *c.*
a. Incapacity of muscular apparatus (64).	
from atony, paralysis, or atrophy (64, 60).	*See* I. B. *f.*
from organic disease (64).	
b. Mechanical obstruction to passage of matters from stomach.	

CAUSES OF PAIN AFTER FOOD.	REMEDIAL MEASURES.
from hypertrophy at pylorus (65).	
from ulcer at pylorus with thickened base (65, 84).	
from cancer of pylorus (83).	
from cicatrised ulcer at pylorus (66).	
from tumours external to pylorus pressing upon it, *e.g.* cancer or hydatid of liver, small omentum, etc.	
from obstruction of duodenum (67).	
D. *Over-acid secretion into the stomach* (69, 75).	In severe pain, promote vomiting by gentle means (38). Alkalies (71). Acids (57). Nitrate of bismuth, vegetable astringents, etc. (71).
a. from various causes of over-irritation, I. A. B. C. E.	*See* I. A. B. C. E.
b. from organic disease of stomach, *e.g.* cancer, ulcer (83, 84).	
c. from blood-disease (70), *e.g.*	
gouty cachexia.	Potash or its bicarbonate (71). Colchicum (71). Means calculated to promote the free action of the skin (71). Active exercise, temperance, etc. (71).
diabetic cachexia.	Avoid articles of food containing much starch or sugar (71). Alkalies, etc. (71). Means calculated to promote free action of the skin (71).
d. from more or less distant sources of irritation (69), *e.g.*	
pregnancy or other uterine irritation.	Appropriate remedies for uterine diseases present.

CAUSES OF PAIN AFTER FOOD.	REMEDIAL MEASURES.
constipation and fæcal accumulation.	Free purgation (71).
phthisis. renal calculus. abdominal tumours.	
E. *Changes of the food by which acid and irritant matters are produced* (72).	In severe cases promote vomiting by gentle means (38). Avoid articles of food which are saccharine or oily, alcoholic liquors accustomed to acetify, and crude vegetable substances liable to ferment. Alkalies (71). In sarcinous cases, sulphite of soda (72), creasote.
a. in connection with delay of gastric alterations in food, I. B.	*See* I. B.
b. in connection with obstructions to the expulsion of food from stomach, I. C. (63, 69).	*See* I. C. (68).
c. from deranged quality of gastric juice, I. B. *g.* (62, 69, 63).	*See* I. B. *g.* (62, 68, 72), I. D.
II. ABNORMAL SENSITIVENESS OF THE STOMACH (73).	In severe pain, promote vomiting by gentle means (38), but cautiously in ulcer of stomach (86). Avoid or remove all known causes of irritation, I. Soft unirritating food in very small quantities at a time (76). Medicines which lessen abnormal sensitiveness of mucous surface (77), *e.g.* opium, belladonna, stramonium, hydrocyanic acid, nitrate of bismuth, alkalies, oxide or nitrate of silver. Epidermic or endermic use of anodynes (77).

CAUSES OF PAIN AFTER FOOD.	REMEDIAL MEASURES.
A. *Exalted nervous impressibility* (74).	
a. general (75).	Remedies for atony and anæmia, *See* I. B. *f.* (60, 61, 55.) Daily bodily exercise and mental occupation, travelling, etc. (78). General calmatives (77).
b. local (75).	Appropriate remedies for spinal irritation, if present, *e.g.* leeches, blistering, etc., over tender spine. Counter-irritation.
B. *Hyperæmia and inflammation* (79).	Counter-irritants, *e.g.* blistering, tartar emetic ointment, croton oil liniment (81). Rubefacient applications during digestion, *e.g.* sinapism. Mental and bodily repose, passive or only very gentle active exercise. Appropriate means for promoting action of skin, *e.g.* warm or vapour baths, frictions, warm clothing (81). Avoid chills and exposure to cold. A warm humid climate, *e.g.* Torquay, Pau, Rome, Pisa, etc. Leeches to epigastrium (81). Ice taken when stomach is empty. Small doses of refrigerant salines, etc., when stomach is empty, *e.g.* nitrate of potash, effervescing citrate of potash, soda water, etc. Purgatives (81), emetics (81). Alkalies and alkaline mineral waters (81, 71).
a. from intense or prolonged irritation (80).	
arising during digestion . .	*See* I.
from abuse of alcoholic liquors.	
from irritant medicines, etc. .	Withhold irritant medicines.
b. from cold liquids drunk during exhaustion and fatigue from violent exercise with perspiration (80).	

CAUSES OF PAIN AFTER FOOD.	REMEDIAL MEASURES.
c. from intropulsion from surface and suppressed perspiration (80).	
exposure to cold.	Warm or hot water bath, or vapour bath (81).
cold or irregular season or climate.	Remove to equable mild climate if necessary.
d. from retrocession of cutaneous eruptions.	Hot water or vapour bath (81). Counter-irritants, croton oil liniment (81).
e. from febrile excitement (80).	Appropriate remedies for febrile state, *e.g.* repose mental and bodily, refrigerants, nitrate of potash, etc.
during disease elsewhere.	Appropriate remedies for diseases present.
from tippling.	Relinquish abuse of alcoholic liquors (81).
from hot and dry climate or season.	Remove, if necessary, to mild humid climate.
from too stimulating a diet.	Farinaceous acidulous and bland diet, summer fruits (81).
f. from diseases obstructing return of portal blood (80).	Leeches to anus (81). Avoid excess of liquid (76, 81). Moderate use of hydragogue and cholagogue purgatives (81).
e.g. of liver.	Appropriate remedies for diseased state of liver.
of heart.	Appropriate remedies for diseased condition of heart and resulting obstructed circulation.
g. from suppressed hæmorrhages, *e.g.* hæmorrhoidal or menstrual flux (80).	If necessary, remove general plethora by appropriate remedies (81). Restore, if possible, suppressed flux by appropriate remedies, *e.g.* hip baths and leeches to anus or vulva.
h. from irritant poisoning, *e.g.* by sulphuric acid.	

CAUSES OF PAIN AFTER FOOD.	REMEDIAL MEASURES.
C. *Cancer of the stomach* (83).	
D. *Chronic ulcer of the stomach* (84).	Appropriate remedies for accompanying hyperæmia, II. B. (85). Secure hearty cooperation of patient in persevering treatment (85). Avoid all irritant ingesta, food or medicines (85). Bland semiliquid food in small quantities at a time (85). Avoid and remove acidity of stomach (85). Avoid flatulent distension of stomach (85). Opium (85). If necessary, nutritive enemata and frictions of cod liver oil (85). Antisyphilitic remedies, if indicated by history of patient (?) (85).
III. PERFORATION OF THE STOMACH (86).	Rigid abstinence (86). Perfect repose in recumbent posture (86). Nutritive enemata (86). Opium (86).
IV. DISTENSION OF THE STOMACH (87).	
A. *By an excessive quantity of food and drink* (87).	Promote vomiting by tickling fauces or by emetic.
B. *By an excessive quantity of flatus* (87).	Friction with hand over epigastrium. Sinapism or other external stimulant (89). Internal stimulants (89). Introduction of tube into stomach (89).
a. From chemical changes in the ingesta (88, 72).	*See* I. E.
b. From exhalation of gas by mucous membrane (88).	Avoid and remove excessive nervous impressibility, II. A. Appropriate remedies for gastric atony, I. B. *f.*

CAUSES OF PAIN AFTER FOOD.	REMEDIAL MEASURES.
c. From atony (88, 60, 64, 90). .	*See* I. B. *f.*
d. From derangement of apparatus for expulsion of contents of stomach by pylorus (88, 63), I. C.	*See* I. C.
V. SPASM OF THE STOMACH (90).	Remove causes of irritation, I. IV. (90). Antispasmodics, *e.g.* ether, chloroform, opium, etc.
VI. ABNORMAL CONDITIONS EXTERNAL TO THE STOMACH (91).	
A. *Contracting space normally allotted to variations in bulk of stomach* (91).	Avoid all causes of flatulency, IV. B. Limit quantity of food to that which can be taken without pain (91).
a. External compression applied over epigastric and hypochondriac regions of abdomen (91).	Remove and avoid, where possible, all causes of external compression, *e.g.* tight stays.
b. Enlargement or distension of organs, or tumours in the neighbourhood of stomach (91).	Appropriate remedies for diseases present (91).
c. Effusion into peritoneum (92).	Appropriate remedies for ascites.
B. *Diseases in which the contractions of intestines are painful or spasmodic* (92).	Regulate quantity and temperature of ingesta to that which can be taken without pain. Avoid or remove all causes of unusual irritation, I. Appropriate remedies for diseases present.
C. *Diseases of parts within the abdomen which are accompanied by tenderness* (92).	Regulate quantity and temperature of ingesta to that which can be taken without pain. Avoid or remove all causes of unusual irritation, I. Appropriate remedies for diseases present.
a. In neighbourhood of stomach. *b.* At a distance from stomach.	

35. The several *sources of irritation* enumerated in the scheme may occasion pain either by virtue of the powerful impression made upon the sensory nerves supplying the interior of the stomach, being conducted to the centre of perception, or by inducing a state of painful muscular contraction in the stomach itself, or in some more distant portion of the alimentary canal. For irritation, however, to produce pain in a healthy condition of the stomach, simply from an impression upon the sensory nerves, it must either be excessive in degree, or its application must be more or less prolonged. The slighter degrees of irritation only occasion pain when from any cause there is an over-sensitive condition of the interior of the stomach (II.), or when there is a disposition from any cause to painful contraction (V. VI. B. C.) of the stomach or intestinal tube. The period of accession, the seat, character and duration of the pain may therefore well be believed to vary with the condition of the stomach and of neighbouring or associated organs, and not less with the several circumstances out of which the irritation arises. The evacuation of the irritating matters from the stomach by vomiting gives relief to pain from this cause, when the

act is not in itself a painful one. The pain, too, often ceases when the irritant has passed from the stomach through the pylorus, or when its irritating quality is destroyed by the administration of appropriate medicines.

36. These ingesta are not productive of pain in a perfectly healthy state. In those abnormal conditions however in which they may give rise to pain (II. V. VI.), there is no difficulty, on a very little inquiry, in tracing the latter to its exciting cause; since the pain may be wanting or greatly less severe after ingesta of an unirritating character, but follow immediately or very shortly, and with constancy, the introduction of the irritant cause into the stomach.

37. It is liquids more commonly than solids, which occasion *pain by virtue of their temperature;* and, in very sensitive conditions (II. V. VI.), by no means extremes of temperature are necessary for this effect, a few degrees of temperature in a liquid above or below that of the stomach being sufficient. In a case of ulcerated pyloric cancer which occurred to me, a single mouthful of water at the ordinary temperature occasioned immediately it was swallowed an intolerable burning sensation, compared to that which might be supposed produced by "boiling hot water," across the whole of the lower part of the thorax. Hot liquids sometimes give rise to pain when cold drinks, at least those at the ordinary temperature, do not; in the majority of these instances there has been reason to believe the presence of hyperæmia or its consequences

affecting the mucous membrane of the stomach; the sensitiveness in the remaining cases, about a fourth, acknowledging some nervous cause. Warm tea is in some cases alone complained of as inducing pain, while other warm liquids are said to have no such effect: this probably depends on the higher temperature at which tea is commonly drunk.

38. Where *vomiting* is not spontaneous, the most eligible mode of inducing it with a view to removing causes of irritation from the stomach is by tickling the fauces. The *mildest of the officinal emetics* must be used, should it be considered desirable to administer a medicine of this class; draughts of warm water, warm chamomile tea, or a few grains of ipecacuan are to be preferred (86).

39. The changes which the food undergoes in the stomach have been already described (11, 13). For a certain time the contact of the unchanged ingesta is tolerated by the healthy stomach, but if *the appropriate changes be not undergone within the natural period,* the food acts as an irritant, and at length produces pain. Unless when the mucous membrane is unusually impressible (II.), pain does not ensue until some little time has elapsed, which varies from a quarter of an hour to an hour or longer after the completion of the meal, according to the intensity of the irritating cause. The usual seat of the pain is the epigastrium, lower extremity of the sternum, the neighbourhood of the ensiform cartilage or the interscapular region, and its character is generally dull, oppressive and weight-like,

or it is described rather as a sense of discomfort. This however may be modified by the presence of conjoined abnormal states (II. V. VI. B. C.), and by the addition of further sources of irritation (I. D. E). The duration of the pain is usually determined by the length of time the food occupies in being chymified, and in passing from the stomach either through the pylorus (13, 25), or by the act of vomiting (30). Should vomiting occur, an examination of the ejected matters displays portions, often large quantities, of undigested food. The diagnosis of this cause of irritation and pain may be assisted by the occurrence of eructations some length of time after food, having the taste and odour of the last meal taken, a phenomenon which commonly precedes nausea and vomiting; as well as by eliciting from the patient the circumstances under which the pain occurs, and those under which a meal may be taken without inconvenience. Pain from the cause we are now considering usually becomes complicated before long with that from flatulent distension (IV. B.), and from irritant secretions (I. D.), or changes in the food (I. E.). It is under these last-mentioned circumstances that an attack of what has been called "acute dyspepsia" is often developed (72).

40. Matters taken as food must be sufficiently porous to allow of their permeation by the gastric juice, so that both the interior and exterior of each alimentary bolus may be subjected to its action. *When this porosity is wanting*, the process of solution is proportionately retarded, the action of the solvent secretion being

limited to the exterior of each mass. When only a few hard or tough masses are included in a meal otherwise digestible, the stomach, unless morbidly sensitive, is but little, if at all, troubled; since, on the digestion of the great bulk of the meal being completed, these may pass undigested through the pylorus. The less rapidity with which some substances are digested than others (13) may depend in great measure upon the comparative closeness of their texture; and in accepting the order of digestibility of different substances deduced from Dr. Beaumont's experiments, it must be with the proviso that they are cooked in a proper manner. An inquiry into the nature and articles of the meal which gives rise to pain is of course necessary for the determination, in any given case, of this cause of irritation. *Hardness of the food* also interferes with the process by which it is prepared for reception into the stomach (I. B. *b. c.*); for though in some instances prolonged mastication may divide it sufficiently, yet the fatigue is such as to deter a hungry person from undertaking the necessary labour.

41. Under this head are included, not only *hard and tough meat*, but also the *harder parts of vegetable food*, either uncooked or incapable of being softened by cooking; amongst these may be enumerated the less succulent of those used in salads, hard and unripe fruits, the kernels of nuts, and hard vegetable fibre. The toughness of meat may be the result of age, of insufficient time elapsing since the death of the animal to allow of the partial loss of post-mortem rigidity, or

from the part of the animal from which it is taken, certain parts being, as is well known, tougher, denser, and coarser in texture than others.

42. The ordinary method of *salting meat* has the effect of hardening it, the attraction of the salt for water withdrawing the greater part of its liquid, and, along with this, albumen and various extractive and saline matters which it holds in solution. The muscular fibre is thus rendered firmer and closer, a condition which is further increased if the meat be subsequently dried. It is true that in the act of boiling, a portion of water is reimbibed; but rarely enough is taken up in this way to soften the meat sufficiently for those whose digestive powers are not of the most active kind: besides, the albumen, which conduces greatly to the tenderness of the meat, is not restored, nor are those acid, saline, and extractive matters which Liebig seems to imagine* may take part in the digestive process in the stomach.

43. *Imperfections of cooking* occur both in the instance of animal and vegetable food: in either the matters may be subjected insufficiently to the softening process (4), or may be rendered by mismanagement hard and indigestible. Among articles of food thus left or rendered too hard for rapid digestion, may be mentioned the firmer and tougher vegetable substances insufficiently cooked, and heavy bread puddings or pastry, which the teeth in mastication separate but imperfectly into grains, and which, when thus

* "Chemistry of Food," p. 139.

separated, have a tendency only the more rapidly to readhere into a mass. It is probable that new bread owes its admitted less digestibility than stale bread to a similar tendency. Meat which has been long stewed, especially if in large masses, until all but the fibres composing it, and a little hard, coagulated albumen have been removed, is about as unfit for food as meat hardened by salting; and so also is meat boiled, or otherwise prepared in such a manner as not to preserve within it the juice of the flesh.

44. The *teeth* may be either *wanting in number*, having fallen out, as in old persons, or having been extracted, or they may be so decayed or broken away as to be useless for the purpose of mastication.* In any of these cases a patient is apt to suffer more or less habitually from the sense of pain after food, if the latter be not soft in its consistence. The molar teeth being those most essential to mastication, it is the absence of these which mostly occasions imperfect mastication. In old persons especially this cause of painful digestion is in operation; but as the teeth may be lost, or inefficient from caries, etc., at all ages, it should be a rule with the practitioner, in every prolonged case of pain after food, to ascertain, by ocular examination, the capability of the teeth for performing their office; since patients, especially females, do not

* I have even met with an instance in which the milk teeth had fallen out at the usual period, and, though the individual was advanced in age, had never been replaced by the permanent set.

usually give spontaneous information to the physician respecting this class of defects.

45. *Mastication may be rendered painful* by disease affecting the teeth themselves or their alveoli, inflammatory or ulcerative affections of the mouth or gums, glandular swellings in the immediate neighbourhood of the jaw, etc. When there is painful disease on only one side of the mouth, such as a carious tooth, in which the pulp is partially exposed, a person often habituates himself to masticate entirely upon the opposite side. If the teeth be perfect on that side, and the act leisurely performed, the food may be divided sufficiently; but this cannot be the case where the teeth are defective or broken away. The patient does not usually inform the physician of this habit, nor of the existence of the tender or carious teeth. He may, however, suspect it, by finding, on inspection of the mouth, that the teeth of one (the unused) side are more incrusted with tartar than those of the other, while the gums look flattened and shrunk; and if the corresponding side of the tongue is coated, while the other side is clean and healthy.

46. Examples of diseased states which may thus *interfere with the movements of mastication* are to be found in organic lesions, such as the contraction of the tissues which sometimes follows extensive mercurial ulceration of the mouth and necrosis of the jaw, after recovery from which the lower jaw may be almost fixed; or in paralysis of the tongue and cheeks, whereby the movement of the food to different sides of the

mouth and beneath the teeth is more or less impeded. In the latter case *the fingers may be used* to move a morsel under mastication to different parts of the mouth, so as to subject it thoroughly to the pressure of the teeth.

47. Several circumstances may lead to the *hurried despatch of meals.* Such as are acquainted with the habits of the insane are aware of the hasty manner in which some devour the food placed before them, and the urgency of hunger may prove an excuse for persons who, from necessity, have been upon the verge of starvation. But there are persons to whom want is a stranger, who voluntarily neglect to take food for so long a period in the day, as to occasion such a degree of hunger as leads to rapid and voracious eating when the opportunity of taking food at length arrives. Persons who are *absorbed in commercial or professional pursuits* often commit, from day to day, an error of this kind, or if they seek to avoid it, not rarely fall into another no less injurious. The principal meal of the day, in place of being leisurely taken and enjoyed, is snatched at some uncertain hour casually furnished by a brief interval of business, when the mind, anxious and harassed, is occupied with cares which leave no room for due attention to the meal; a few minutes only, and possibly these interruptedly, being perhaps allotted, with impatient and niggard hand, to what is regarded as an unwelcome though necessary intrusion upon the time which ought to be allotted to the ceaseless toil for wealth. This hasty despatch of

meals not only interferes with the due preparation of the food by mastication, but also with the secretion of the saliva and gastric juice, both of which flow, in part, in obedience to sapid impressions received from the food in the mouth (8, 10). But "bolting the food" has a further evil result in the impairment of the digestive process as carried on in the stomach. *Persons who eat too fast commonly also eat too much*, not feeling "satisfied" until more food has been taken than the stomach can readily digest (51); and, besides, time is not given for the secretion of that quantity of gastric juice which is essential to the digestion of each successive morsel (9), so that the whole process of solution of the meal is retarded. I would observe, too, that there is another cause which sometimes leads to imperfect preparation of food in the mouth, and that is the apparent softness of the substance eaten, and the little pleasure afforded by mastication where it is *deficient in sapidity*. It often happens that, in this way, large pieces of flour-pudding, potatoe, or apple, and such articles as rice, are swallowed, having scarcely been subjected at all to the processes of mastication and insalivation. Pain after food resulting from too rapid eating may occur only occasionally as the result of some solitary error, or though the error may have become habitual, the pain may still at first only be observed when there is a coincidence of some other cause of retarded digestion (I. B. *a*.). In other instances, pain after the principal meal of the day, or that meal which is usually "bolted," may be the rule,

especially if the individual have long neglected so simple and natural a condition of health, and its absence the exception; the latter only being noticed when the meal has consisted of some very easily digestible article, and when, as to men of business only happens perhaps on Sundays, the circumstances under which the meals are taken are such as are favourable to ready digestion. I cannot here omit to mention another disastrous result of this habit of hasty despatch of meals during business hours, of which my own experience has furnished numerous examples; I allude to the attempt which the sufferer, from the consequent pain, often makes to rid himself of the sense of load with which he is oppressed by a "dram." Little by little have I seen this occasional indulgence, which the individual justifies to himself on the ground of its necessity as a medicine, expand into a habit, the daily glass lead to its repetition at other periods of the day, and the infatuation only continue to gain strength till organic changes have been established in the stomach, or the patient has been brought to the grave with cirrhosis of the liver, and its too well known accompanying disorders.

48. To those whose business engagements do not allow of sufficient time in the middle of the day for the leisurely enjoyment of a full meal, the best advice that can be offered is that the following arrangement should be adopted: to breakfast at as early an hour as will permit of from half an hour to an hour's interval between the meal and the time of going to business,

and to make this meal a nutritious and substantial one; to *delay their dinner till the urgent business of the day is concluded,* and till they can sit down in comfort, and free from care, bustle, or interruption, to its enjoyment; and, in the middle of the day, in place of a full meal, to take a *light luncheon* of some easily digestible food. It is true that a late dinner of this sort has its own disadvantages, but I am convinced by experience that they are far outweighed by freedom from those disturbances of digestion and their results (47) which attend a full but hurried meal.

49. Although it is not easy to separate the *influence of deficient insalivation* from that of deficient mastication of the food, the operation of the former cannot be entirely overlooked in an enumeration of the sources of delay in the digestive process. It can, however, only be regarded as an assisting cause of this delay; slow digestion has not, in my experience, been ever observed as the result of this deficiency alone. I may add that Dr. Beaumont denies the injurious influence either of free and *constant spitting*, or of smoking tobacco.*

50. The gastric juice being the great solvent of the food, all the circumstances which interfere with its free secretion impede those changes in the aliment which occur in the digestive process. The experiments of Dr. Beaumont on Alexis St. Martin, by irritating the interior of the stomach with the thermometer, or with small bags containing food, showed that pain was

* Op. cit., p. 60.

experienced as soon as the flow of gastric juice was lessened in amount. Similar conditions of pain, viz., the presence of unaltered matters in the stomach, and deficient flow of gastric juice, are met with under the several circumstances enumerated in the scheme. As in those instances in which the causes previously enumerated are in operation, the determination of a *deficient secretion of gastric juice*, as the source of painful delay of the digestive process, depends upon careful inquiry being made into all the circumstances under which the pain becomes developed, and into the presence of all those morbid states of the stomach, general system or distant organs, by which it is known the secretion may be influenced. It is deserving of further inquiry how far a failure of the changes in the acidity of the urine which Dr. Bence Jones has shown to be normally associated with the several stages of digestion (10), may be taken to indicate defective secretion of gastric juice.

51. Dr. Beaumont has expressed the law which in health governs the quantity of gastric secretion capable of being excited by food, by stating that it is sufficient to digest that quantity of aliment which the wants of the system at the time demand. The natural appetite and the amount of waste undergone by the system from bodily exercise, must be the measures by which this want is determined. The *quantity of food* at one meal should be such as to satisfy the appetite, but short of that which produces indisposition to further bodily or mental exercise. *Taking food too soon after*

a full meal is thus equivalent in its results to taking too large a quantity of food at once; but it must be remembered that, on the same ground, the absolute frequency of repetition of food is only to be regulated by the quantity and nutritious quality of that eaten on a previous occasion, and the consequent demand for nourishment on the part of the system. I have noticed already the fact that the hasty discussion of a full meal is very apt to lead to excess (47).

52. *Mental anxiety, care, and powerful mental emotion*, vexation, grief, anger, etc., arrest more or less completely both the free secretion of the saliva and that of the gastric juice. In persons of irritable temper very trifling sources of annoyance, such as an ill-dressed dinner, will suffice to produce this effect, and to occasion an attack of painful digestion. Many of the mental impediments to active digestion may, as I have before (48) pointed out, be removed, by selecting a proper time for a full meal; but there are others which foresight cannot always avert—the irritations, annoyances, and mental asperities of life, from which all are liable to suffer, and whose influence can only be softened by the *cultivation of a cheerful, contented, confident and happy frame of mind*, and of a *control over the temper*. Much of the moroseness and ill-temper which in the dyspeptic is put to the account of his disease, may be overcome by the efforts of a firm will. The *withdrawal of the attention from the sapid impressions made upon the mouth* by the operation of the above-mentioned causes, or by the habit which some

indulge in of reading during meals, may not improbably take a part in occasioning a deficiency in the gastric secretion, just as a hurried (47) or insipid meal, or the aguestia which accompanies catarrh may, in accordance with M. Blondot's (10) observation, have the same effect.

53. Although it has been established by Dr. Beaumont that active bodily exercise between meals hastens the digestive process when once fully commenced, yet the experience of all observers coincides with the belief that the secretion of the gastric juice is usually retarded, and consequently the digestive change in the food delayed, by *laborious or very active exertion immediately on the ingestion of a meal.* But the secretion of gastric juice is also slow, when from any cause the powers of the body are exhausted prior to the reception of a meal. In healthy persons this usually occurs from the effects of excessive muscular exertion, or from deprivation of natural rest or sleep; but in those who are debilitated either from age, disease, or any other cause, the various necessary occupations of the day, and the unavoidable excitement arising out of its events, exhaust the strength before the period for the midday meal arrives. In these persons it sometimes happens that breakfast, which is taken at a time when the bodily powers are refreshed by sleep, is the only meal which occasions no distress. Where this is the case, *breakfast* should include some of the nutritious articles of food usually reserved for dinner, and the latter meal may be often advantageously prefaced by a *short sleep.* After exces-

sive fatigue a similar indulgence may be recommended to those who are liable to suffer from pain after food.

54. The mode in which *anæmia* operates in diminishing the flow of gastric juice requires but little remark, when it is kept in mind that a due supply of healthy blood is an essential condition of secretion of any kind. The *clinical recognition* of anæmia also presents no difficulty: its more obvious and striking indications are pallor of the skin, lips and mucous membranes, pallor or sallowness of the complexion, the small and pinkish hue of the superficial veins visible through the integument, and murmur audible on applying the stethoscope over the larger veins of the body or the base of the heart. With these more manifest signs of the condition of the blood, are associated symptoms of muscular debility, weak circulation, and imperfect performance of function throughout the body; the bowels are torpid and the catamenia scanty, pale or suppressed. Assistance in the diagnosis, but still more in directing the employment of remedies, is derived also from the *history of the patient's condition, which may embrace one or more of the following occurrences or states;* insufficiency of nutritious food; change of residence from the open country to a populous town; confinement for a length of time in a vitiated and impure atmosphere, and deprivation of sunlight; prolonged residence in a malarious district; hæmorrhages either directly from the stomach or intestinal canal, or from other surfaces, as in the instance of menorrhagia, or excessive and injudicious withdrawal of blood by

venesection or local depletion in the treatment of disease; prolonged and profuse discharges from mucous membranes as in leucorrhœa, or excessive secretion as in the instance of prolonged lactation; ague, tuberculous disease, or some other morbid state known to impoverish the blood, such as rheumatism, cancer, Bright's disease of the kidney, or disease of the spleen.

55. The first step in *the cure of anæmia*, without which the pain after food, though it may be palliated and temporarily averted, cannot be completely remedied, consists in the *removal*, where practicable, of *the several causes* on which it may depend. A supply of *nutritious and animal food* in quantities and under circumstances favourable to its digestion, removal from a populous or malarious district, or from confinement in a vitiated atmosphere to a healthy and open country locality, the abandonment of suckling when lactation has been continued too long, the arrest by astringents, etc. of hæmorrhages and other passive discharges, are measures of the first importance. The next step is *the improvement* by appropriate medicines of *the impoverished condition of the blood.* Those which by *increasing the tone of the system* promote the digestive changes (I. B. *f.*) are often first to be employed, such as the mineral acids and vegetable bitters; but the chief remedy lies in the *ferruginous preparations*, which should be taken shortly after a meal. The pulvis ferri (fer réduit), the citrate of iron, or the citrate of iron and quinine, are on the whole the most eligible forms for administration,

but in dispensary practice I have been in the habit of employing the sulphate in solution with syrup to a large extent, with the best results. Where there is a disposition to passive hæmorrhages or fluxes, the tincture of the sesquichloride is to be preferred. In all cases where iron is given, care should be taken to preserve regularity in the action of the bowels (61). It is to cases of this kind, also, that *the chalybeate waters* are especially adapted, as that of Tunbridge Wells, or the alkaline chalybeates (Franzensbad or Egar).

56. The *articles of food which are most suitable* are tender mutton, venison or poultry, and these roasted rather than boiled (sometimes they are better digested when eaten cold than hot), tripe, softly boiled eggs occasionally, and ~~stale~~ well-made bread in moderation. Vegetables also are not to be forbidden; well cooked mealy potatoe, and the softer of the green vegetables as cauliflowers and asparagus are to be preferred, or rice may be eaten when soft. The soft pulpy summer fruits may also be eaten in moderation, but not by way of dessert when the wants of the system have previously been otherwise satisfied. With dinner, especially in atonic and anæmic states of the system, or in persons accustomed to their use, some of the *milder stimulant beverages* may be taken, so long as the quantity of liquid used is small; a glass of sherry, or a dessert or tablespoonful of brandy in a small tumbler of water, or a small glass of sound ~~bitter~~ beer, are among the more eligible of them. It

is also to be recollected that as bodily exhaustion and fatigue retard gastric secretion, so the hours immediately succeeding sleep are those in which these conditions are less operative than any others in the day. Hence it is, that *breakfast* should, as the meal at which the digestive powers may be expected to be most active, be made to include some of the articles of animal food enumerated above. At no time is this practice of more value than where the blood is in an impoverished condition.

57. The *mineral acids* are administered either with the view of giving tone to the stomach, or of promoting the secretion of the gastric juice and assisting in the digestion of the food, when the secretion is defective. With either object, they may be administered in combination with one of the vegetable bitters about half an hour before a meal. The *hydrochloric acid* is often preferred as being, at least, one of those naturally present in the gastric juice. The mineral acids are also very effectual in remedying the disposition, in certain cases, to *an over acid secretion* from the mucous membrane. Sulphuric acid answers well for this purpose, but Dr. Pemberton* preferred the nitric acid, and also drew attention to the fact, that lemon juice was sometimes of service, and at the recommendation of my friend Mr. McCrea, I have of late employed acetic acid also with advantage.

58. *Rhubarb* and *ipecacuan* are medicines which

* "Practical Treatise on Various Diseases of the Abdominal Viscera," p. 127.

demand a few observations. Both of them promote the movement of the stomach and bowels, and excite secretion from their mucous membrane. The former has consequently long been employed with confidence as the basis of "dinner pills," being thus administered in doses of three or four grains from half-an-hour to an hour before the principal meal. The latter was introduced into practice at the close of the last century, by Daubenton,* in doses of $\frac{1}{4}$ grain to 2 grains, when it is believed by him and others, among the more recent of whom may be named Dr. Budd,† to excite gentle movements of the walls of the stomach, and a flow of the gastric secretion without producing nausea. In some persons, however, not only nausea but complete vomiting is occasioned by small doses of ipecacuan, and hence Daubenton advises us to "commence with a very small dose and to increase it gradually as may be found necessary, till the operation of the remedy becomes sensible." He considered it most applicable to the indigestion that occurs at the "decline of life," that it is best taken "in the morning fasting," and that the most easy and least unpleasant mode of taking it is in the form of lozenges, containing each about a sixth of a grain of ipecacuanha. It is recommended by Dr. Budd to be combined with rhubarb in the customary dinner pill. Another useful medicine is to be found in *capsicum*, especially, where the defective

* "Observations on Indigestion," etc., (with an Appendix), Second Edition, 1807, p. 16.

† *Medical Times and Gazette,* April, 1854, p. 365.

gastric secretion occurs in gouty individuals, or in those who are habitual drunkards. It may either be given in doses of one, two, or three grains, according to the effect desired, combined or not with rhubarb, before a meal, or it may be used with the latter as a condiment.

59. The gastric juice does not act upon food in a liquid form, until the latter has acquired a certain amount of consistence by absorption of its watery portion. Hence broths, *soups, etc., only slowly undergo digestion*, if taken into the stomach in large quantity, and the action of the gastric juice upon solid food is equally *retarded by drowning the latter in a quantity of liquid.* Hence it is, that persons whose stomachs are unusually sensitive (II.) often suffer more inconvenience from a meal of "slops," than from a dry meal consisting of the more digestible articles of food. Liquids produce less disturbance of the digestive process at breakfast than at dinner, and hence may be taken more freely with the former than with the latter meal; the explanation of which lies in its more rapid absorption for the restoration of the loss of liquid, which has taken place from the blood by secretion of the skin and kidneys during sleep. The absorption of liquid from the stomach, and hence the digestive process, is *impeded by hyperæmia*, especially when this is the result of disease which obstructs the return of blood by the portal vein (II. B. *f.*); and its passage from the stomach into the intestinal canal is impeded by the derangements noticed under I. C. in the scheme.

60. The part which the *movements of the stomach* play in the digestive process has been already alluded to (10, 12, 13). It is consequently easy to perceive how the latter must be *impeded* by causes which either impair the muscular power of the stomach, or prevent the contractions of the organ acting normally and efficiently upon the food. The *secretion of gastric juice will be impeded* (12), no less than its complete admixture with the food, and the expulsion of the latter or of flatus (88) from the stomach. When from any cause the movements of the stomach are inefficient, the defect in the gastric changes in the food and the consequent distress is greater, the more imperfect the previous preparation that the aliment has undergone by cooking, mastication, and insalivation (I. B. *a. b. c.*). The circumstances which most commonly impair the efficiency of the gastric movements are *atony* which may lead to *atrophy* (64), structural disease (83, 64), and *flatulent distension of the stomach* (IV. B.). *Atony of the stomach* may arise from local debilitating causes, or it may be a part of a general atonic condition of the system. Among the *local debilitating causes* may be enumerated the previous unnatural distension of the stomach with food or flatus (IV.), which, when habitual and excessive, may lead even to permanent dilatation of the organ; the abuse of warm diluent drinks, especially of tea; prolonged and repeated attacks of spasm (V.); gastric hæmorrhage; and the presence of a hyperæmic or inflammatory state of the mucous membrane, or of organic disease. Or this state of the stomach may be,

and commonly is, associated with general muscular debility or atony, the recognition of the presence of which, and of its known causes, is consequently most important in the diagnosis of the pain after food. When there is *general atony* its signs are exhibited throughout the muscular system, voluntary and involuntary. In the former it is shown by an incapacity for the customary degree of powerful, prolonged, or sustained exertion, and by softness and flabbiness of the muscles to the feel. In the latter, it is manifested by a soft, weak, and occasionally perhaps intermitting pulse; a palpitating heart, whose action is accelerated by trifling causes; a tendency to fainting or giddiness on sudden exertion or change of posture, and to swelling of the ankles and feet; a readiness to perspire under trifling exertion; costiveness of the bowels, and a disposition to flatulent distension of the stomach and intestines. The *circumstances under which this atony may arise* are various; some one or more of the following causes, however, will, on inquiry into the history of the case, usually be discovered to have been in operation:—advanced age; anæmia and its several causes (54); insufficient or innutritious food for some time, and the several conditions which are known to impair the perfection of the digestive process where quantity and quality of aliment have not been wanting; residence in a hot climate; the influence of a hot season, or prolonged confinement in a heated room or an impure atmosphere; residence in a malarious district; intemperance; exhaustion from excessive fatigue,

watching, or mental and sedentary work; circumstances calculated to depress the powers of the nervous system by their influence upon the mind, as anxiety, care, fear, etc.; indulgence in enervating and debilitating habits, as late hours, too much sleep, excessive venery or onanism; and lastly, previous disease, especially gout, and such as is accompanied by excessive or prolonged discharge of blood, or of some normal or abnormal secretion.

61. Of the remedies mentioned for the state of atony, there are some which call for special remark. The *removal to a healthy and bracing air* from the contaminated atmosphere of a large town, from a warm climate, or under any circumstances giving rise to debility, is a remedy of great importance. Almost any change from town to the free open country is beneficial; but in some instances it is important, and in all desirable, that the climate selected should be dry and bracing, qualities which are readily met with in the open, hilly districts of our own island, and of which Brighton, Malvern, and Clifton may be mentioned as fair examples. It is to be observed, too, that a removal of this kind possesses the additional advantage of withdrawing the patient from the depressing influences which attend the daily cares and anxieties of the man of business, or the engagements of the votary of pleasure. Of the whole class of *tonic remedies* there is not one which surpasses in efficacy the general external application of cold. To a cool, bracing atmosphere the free daily use of cold water should be superadded. The *shower bath* is not only

the most convenient, but also the most effectual mode of applying it, the precaution being taken that, in the case of weak and nervous females, the quantity of water used at a time and the height of the fall be not too great at first, but rather gradually increased after a few baths; and should the feet be disposed to chill, directing that the patient shall stand in a covered vessel of warm water. In place of this the *plunge bath* may be used; and either may be advantageously prepared, if convenient, with sea water in place of fresh. Should the patient not possess sufficient power to establish an active reaction after these baths, cold *sponging with salt water* may be substituted. The best period of the day for taking these baths is immediately on rising from bed in the morning. The reader must not accuse me of a leaning towards heresy, when I also express an opinion in favour of a small *draught of ice-cold water*, or cold spring water, as the most efficient of internal means, where it does not produce pain, of imparting tone to the muscular coat of the stomach. It should be taken at a time when the stomach is empty, and often succeeds in producing an appetite when swallowed an hour or so before a meal. I have already alluded to the *mineral acids* (57). When the general atony is not considerable, and the cause which produces a debility of the muscular coat of the stomach has been either over-distension of the organ, or some other local cause, one of the *vegetable bitters* may be prescribed, combined with a mineral acid, or with a stimulant: it should be taken

half an hour or an hour before meals. The bitters commonly employed are the cold infusion of chamomile, quassia, chiretta, gentian, calumba, or cascarilla, or the decoction of cinchona bark; to which may be added, as a stimulant, especially in gouty or intemperate persons, half a drachm to a drachm or more, according to circumstances, of the officinal tincture of any of these drugs, or of hop, orange peel, cusparia, rhubarb, or aloes; or the carbonate or aromatic spirit of ammonia. *Nux vomica*, or its extract, in doses of a grain, or *strychnia*, in doses of a twelfth of a grain three times a day, are remedies of great value. In the more general forms of atony there is no tonic more serviceable than *quinine*, combined with an acid and some agreeable aromatic tincture. I have referred above to some of the officinal *stimulants* which may be employed in conjunction with tonics; but advantage is also derived, in cases of general atony, where there is nothing to contra-indicate its use, from allowing the patient either a small quantity of sherry or good madeira, a table-spoonful of brandy in a small tumbler of water, or, where it agrees, a glass of ~~bitter~~ beer with his dinner; or even a little wine may be permitted to be taken with a biscuit at other periods of the day, should the patient feel exhausted or faint, or should his previous habits demand such a concession. The *metallic tonics* which are most applicable to these cases are the salts of iron and silver. The value of the ferruginous preparations and chalybeate mineral waters has been already referred to (55), and the use of the

preparations of silver will be mentioned in a future paragraph (77). I have referred to the costiveness which commonly attends general atony and anæmia, and which requires the use of *aperient remedies.* Rhubarb and aloes are the medicines best fitted for these cases; I usually prescribe them in the form of the compound rhubarb pill, which may be given in doses of from five to eight or ten grains. I have long been in the habit of combining with each dose of this pill a twelfth or eighth of a grain of strychnia, which decidedly adds to its efficacy, giving tone to the bowels, and enabling a smaller dose of the pill to produce an evacuation. The object of the aperient in these cases is not to purge the patient, but to produce one full and satisfactory fæcal evacuation daily. The dose may be gradually diminished as the general tone of the stomach improves. When the bowels have been constipated for a long time before the treatment is commenced, a dose or two of some more powerful cathartic may be required, such as calomel or blue pill, with the compound colocynth pill, or calomel and jalap. Should the bowels after this still continue obstinately sluggish, it is better to assist the operation of the rhubarb and aloes by an injection of a pint of cold water in the morning at a stated hour (the customary period after breakfast is the best), than to have recourse to more powerful medicines.

62. Like any other secretion, *the gastric juice is liable to be thrown out in an abnormal condition,* and when this is the case, the alterations it is destined to effect

upon the food cannot fail to be imperfect. Those states of the gastric secretion in which it manifests an unusual degree of acidity or acridity, will, with their causes, be alluded to in future sections. I shall here confine my remarks to the remaining cause of deranged quality in the secretion noticed in the scheme. In advanced cases of *Bright's disease of the kidney*, especially those in which this organ is found after death in an atrophied condition, painful digestion with flatulence, nausea, and vomiting, are symptoms by no means unusual. It is probable that in these instances urea is secreted at the same time as the gastric juice by the mucous membrane of the stomach, a view in accordance with the observation of Bernard and Barreswill,* that after extirpation of the kidneys urea was eliminated with the gastric juice, but was decomposed by the acid of that secretion, appearing in the form of lactate and phosphate of ammonia. It is unnecessary to point out here the diagnostic marks of Bright's disease; but where the pallid and puffy countenance, the clinical history of the patient, or signs of dropsical effusion, point in that direction, the urine should be carefully examined with a view to the detection of this very serious disease. Although the cause of the uræmia present may be incapable of removal, something may be done to prevent the interference of it with the gastric juice and with digestion, first by promoting the elimination of the urea from a different surface by means of the *warm water or vapour bath*, and the use in the mornings of

* "Archives Gén. de Médecine," April 1847, p. 449.

some *hydragogue cathartic* such as the bitartrate of potash or the compound jalap powder, and next by the daily use of the *mineral acids* (57).

63. The pain which arises after food from this cause may resemble that which has already been alluded to as accompanying delay in the digestive changes of the food (39); but when the *obstacle to the expulsion of the food* has been long in operation, the stomach, loaded with repeated meals and with flatus and acid matters (72, 88), the results of abnormal changes in the food which it cannot discharge, *becomes enlarged and weakened.* This condition throws an additional difficulty in the way of the expulsion of the food, which, thus retained, accumulates for periods varying from several hours to one or several days, at the expiration of which, spontaneous vomiting, often of large quantities of accumulated matter, occurs with relief to the sufferings of the patient. During this period of retention the contents of the stomach undergo abnormal changes, the leading features of which are the formation of a *large quantity of acid matter*, and the *evolution of gas* in considerable quantities. In fact, in addition to an excessive secretion of acid, *fermentation* takes place in the substances capable of undergoing that process (73), probably not only in consequence of the length of time the matters are retained, but also in consequence of *some unhealthy secretion, capable of acting as a "ferment"* (69), being poured out from the mucous membrane. When this is the case, the pain is commonly severe and accompanied by a sense of burning or distension,

the patient sometimes finding some relief from bending forward the body and pressing upon the abdomen, and from eructation of flatus. Complete relief, however, is not obtained till full vomiting occurs with complete evacuation of the contents of the stomach. The matters vomited are then yeasty in appearance, intensely acid to the taste and to litmus paper,* and on microscopical examination *torulæ and sarcinæ* are discovered in abundance. The bowels are constipated, and emaciation proceeds in proportion to the smallness in amount of the food which passes into the intestines. It follows from what has been said, that if physical evidence be furnished of a *dilated state of the stomach*, greater certainty may be attained in the diagnosis of obstruction to the passage of matters from the stomach. Having, in another work,† entered at length into the nature of this evidence, I shall content myself with alluding here only to its leading features. When the dilated stomach contains the accumulated food, the abdomen is more or less enlarged, the fulness being most evident at depending parts; a gurgling squashy sensation and sound, as of beating together liquid and air, are perceived on alternately and pretty sharply pressing with the fingers and withdrawing pressure on the abdomen, and the same sound may be elicited by the patient spontaneously and forcibly contracting and relaxing the abdominal parietes. When the dilatation

* "In Dr. Jenner's case of sarcinous vomiting the secreted acid was the hydrochloric."—*Medical Times and Gazette*, August, 1851, p. 191.

† "Physical Diagnosis of Diseases of the Abdomen," p. 104.

is very great, fluctuation may be perceived by the customary mode of manipulation, and a sound as of admixture of gas and liquid may be elicited by succussion. On percussion, dulness, having a line of level, is observable over that part of the abdomen which corresponds with the lower part of the enlarged stomach and with its contents, above which resonance is obtained. These phenomena disappear and new signs arise when the stomach has been emptied by free and full vomiting.

64. That *muscular action of the pyloric portion* of the stomach by which food is expelled into the duodenum, *may be impeded* by *organic disease* or cancer involving this division of the organ, the signs of which will be noticed in a future section (83), or by an *atonic state* the symptoms of which have already been dwelt upon (60), and the presence of which is in addition to be suspected when, on careful and repeated examination, in a case of dilated stomach, no evidence of thickening, induration, or deposit in the tissue can be discovered by the customary means of investigation. When this atony is extreme the *muscular coat of the stomach becomes atrophied.* The occurrence of atrophy of the muscular coat of the pyloric portion of the stomach, when cancer of the pylorus invades this part of the body of the organ, suffices to produce dilatation from retention of food when the pyloric contraction is quite inconsiderable.

65. This *hypertrophy* affects either the muscular or mucous and submucous tissues, or both, and is usually

the result either of irritant poisoning or of prolonged irritation applied to the stomach, either from an addiction to spirituous drinks, or from some of those causes of irritation enumerated in the scheme, especially an habitually or frequent highly acid condition of the secretions or contents of the organ. Under these circumstances the pylorus is excited to an unusual contraction, and the repetition of this is followed according to the known law of physiology by augmented nutrition. The history of the patient thus in such cases reveals the operation of one of these causes. If the hypertrophy be to a great extent, and all the circumstances be favourable for manual examination, there may be felt perhaps some obscure resistance to the hand in the epigastric or upper part of the umbilical region. The *thickening of the tissues forming the base of an ulcer* at the pylorus may produce a similar obstruction to hypertrophy independent of ulcer.* The symptoms of ulcer (84) will in such a case be conjoined.

66. A *cicatrised ulcer contracting the pyloric portion* of the stomach may be suspected when vomiting of blood or its passage by stool, with other symptoms of ulcer (84), have some time before preceded the signs of contraction of the pylorus and dilatation of the stomach, while at the same time no tumour is discoverable on careful and repeated manual examination, and the other signs of cancer (83) are wanting.

67. The usual cause of *obstruction in the duodenum*, such as to give rise to dilatation of the stomach, is cancer

* See a case by Dr. Todd.—*Medical Times and Gazette*, July, 1854, p. 1.

of this portion of the intestine, or of the tissues external to and surrounding it, such as the mesocolon, head of the pancreas, parts about the transverse fissure of the liver, etc. In these cases tumour is generally discoverable on examination of the abdomen, varying in size and irregular in form, fixed to the posterior part of the trunk, and sometimes pulsating. In such a case I have noticed a depression or separation in the usual abdominal fulness, corresponding with the situation of the pyloric valve, pressure made on either side of it producing a croaking noise, as gas was thereby forced backwards and forwards between the stomach and duodenum. The diagnosis of such a case would of course be assisted by the presence of jaundice and excessive emaciation, especially if conjoined with fatty discharges from the bowels.

68. The regulation of the diet is of the first importance in these cases. The food given should be such both in respect of quantity and nature as shall undergo digestion most quickly, be capable of absorption by the stomach without requiring for this purpose to pass the pylorus, and at the same time be such as is indisposed to undergo the process of fermentation. These objects are gained by *the use of small quantities of food,* by confining the patient almost entirely to *articles abounding in protein* compounds, and by enjoining *abstinence especially from saccharine, amylaceous, and oily matters.* But should the quantity of food capable of digestion without distress be too small for the patient's support, *nutritive enemata* should also be

given, and a pint of good beef tea may be daily administered in this manner with advantage.

69. The pain arising from an *over acid state of the gastric secretion* may be very early developed after a meal; it is often of a hot burning character, and is commonly associated with the eructation of matters that are sour to the taste, and produce a burning sensation in the pharynx, down the course of the spine and sternum, at a spot in the back corresponding to the cardiac orifice of the stomach or opposite the xiphoid cartilage. There may be associated with the over secretion of acid the secretion of some kind of "*ferment*," capable of producing alcoholic and acetous fermentation in the saccharine ingesta. The delay of the digestive process even in protein articles, in many cases in which there is an excess of hydrochloric acid thrown out, would also lead to the supposition that the *natural ferment-substance or pepsin was deficient in quantity or altered in quality;* and it would appear not improbable that it is some alteration in this substance which sets up the abnormal changes above alluded to (63), in the amylaceous and saccharine articles of food. When there is an abnormal quantity of acid poured into the stomach during digestion, *the urine* commonly, but not always, presents an alteration of the opposite character, becoming quite neutral in its reaction or alkaline from fixed alkali, and when the latter change is marked, it may present, on standing for a time, a deposit of granular phosphate of lime, or this salt in the form of crystalline plates may form an iridescent

pellicle upon its surface. At a later period after a meal, at a time when the change noticed by Dr. B. Jones to occur normally in the urine takes place (10), the urine may exhibit unusual acidity; if the latter be moderate, a deposit of urate of ammonia or oxalate of lime may fall; or if excessive, crystals of uric acid may appear. When all the acid in the stomach is vomited, however, this alteration to over acidity of the urine may not be observable, that secretion retaining for many hours the alkaline reaction and phosphatic sediment. Moderate excess of acidity in the stomach may produce no uneasiness, just as in the case of other sources of irritation (35), so long as there is no unnatural sensitiveness of the lining membrane of the stomach, even though the changes in the urine be marked. When the irritation is permanent and not dependant upon the ingestion of food, as in the case of ulcer of the stomach and distant sources of irritation, acid, acrid, and watery secretions may be poured out by the mucous membrane, at times when the stomach is empty as well as during digestion, and may give rise to attacks of gastrodynia and pyrosis.

70. It would be foreign to the object of this work, even if the present state of animal chemistry permitted of its certain determination, to discuss the mode in which the gouty and diabetic cachexies give rise to excessive secretion of acid in the digestive act, or to indicate the precise point at which an arrest takes place in those metamorphoses which the food and tissues undergo, prior to their elimination from the

system in the form of carbonic acid and the normal constituents of the excretions. The researches of the physiological chemist have hitherto succeeded only in indicating the path of future inquirers, and in erecting hypotheses of greater or less probability; nothing has been announced from which new remedies or improved methods of treatment can be deduced. In making the diagnosis of these two conditions, attention must chiefly be directed to the clinical history of the patient, his age and mode of life, as well as to the symptoms with which the excessive acidity is associated. Both forms may be associated with dryness of the mouth, coating of the tongue, and costiveness; but in the *gouty* subject there may be in addition lumbar or wandering pains, or tophaceous deposits; or there may have been previously one or more attacks of regular gout; and inquiry in such cases may elicit either a hereditary tendency to this disease, or such a mode of life on the part of the patient as is known to promote its development even in those not thus predisposed. The detection of an excess of uric acid in the blood, by the easy process devised by Dr. Garrod,*

* One or two fluid drachms of the serum of the blood, or, what answers as well, and for obvious reasons may be more readily obtained, of the serum of a blister, should be placed in a flattened glass dish, and be mixed well with strong acetic acid (about six minims to each drachm of serum). A fine thread, consisting of from one, two to three ultimate fibres of any linen fabric, is introduced and depressed in the liquid, and the whole set aside in a moderately warm place till almost dry. Should uric acid be present in the serum above the amount natural to healthy blood, it will form rhomboidal crystals on the thread, which may be detected by the microscope.—*Medical Times and Gazette*, March, 1854, p. 302.

would doubtless give certainty to the diagnosis. The *diabetic* origin of the acid secretion can only be positively asserted when the urine has presented the unequivocal evidence of saccharine impregnation, and this should be sought for in cases where there has been unusual debility, loss of flesh and weight, with much thirst and great appetite.

71. *Alkaline substances* are the natural chemical remedy for an acid state of the contents of the stomach; and when given in quantity sufficient to neutralise it, commonly have the effect of removing pain dependant upon this condition. The quantity necessary to be administered for this purpose, however, is often very considerable, so much so, indeed, as in severe cases to render questionable the applicability of the remedy, especially as in many cases it has no power of preventing the recurrence of the acid secretion. The chief cases in which a course of alkalies exhibits anything but palliative efficacy are those in which there is *a chronic catarrhal condition of the mucous membrane* of the stomach (81), in *gouty or diabetic diathesis,* or where *calculi* are irritating the urinary canals. Any of the alkalies or alkaline earths may be used as a palliative. *Liquor potassæ* and its carbonate, the alkaline bi-carbonates, carbonate of ammonia, lime-water, chalk, or magnesia, are commonly employed, and the selection from them is guided by the peculiarities of the case and the accompanying symptoms. Thus, *where diarrhœa is conjoined,* lime-water or chalk may be used; *where constipation*

prevails, or there is any reason for inducing a freer action of the bowels, magnesia or bi-carbonate of soda is selected; *where much flatulence is conjoined*, liquor potassæ or calcined magnesia is to be preferred to those medicines whose palliative operation is necessarily associated with the extrication of carbonic acid gas. In *gouty* and *calculous* cases liquor potassæ or the bi-carbonate of potash may not only be used as a palliative, but, even where acidity is not excessive, may be administered as a curative remedy, two or three hours after each of the principal meals of the day. In *diabetic cases* not only this alkali may be used with advantage, but also lime-water, or the carbonate of ammonia. In irritable states of the nervous system in which acidity, from the several causes enumerated, is apt to occur, lime-water has appeared to exhibit something more than a palliative operation (77). I have already, in a previous section, alluded to the value of the acids in correcting a disposition to excessive acid secretion. It is not always easy to perceive how they operate in these instances; but probably by being taken shortly before a meal, it is often by giving tone to the stomach (57), and by promoting a healthy secretion of gastric juice. Some metallic and vegetable substances, believed to possess *tonic and astringent* properties, are often serviceable in cases of excessive acid secretion, especially in those cases in which this arises from some irritation applied at a distance (I. D. *d.*). Those most serviceable are *nitrate of bismuth*, lime-water, or chalk, sulphate of zinc,

nitrate or oxide of silver (77), logwood, krameria, and kino. They should be administered about an hour before meals, and are effectual not only in curing the tendency to acid secretion, but in obviating the tendency to pyrosis, which occurs when the stomach is empty. Bismuth and lime-water are the most serviceable in cases where the acidity arises in connection with organic diseases of the stomach itself. Where a *constipated state of the bowels* gives rise to the over acidity of the gastric secretion, the use of astringent substances must give way to those means which are adapted first to clear out all accumulation in the bowels, and next to restore their healthy and normal action. With the former object, some of the most active *cathartics* are to be preferred, such as a dose or two of calomel and jalap, or of calomel or blue pill with the compound colocynth pill, or the useful, but often misused, blue pill at night and black draught in the morning. Where fæcal accumulation has been proceeding for some time, and has formed hard collections in the colon, large, warm, emollient enemata are requisite, and the saline purgatives are most useful. After the bowels have been satisfactorily evacuated, their healthy action may be restored by the means referred to in a previous section (61). The *gouty diathesis* demands, in addition to the remedial measures hitherto mentioned, a careful regulation of the mode of life and diet, early hours, *daily active exercise*, great *temperance* in eating and drinking, and the adoption of means fitted to *promote the free action of the skin*, such

as wearing an underclothing of flannel, and the frequent use of the vapour bath, followed by active friction with a coarse towel or horsehair glove. The use of *colchicum* also is not to be neglected as a curative measure; the vinum or acetum colchici (♏ x—xv), or the acetic extract (gr. j—i ß), may be given in these cases twice a day. In *diabetic cases saccharine articles* of food, or those which contain any large amount of *starch, should be avoided;* but an exclusively animal diet, which few patients will submit to, and which, if submitted to, fails in effecting its object, is not to be recommended. Care should be taken in these cases, as in gout, to favour the secretion from the skin, and by occasional small doses of one of the milder mercurial preparations, to promote a healthy secretion from the liver.

72. These *irritant changes* consist in the *decomposition and fermentation of substances* capable of undergoing this change with *extrication of gas*, similar to what would occur in similar circumstances out of the stomach (IV. B. *a.*), and in the *production of acid substances*, such as the acetic and butyric acids. The changes arising from fermentation are most remarkable in those cases in which *sarcinæ and torulæ* are discoverable in the vomited matters. The amylaceous and saccharine matters give rise, in this instance, to the formation of alcohol, and acetic and carbonic acids, the last of which *distends the stomach* and is eructated in large quantities. The probable cause of this alteration has been already discussed (63). In

what has been termed "*acute dyspepsia*," these irritant changes in the food play a prominent part. This derangement of digestion arises usually in connection with an *inordinately large meal* containing *articles which readily undergo an acidifying process*, sugar, butter, and oily substances contained in pastry, wine or beer, especially their more acid or sweet varieties, or a mixture of two or more of them, and substances either difficult of digestion in themselves, and thus calculated to irritate the stomach, or taken under circumstances which are fitted to delay the normal process of digestion (I. B.). Now, although I have found it desirable to separate in the scheme the two conditions which may give rise to "acidity of the stomach" and pain from this cause (I. D. E.), yet, practically, *the two are constantly united:* an over acid state of the secretions of the stomach and acid changes in the food either arise from the same cause, or the former is accompanied by such other alterations (69) in the gastric juice as must delay digestion, or give rise to fermentation; or else acidification of the contents of the stomach constitutes a source of irritation which excites an over acid and irritant state of the gastric secretion. While, therefore, there is little or no difference in the symptoms arising under the influence of the two causes of "acidity," many of the remedial measures adapted to acidity primarily arising from one cause are called for also in that which proceeds primarily from the other. That form of acidity with fermentative alterations in the ingesta, which arises in

connection with *the development of sarcinæ in cases of obstructed pylorus*, etc. (I. D.), is capable of palliation by medicines whose presence is fatal to the life of the lower form of organic beings. It was with a happy idea of this kind that the *sulphite of soda* was introduced into practice in these cases by Dr. Jenner;* the acid of the stomach immediately sets free sulphurous acid, whose poisonous action upon vegetable life is familiar to chemists and naturalists. The use of this salt also obviates the necessity for the use of any of the alkalies, the simultaneous administration of which would prevent the decomposition essential to the operations of the sulphite. The soda of the salt itself neutralises, so far as it goes, any acid in the stomach, just as would the soda of the carbonate, if this were administered; the only difference being, that in the former case an acid is eliminated which is of further service, and in the latter, one which by aiding in the gaseous distension of the stomach might only add to the distress of the patient. The dose of the sulphite given in solution is from half a drachm to a drachm three times a day. *Creasote*, in doses of two or three minims, gradually increased if necessary, may be used with the same object; but, though like sulphurous acid fatal to vegetable life, it is less effectual than the sulphite of soda in these sarcinous cases of acidity, partly, perhaps, on account of the double operation of the latter just referred to. In all cases of delay of gastric digestion, or when, from a deranged state of the gastric secretions or obstruction

* Loc. cit.

to the food leaving the stomach, there is a disposition to the *ingesta becoming acid or rancid*, substances disposed to this change should be either taken in great moderation, or altogether *abjured as articles of diet*. Butter, cream, and oily or fatty matters, sugar and pastry, or dishes containing them, such as articles of animal or vegetable food fried in butter or fat, come under this category. In sarcinous cases, especially, must this dietetic rule be adhered to, and the patient restricted to the diet already recommended (68).

73. The healthy mucous membrane of the stomach tolerates without pain the contact of food so long as the latter undergoes the normal changes in digestion, and leaves the stomach at a proper time. But, more than this, it bears without distress moderate occasional departures from this perfectly normal order of things; moderate degrees of irritation, if not too often repeated, may be applied without pain in any way indicating its existence. If then, in any case, the customary articles of food, prepared in a proper manner and sufficiently masticated, occasion pain immediately on their ingestion, or if the pain arises on any occasional trifling departure from the healthy process of digestion, that is to say, under occasional moderate over-irritation of any kind (I.), or if this irritation induces pain earlier than is customary (the pain not being referable to distension (IV.), spasm (V.), perforation (III.), or abnormalities of parts or organs external to the stomach (VI.), *an abnormal sensitiveness of the stomach* must be assumed. This conclusion is strengthened, if the pain

(still excluding the above-mentioned sources of distress), follows the ingestion of the most unirritating and most digestible articles of food, and especially when these are taken in the smallest quantity, and the pain after them is immediate. When pain arises from over sensitiveness of the stomach, it also usually occurs earlier and is more severe, the greater the amount of irritation to which the mucous membrane is subjected. Its seat is usually the epigastrium, lower region of the sternum or corresponding part of the back, and it may appear limited, in certain cases, to some one spot which can be covered by the finger, and is usually associated with more or less epigastric tenderness. Its character and severity vary with the nature of the irritation, and the amount of sensitiveness. *I do not believe that any diagnosis of the cause of the sensitiveness can be established upon varieties in these respects*; this must be founded on other considerations, especially upon the phenomena associated with the painful digestion, and upon a recognition of those circumstances out of which diseased conditions are admitted to arise. Whatever the nature of the sensitiveness, in high degrees of pain, nausea and vomiting immediately or after an interval very commonly ensue; the former, perhaps, being preceded or replaced by regurgitation; and either mode evacuating the stomach, if complete in its operation, often, but not always, gives more or less perfect relief. It is from a knowledge of this that persons who suffer habitually and severely after their meals, soon learn to adopt of their own accord one of the more ready

methods of inducing vomiting (25). There is another frequent character of pain from an over sensitive state of the stomach which must not be passed over, and that is the chronicity of the affection. Many of the causes of excessive irritation may be in operation once, an attack of pain ensue, and on avoidance of the cause never again recur; though with many causes dependent upon chronic states of disease, such as anæmia or atony, this is not the case; but, in abnormal sensitiveness of the stomach, the pain may recur daily, or nearly daily, with various degrees of severity, according to the care which the patient takes to avoid excessive irritation, for weeks, months or years. It is further of importance to keep in mind that, although in the scheme several causes of excessive sensitiveness of the stomach are separately enumerated, two or more of them may be, and often are, found associated in an individual case, each modifying the phenomena arising out of the other, and often rendering the diagnosis difficult and the treatment complicated.

74. After a conclusion has been arrived at, that, in any given case of pain after food, this symptom is due to an over sensitive condition of the stomach, the sole dependence of the latter upon the simplest cause, viz. —*exalted impressibility of the nervous system* connected with the organ, is not to be assumed until a careful investigation of the history of the case and associated phenomena has convinced the observer that hyperæmia or inflammation, ulcer or cancer of the stomach are not present to explain it. But, even should the

physician satisfy himself that one of these affections is in operation, he must not on that account ignore the influence of exalted nervous impressibility, should direct indications of its action be exhibited either topically or throughout the system at large; and such indications should be sought for, and if discovered, be accepted as guides in treatment, whenever the pain after food is more intense than usually occurs under similar circumstances of irritation, with the amount and duration of disease believed to be in existence. It is also to be observed that exalted nervous impressibility is much more commonly met with in association with one or more of the conditions alluded to, than independently of them. I may further remark with reference to the scheme, that, although for the sake of convenience general and locally exalted nervous impressibility are separated, yet in practice it commonly happens that the two are conjoined, persons of highly nervous temperament being more apt than others to suffer from all kinds of nervous disorders, and from nervous sensitiveness of the stomach among the number; while on the other hand abnormal sensitiveness from any cause giving rise to pain, if it has lasted long, induces more or less disturbance in the nervous system at large, with a greater or less number of the symptoms connected with general exalted impressibility.

75. A *generally exalted state of nervous impressibility* is met with as a physiological condition in what is known as the "nervous temperament," and, equally with that which arises as a pathological state,

exaggerates and magnifies the effect on the sensorium of irritations applied to the mucous membrane of the stomach. The nervous temperament is most commonly met with in females, but, as is well-known, is not confined to this sex. In these persons not only do physiological nervous stimuli produce upon the mind and body unusually powerful effects, but the medical history of the patient exhibits throughout a class of diseased conditions in which nervous phenomena have principally prevailed, excessive or defective sensation, sympathetic pain, convulsive, spasmodic or paralytic affections, or some of those phenomena which characterise what is known as hysteria. And it is this same class of nervous phenomena which is met with in that pathological exalted impressibility, which takes part in the production of pain after food. Paroxysms of *neuralgic pain in the stomach* itself when free from food, relieved by firm pressure and accompanied by a flow of water from the mouth or stomach, indicate the participation of the nerves of the stomach in the exalted excitability, while neuralgiæ in other parts which the gastrodynia may follow or by which it may be replaced, indicate a more general participation of the nervous system in the same condition. The occurrence of other painful affections and disturbances of the motor, especially involuntary motor functions, point in the same direction, such as headache, painful menstruation, globus, vertigo, cramps, cough when the chest and throat are ascertained to be free from disease, palpitations, and the manifold phenomena of hysteria. The mental or

moral faculties of the individual often take a share in the general disturbance of the nervous system; there is an indisposition or sense of incapacity for mental work, the temper is irritable and captious, and trifles disturb its equanimity, the purposes of the patient are marked by irresolution, he feels gloomy and desponding, or becomes melancholy or even suicidal in his thoughts. But the most common of the severe mental disturbances consists in a morbid concentration of the thoughts and attention upon the state of the bodily health, and especially upon the state of the digestive and circulating functions: the patient takes accurate note of every minute variation in his sensations, pulse, tongue, evacuations, etc.; and in every thing he proposes to undertake, however trifling, ponders first upon the probable influence it will exert upon his actual or imaginary ailments. In some cases, the hypochondriac adds to all this absurd and insane explanations of his feelings, and an actual *delusion* is observed to dominate in the mind. Besides, this generally exalted impressibility exaggerates the operation of all those causes of delay in the gastric changes in which the nervous system takes a part. Thus slighter causes of *mental disturbance or emotion* arrest the salivary or gastric secretions (52), irritation in the stomach or elsewhere more readily disorders the quality of the gastric juice, and less degrees of gastric or distant irritation suffice to produce "*acidity*" (I. D. *a. b. d.*), and irritant changes in the contents of the stomach (I. E.). It is also of assistance to the recognition of

this state of the nervous system, to recollect that it arises most remarkably in connection with a state of general atony, and under the operation of its causes (60), or under the influence of intense mental anxiety, care, or depressing emotions. In the cases where pain after food results purely from exalted nervous impressibility, the epigastric region is not so commonly tender on deep pressure as in cases of hyperæmia or ulceration, the appetite is often irregular or depraved, but the tongue is clean, though often flabby and indented at the edges by the teeth, and thirst and feverishness are wanting. It often happens in hysterical subjects, that the pain after food in connection with this condition comes on without any warning from previous disorder of digestion, perhaps replacing some other form of nervous disturbance, and a severe attack of pain may be succeeded by an abundant flow of watery urine. The pain, too, of certain occurrence when the patient takes his food under ordinary circumstances at home, with every care in its selection, etc., may fail to appear on his entering into company or travelling a short distance from home, even though food is eaten of which under other circumstances he would not have dared to partake. The condition known as "*spinal irritation*" is sometimes associated with those exalted states of nervous impressibility now under consideration; and, when this is the case, in addition to or independently of pain on pressure over the region of the stomach, the skin over the epigastrium and lower regions of the stomach may

present an abnormal degree of sensitiveness, on pinching or drawing the finger along it; spasms, dyspnœa and palpitations are apt to be conjoined, and some part, usually the lower dorsal region of the spine, is tender to pressure or percussion.

76. In prescribing *a diet in over-sensitive conditions of the stomach,* it must be recollected that the food which comes into contact with the interior of the organ is to be regarded much in the same light as a local application made to tender parts upon the surface of the body; and as we should avoid bringing in contact with the latter any but bland and unirritating dressings, so with the former a similar principle must guide us, and we must select such matters only, and in such quantities, as, while they are fitted to sustain the body, would be unirritating if applied to an external sore, and which experience has shown may be used introduced into the sensitive stomach without producing pain or distress. In inflammatory and ulcerative conditions of the stomach, where the tenderness of the stomach is more due to the extent and severity of these lesions than to the exalted impressibility of the nervous system, the diet must often be exceedingly rigid, being limited to some of the *most bland and soft or liquid articles of food,* such as milk, arrowroot, gruel or beef-tea, which can sometimes only be tolerated when given in the smallest quantities at a time, such as a table-spoonful, or a tea-spoonful. In cases in which acidity prevails, one-third part of lime water is advantageously added. When these small quantities are given, they must be repeated

every ten or twenty minutes with occasional longer intervals, and if insufficient to support the patient, injections of good beef-tea must in addition be thrown into the rectum. In cases *where the portal circulation is much impeded an absolutely liquid diet is objectionable*, since an obstacle is presented to its absorption, and in such cases even minute quantities given at intervals may accumulate, and at last the whole be vomited together. But it is only when there is a great disposition to vomiting that this sort of diet is called for or desirable, in cases where *the sensitiveness of the stomach is due merely to nervous impressibility*. Where this is alone present, it commonly suffices carefully to avoid or remove all grounds of abnormal irritation, and by the several means mentioned in former sections, to favour the rapid and complete performance of the digestive act. In these, as in atonic cases, a moderate meal of solid food, upon which the stomach can contract firmly, is commonly more easily tolerated, and at the same time more rapidly and painlessly digested, than the liquid diet above referred to. Even in cases where recourse must be had to the latter, as the sensitiveness of the stomach decreases, the quantity and intervals of food may be increased ; and at the same time, as a bulk of liquid is often with difficulty digested, a transition may be made to tender and finely chopped animal food mixed with real gravy as it flows from a cut joint, and a little bread, the whole being well and carefully masticated. Some variety should be introduced into the diet-table, and regard should be had to the capricious

peculiarities of which a sensitive stomach is often the subject, both in the selection of the food, its mode of cooking (21), and its temperature.

77. *Opium* in doses of a third of a grain or half a grain, or an equivalent quantity of one of the salts of morphia, is often highly effectual in subduing an excessively sensitive condition of the stomach, and, like all remedies intended to exert a topical anæsthetic operation, should be administered about half an hour before food. It is most serviceable in those cases which are associated with an irritable condition of the bowels, where taking food induces a stool immediately, or within a short time, and especially when the peristaltic action is accompanied from any cause by pain (92). The use of opium is also demanded in cases of general nervous excitability, with a view not only of lessening topical sensibility, but also of exerting its *general calmative operation* upon the functions of the brain and nervous system at large, and *of producing sleep,* without the enjoyment of which an irritable condition of the nervous system cannot be expected to be subdued. With this view a full opiate should be administered at night, and in the instance of drunkards or exhausted individuals whose symptoms are verging upon those of delirium tremens, it may be also requisite to allow smaller quantities during the day. In ordinary cases, however, much may be done in *calming nervous excitement and producing sleep without the use of opiates,* whose tendency to constipate the bowels often proves an impediment to their employment. *Removal from*

the cares and anxieties of home or of business, the soothing assurances of the physician, *free exposure to the air*, with the quiet of the country and such *exercise* as can be borne without distress, attention to the regular performance of the digestive process, and to the *daily healthy evacuation of the bowels*, and in addition a *tepid bath at bed-time*, often prove sufficient not only to calm general nervous excitement, but to ensure natural and refreshing sleep. Should these means fail, twenty minims to half a drachm of tincture of *henbane* may be given at bed-time, or opium may at last be resorted to. Where it is considered desirable to avoid the internal use of opium to subdue over-sensitiveness of the mucous membrane of the stomach, the extract of *belladonna* or of *stramonium* may be administered in its place in doses of a third or half a grain. *Hydrocyanic acid* also is a medicine of much value for the same purpose, but should be given in frequently repeated doses of one to three minims (Scheele's strength), at a time when the stomach is empty, and it should not be diluted with more than two or three drachms of water. But in addition to these medicines, there are others which experience rather than analogy has taught us to use to allay excessive sensitiveness of the lining membrane of the stomach. The *alkalies*, especially lime-water, have already been mentioned (71), and I have only to refer here, in addition, to the nitrate of bismuth and the nitrate and oxide of silver. The *nitrate of bismuth* is commonly administered in doses too small to produce any bene-

ficial effect; it should be given in doses of from ten to twenty grains, suspended in water with the aid of a little mucilage, and the dose repeated occasionally while the stomach is free from food. The *nitrate* or the *oxide of silver* may be used in the form of a pill made with bread crumb two or three times a day, while the stomach is empty, an hour or so before meals, in doses commencing with a third or half a grain, but which may be increased by degrees to a grain or a grain and a half. At the end of a month or six weeks the use of the salts of silver should be suspended so as to avoid the chance of permanent discoloration of the skin. Of the above metallic remedies bismuth is most apt to confine the bowels, and hence during its use an occasional aperient is generally required (61). The best results also often follow *the application of anodynes externally.* A soft *plaster containing opium* or one made with *extract of belladonna,* or a *liniment containing aconite, morphia, veratria or chloroform,* not only rubbed over the part, but kept constantly applied by the aid of lint steeped in it and covered with oiled silk, may be used for this purpose. A very effectual plan consists in raising a blister over the seat of pain by cantharides plaster or the nitrate of silver, and after carefully removing the cuticle, *sprinkling the denuded surface with half a grain or a grain of morphia,* or one of its salts, once or twice in the twenty-four hours, subsequently dressing it with moistened lint and oiled silk.

78. While insisting on the importance of *bodily exercise* as a remedy for subduing that general nervous

impressibility which is so often associated with painful gastric digestion, it must be kept in mind that its kind and amount must be regulated by the powers of the patient, not indeed always as represented by himself, but as judged of by the general tone of the system, by the readiness with which exertion induces perspiration, and by various circumstances which the acute and experienced physician readily seizes to guide his opinion upon this point. Where a patient is really much debilitated, passive exercise in a carriage can at first probably alone be used; but as daily exposure to the air improves the strength, or if this be little impaired when the case first presents itself, walking exercise should be encouraged. It should not, at the beginning, be used to the extent of producing fatigue, but should, during part of the day, supersede passive exercise, and at last completely supplant it, except of course where the patient is *travelling*, in which case riding and walking may be made with advantage to alternate through the day. As the strength improves, the amount of active exercise taken should be increased. Horse exercise is very serviceable in many cases, and has the additional advantage of interesting the mind more than walking, in consequence of the variety of objects presented to the senses, from the greater extent of country which may thus be traversed in a single journey. In any case it is well to bring into play other inducements to active exercise, than mere duty: the patient may thus be advantageously encouraged to carry on *some healthy occupation*

which requires him to be almost constantly out of doors, or to engage in *out-of-door games or field sports;* or persons disposed to such pursuits may find *occupation for body and mind* in the practical pursuits of such sciences as geology, botany, or entomology, and in seeking and collecting for themselves specimens in illustration of the science they select. All these suggestions of employment have especial reference to those cases in which a tendency to hypochondriasis is observed; not only because exercise in the open air is thus, in a manner, rendered compulsory, but also because occupation relaxes and diverts that over-strained attention with which such persons constantly regard their gastric and other bodily ailments. Healthy *bodily exercise* and healthy *mental occupation*, such as I have referred to, are both found in travelling in an interesting country. A legitimate and salutary outlet for the powers of the mind and sympathies of the heart, in such of the female sex as are placed in circumstances above domestic anxieties and cares, may be found in active ministration to the necessities of others less fortunate than themselves, and in carrying out by their own exertions some of those numerous benevolent projects which are characteristic of our time and nation.

79. The amount and duration of these *changes in the vascularity and nutrition of the mucous membrane* of the stomach which shall suffice to occasion pain after food, will depend in a great degree upon the temperament of the patient, and the extent to which

the nervous impressibility, either general or local (74, 75), is exalted in the individual case. When the latter is normal or obtuse, it may happen that slight pain after food may only occur when these changes have lasted for a long period, and been productive of serious mischief. Much, too, will depend upon the conjoined irritation either from delay in the digestion in consequence of the associated abnormalities in the flow of the gastric juice (I. B. *d. g.*), from acidity (I. D. E.), etc. The presence of *hyperæmia or inflammation* must be judged of, not from any peculiarities in the pain which succeeds the taking of food (73), but from a consideration of the associated phenomena, the history of its development, and the previous operation of its admitted causes.—1°. The *associated phenomena.* Apart from those symptoms which have been referred to as connected with associated derangement of the gastric secretions (I. B. *d. g.* D. E.), and those which accompany more or less all the forms of abnormal sensitiveness (73), there may be present here, thirst, especially during digestion, dryness of the mouth and lips, often redness, peeling or chapping and bleeding of the latter, redness, heat, and tenderness of the gums and mucous membrane of the mouth and fauces, sometimes aphthæ, and a *tongue* either coated, dry and brown, more or less intensely red with enlarged papillæ, or presenting a dark congested appearance; in other cases the whole surface of the tongue looks smooth, polished, deprived of epithelium generally or in patches, or variously wrinkled or fissured, or it

may be completely natural in aspect. The conjunctivæ often appear bloodshot, and the tarsi are red and sore, the eyelids being disposed to be gummed together after sleep. Pain, independent of food, is not a remarkable symptom, and if present, is not of very severe character, but is increased by pressure. There is often febrile disturbance, especially during digestion, marked by lassitude, flashes of chilliness or heat, flushing of the countenance, accelerated pulse, dryness and heat of skin generally, or confined to the palms of the hands, soles of the feet, and cheeks, with scanty and high-coloured urine. Where the condition of the mucous membrane of the stomach has extended itself to the duodenum, more or less jaundice may present itself, and the implication of the intestines lower down may be marked by the setting in of a mucous or serous diarrhœa. In cases of portal obstruction (*f.*) and of suppressed hæmorrhages (*g.*), blood may be expelled by vomiting or stool. In other cases the vomited matters are mucous or bilious when the stomach is empty; or if the vomiting occurs after food, consist of the latter in various stages of digestion mixed with mucus. But it is not essential to the diagnosis that all these symptoms, or even the greater part of them, shall be present, especially in acute cases of catarrh of the stomach, arising out of a debauch, etc., and where they are but few, and not strongly marked, great and most valuable assistance is furnished by the clinical history of the case and examination of the patient affording evidence of—

2°. The *previous operation of the admitted causes* of hyperæmia and inflammation (II. B. *a.* to *g.*) (80).

80. The application of a *cause which operates with severity* may, in a previously healthy stomach, induce such a state of hyperæmia as may suffice for the production of pain after food; especially if the cause be such as at the same time to promote inordinate impressibility of the nervous system generally, or of that portion more immediately in relation with the stomach. Of this character especially are the operation of *cold water drunk when the system is depressed and exhausted by violent exertion*, and when the body is consequently unable to oppose to the destructive agency of cold a sufficient amount of conservative energy. Such again is the operation of *indigestible and irritant food*, and even of digestible food, when taken after prolonged starvation. As another instance of severe irritation may be mentioned, the *ingestion of an inordinate quantity of alcoholic liquor*, which Dr. Beaumont observed in Alexis St. Martin to be shortly followed by the condition of stomach under consideration. It may arise in a healthy person also from *disorder of the functions of the skin*, either immediately on simple exposure to cold, or as a sequel to ordinary catarrh. It is probably in this way that it is apt to arise during residence in a cold and bleak district, and where the alternations of temperature are excessive, during prolonged frosts and the prevalence of north-east winds. The effect of a *febrile state* in promoting this condition may not only be observed in ordinary catarrh, in the course of

phthisis and other chronic diseases accompanied by irregular fever, but to the induction of more or less of this condition must partly be attributed the effect of mental irritation, of tippling, and of very hot or dry seasons, and climates. When the irritation arising from irregularities in the digestive process is the cause of hyperæmia, the history of the case is one which often extends over months, or even years of dietetic errors, and the patient has, probably, for a long period suffered either from pain after food, or more or less from symptoms referable to a disordered state of the secretions and functions of the stomach. Much light may be thrown upon cases of painful digestion by the discovery of some of those *diseases which impede the return of blood from the mucous membrane* of the stomach and bowels. The most important of these are diseases of the *heart*, e. g., valvular lesions and fatty degeneration, and those diseases of the *liver* which obstruct the passage of the portal blood through the organs, e. g., induration and cirrhosis. A careful inquiry into the medical history of the patient, and a physical examination of the heart, lungs, and liver, are necessary to the diagnosis of the former of these; while the obstructive diseases of the liver are to be distinguished partly by physical examination, partly by the presence of more or less peritoneal effusion, some jaundice, and, perhaps, conjoined enlargement of the spleen, and in part by the history of the case furnishing evidence of the known causes of these hepatic diseases, such as habits of tippling, residence in a tropical and

malarious climate, etc. It is in cases where hyperæmia arises from these obstructive diseases, whose diagnosis I do not here propose to discuss any further, as well as where it has originated in *suppressed menstrual and hæmorrhoidal discharges*, that hæmorrhage from the stomach, either extensive and alarming, or merely occasioning an admixture of some black or chocolate-coloured portions with the vomited matter, is observed, a symptom which is sometimes connected with superficial ulceration of the mucous membrane.

81. The remedial measures recommended in those cases of pain after food, which are connected with an over-sensitive condition of the stomach from hyperæmia, demand a few remarks.—The principle which should guide the practitioner in prescribing the diet has been already dwelt upon, but there is often considerable difficulty in carrying it out in practice. In *recent cases arising from a debauch, an emetic* of ipecacuanha, *abstinence* from food or the use of only a little cold water or barley water, with *a dose of some purgative,* generally suffices to remove the hyperæmia and restore the digestive powers of the stomach. Should it fail to do so, the emetic and purgative may be repeated with advantage. In protracted cases of *chronic hyperæmia or inflammation*, a diet consisting of small quantities of farinaceous matters, as gruel, sago, soft plain bread pudding, whey, with a moderate allowance of the softer acidulous and mucilaginous summer fruits, usually agrees best, and must be persisted in so long as febrile excitement succeeds the use of more stimu-

lating articles of diet. In the more *febrile cases*, too, acidulous drinks may be allowed, but in those *cases in which portal venous obstruction* impedes the absorption of watery matters, liquid articles of food should be allowed but sparingly, the softer kinds of solid food and fruits being better adapted to digestion than gruel, beef-tea, etc. The withdrawal of blood from the arm is only called for in cases where, in connection with the suppression of an habitual discharge or from other causes, a state of *general plethora* is present; but *local bloodletting by leeches* is a remedy more frequently demanded. In cases of *obstructed portal circulation*, and where the hyperæmia is connected with *suppression of menstrual or hæmorrhoidal discharges*, the leeches are best placed *upon the verge of the anus*. Three or four are mostly sufficient to relieve the portal system, if the bleeding from the bites be encouraged by the application of a warm linseed poultice. In other cases, leeches to the epigastrium are only required where the symptoms of hyperæmia are severe, tenderness extreme, and the thirst great independently of food. Whenever employed, caution must be used, especially in habitual tipplers, both in respect to their number and repetition, so as to avoid depressing the powers of the patient. *Counter-irritants* are remedies of more general value, and are well adapted to the more protracted cases, and those which arise from the retrocession of cutaneous eruptions. In the latter instance, the production of a crop of pustules by means of the croton oil liniment has appeared a useful method.

Much relief is often afforded, and the digestion rendered less painful, by the application of a sinapism or of a layer of flannel soaked in some rubefacient liniment to the epigastrium, for a sufficient time to redden the skin, *during the digestion* of the principal meal, where regular meals are allowed; and if they are not allowed, by causing the patient to wear the flannel thus imbued continually, covering it to prevent evaporation with a layer of oiled silk or thin gutta percha. A stimulating plaster worn in the same manner is often also of service. If a blister be applied, the denuded cutis may be used as a means of introducing medicine into the circulation for the alleviation of pain (77). It is of the highest importance in all these cases *to promote the free action of the skin,* especially where it is dry and harsh, or where the hyperæmia owes its origin to exposure to cold or the retrocession of a rash. For this purpose, baths and a suitable climate, or confinement to a warm atmosphere, are remedies far preferable to the use of diaphoretic medicines, many of which are inapplicable, either because they are irritants to the mucous surface with which they come in contact, or for other reasons. In fact, in treating these cases, the general rule should be followed of *sparing the stomach as much as possible,* whatever the indication to be fulfilled. The *warm bath or vapour bath* should be used daily for twenty minutes or half-an-hour, or, in cases of retroceded rash, the hot-water bath may be preferable for a shorter period. It is best taken before going to bed, and active friction of the skin with a flesh-brush or horsehair

glove may be used on rising in the morning. In cases where the *menstrual or hæmorrhoidal flux have been suppressed* the *hot hip bath* may be used. Where it is an object merely to *keep the bowels in a regular condition*, and a diet consisting in part of acidulous fruits fails to effect it, an enema of warm water is to be used in preference to purgative medicines; but the latter class of remedies is sometimes called for, and, used in moderation, is very useful in treating certain hyperæmic conditions of the stomach. Thus, when this state has recently arisen from the irritation of a debauch, a brisk purgative of any kind, with abstinence, will often at once restore the healthy state of the mucous membrane. In cases too of *portal obstruction*, where the liver itself is not the seat of serious organic change, a dose or two of one of the hydragogue and cholagogue purgatives is often beneficial; as for instance, of the compound colocynth pill combined with a grain or two of blue pill, or the compound jalap powder; and this may be followed up by occasional doses at night of one of the milder mercurials, as hydrargyrum cum cretâ, followed in the morning by a small dose of castor oil or one of the neutral purgative salts with taraxacum. Where the liver has undergone any serious organic changes, e.g. cirrhosis, induration, etc., advantage is sometimes obtained from the use of the nitro-muriatic acid bath. In cases of *chronic catarrhal inflammation* also, much benefit is derived from the internal use of *alkalies* (71), and from the *alkaline mineral waters*, as those of Carlsbad, Marienbad, Ems, Kissingen, etc. It only

remains to notice *the question of allowing stimulants* to the patient in hyperæmic and inflammatory conditions of the stomach. As a general rule alcoholic stimulants, being topical irritants, are to be avoided, and whatever other reason there may be for allowing them, this rule must be rigidly enforced if pain follows their ingestion. In the instance of *persons greatly debilitated,* and of those who are *habitual tipplers,* or who being advanced in life have always been *accustomed to their moderate use,* digestion goes on better and less painfully when a small quantity of wine or weak brandy and water is allowed with the meals ; the hyperæmia is not increased, and the nervous depression which might result from the withdrawal of the habitual stimulus is avoided. Both the stimulant and animal food may be allowed with greater safety where a counter-irritant is being simultaneously employed.

82. There are certain *morbid conditions of the mucous membrane of the stomach involving its secreting structure* more or less completely, which have very lately been made the subject of inquiry by Dr. Handfield Jones,* and which consist in fibroid degeneration with obliteration of the tubular glands which normally secrete the digestive fluid, and loss of substance, changes some of which are allied to those that are known to take place in cirrhosis of the liver, and in certain morbid conditions of the valves of the heart. The morbid appearances due to these alterations have hitherto

* "Transactions of the Pathological Society of London," vol. iv., p. 124 ; and *Medical Times and Gazette,* June, 1854, p. 581.

been either inexplicable or regarded as the result of chronic inflammation, but like fibrous tumours or malignant growths, it is probable they are not essentially connected with hyperæmia, although the latter may possibly hasten and favour their progress. When the whole of the mucous membrane is thus degenerated, gastric juice cannot be secreted; but, where a portion is left normal, Dr. H. Jones appears to think that a change of this kind, gradually coming on, may be met and compensated by increased secretion from the part left healthy. The sensitiveness of the membrane also appears to be compromised in the organic changes it undergoes; since in these cases of extensive disorganisation, and in those where the tubular glands are in all points obliterated, and no gastric juice at all can therefore be secreted, no distress of any kind arose after food to indicate such serious mischief. It is probable that some of the changes in the mucous membrane of the stomach noticed by Louis,* and subsequently recognised by other observers in cases of phthisis, and which, regarded as inflammatory, have long puzzled physicians on account of the absence or paucity of symptoms,† are referable to degeneration of the character brought under the notice of the profession by Dr. H. Jones.

83. Pain after food may arise at a very early period

* "Researches on Phthisis," (Sydenham Society edition), p. 62.

† "When the mammillated state was the sole existing lesion of the mucous membrane of the stomach, I have not observed any symptoms referable to it with certainty."—Louis, p. 205.

of *gastric cancer*. When the cardiac orifice is the seat of the disease, the pain is perceived immediately on the deglutition of a morsel of food, whose progress downwards is arrested by the accompanying contraction of the orifice. The pain is referred either to the region of the ensiform cartilage, or to a corresponding spot in the back, and the food is regurgitated either on the arrest of each successive mouthful, or after a few have been swallowed. The resulting inanition causes emaciation to be rapid and extreme, the abdomen is retracted and the organs displaced from emptiness of the digestive canal, but tumour is rarely discoverable.* Similar pain immediately after swallowing, with a conviction of arrest of food at the situation of the cardia, may arise however independently of cancer, as the result of spasmodic stricture of this part, which is to be distinguished from cancer by its obvious connection with a nervous and hysterical condition, by its variableness, being one day marked, but little troublesome on another, by its seldom supervention, and by its aggravation under mental irritation or emotion. The presence of cancerous cachexia, and the recognition of cancer of the liver, aid in the diagnosis of these two conditions. Confining my observations now to cancer affecting other portions of the stomach, it is to be remarked that at all periods of the disease, the readiness with which pain follows the taking of food depends greatly upon the sensitiveness of the stomach from nervous causes (II. A.), upon the interference of the

* "Physical Diagnosis of Diseases of the Abdomen," p. 108.

stomach disease with *the tissue and secreting function of the mucous membrane* (I. B. *d.*), and also upon the extent to which the cancerous deposit impedes the movements of the stomach and expulsion of food into the intestines, when involving any, especially the pyloric portion of the body of the organ and accompanied by atrophy of its muscular texture (64). Usually, however, at the earlier periods the pain is not severe or immediate on the taking of food, but arises, like that which follows upon arrested gastric changes in the food (I. B.), during the progress of the digestive act, and may only be distinguishable from pain acknowledging this origin by taking associated phenomena into consideration. As the disease advances, however, and ulceration sets in, the pain after food usually becomes more severe and more certain in its occurrence, though varying in intensity from time to time, and is more immediate upon the act of ingestion; but even in extensive cancerous ulceration, when the nervous impressibility of the patient is obtuse, the pain may be trifling and uncertain, or merely such as is accustomed to be noticed in ordinary delays of digestion (39). Just therefore as in other forms of abnormal sensitiveness, the *diagnosis of cancer* must be based not on the character of the pain after food, but on the associated symptoms, and in some degree on a recognition of the circumstances under which the disease is accustomed to arise.—1°. *Associated symptoms.* One of these is spontaneous pain in the epigastrium, hypochondria, or generally over the abdomen, which

may occur in paroxysms like gastralgia, but, once developed, rarely leaves the patient entirely to the end of the case; it varies in severity, but, on the whole, is more distressing than that from hyperæmia, and is sometimes lancinating. It is aggravated by food, and often increased by pressure; sometimes, however, as in pure nervous pain, this is not the case, and food or pressure may relieve it. The appetite is impaired pretty equably throughout the progress of the case; a symptom which also pertains to degenerated conditions of the mucous membrane from non-malignant disease (82). Vomiting is a common symptom; the matter ejected at first, when the stomach is empty, is usually a glairy fluid; but, when the stomach contains food, the latter is thrown up in various degrees of digestion. The vomited matters are often intensely fœtid, and fœtid gas is eructated at intervals from the stomach; the latter symptom may occur also in cases of "acute dyspepsia" (72), and in highly hyperæmic conditions of the mucous membrane. *When cancer affects the pyloric valve* and the neighbouring portion of the body, an impediment is placed upon the expulsion of the contents of the stomach into the duodenum, and in cases of this kind not only may the physical signs of dilatation of the stomach (63) be recognised, but successive portions of food, in place of being vomited shortly after being taken, may accumulate in the stomach and be thrown up at intervals, which vary from several hours to several days; in the latter instance, often in enormous quantity. It is in this

state also that dilatation of the stomach occurs, and the symptoms arise which have already been pointed out as associated with sarcinæ in the contents of the stomach (63). It has been asserted that recent meals are sometimes retained, when a former, or yesterday's meal is ejected; but I cannot say I have ever distinctly seen this occur, although from subsidence of the heavier portions of the contents of the stomach, where this organ is sac-like and motionless, a sort of mechanical separation may take place, and the more liquid and light portions may be vomited first or alone. All the above symptoms are most severe and characteristic in the advanced cases of cancer. At the later periods of the disease *hæmorrhage* into the stomach takes place, and the vomited matters become brown-coloured or blackish from the presence of blood which has oozed into the cavity and become altered by the gastric fluids, or resemble "coffee-grounds" or "sooty matter." Blood in large quantities, however, may be vomited, as in ulcer of the stomach, from erosion of a large vessel (84). In other instances, in place of being vomited, the blood is passed by the rectum in the form of black stools. The bowels are usually constipated in cancer; but, towards the last, it is not rare for an exhausting diarrhœa to set in. The tongue does not present the morbid appearances described as occurring in hyperæmia (79), but is usually clean and commonly looks anæmic. Fever, also, is wanting; and, in place of it, the face, lips, and mucous membranes are pallid, and the integument acquires after a

time the straw-coloured tinge of cancerous cachexia. Emaciation is sooner or later observed, is sometimes rapid, and often becomes extreme before the patient dies. But, of all the indications of cancer of the stomach, none is of greater diagnostic importance than tumour; not that cancer may not prove fatal without its being discovered during life, but because its absence always throws a doubt upon the diagnosis, in consequence of many of the other symptoms being common to cancer with other states, and being difficult to estimate accurately as to value. As I have discussed elsewhere the physical evidence of cancer in the stomach,* I shall confine myself to very few remarks upon the subject here. I have already mentioned that tumour is rarely discoverable when cancer affects the cardiac orifice of the stomach; but it is more easily and surely found when the anterior wall of the body of the stomach is cancerous, and where the pylorus is its seat, may mostly be found in advanced cases, if not at once, yet on careful and repeated examination. Its usual seat, in the latter instance, is a little to the right of the median line, and from one to three inches below the margin of the ribs; but it may be found elsewhere, in consequence of having gravitated or been displaced into other regions of the abdomen. The size of the tumour varies: it is hard, usually somewhat moveable, and percussion over it elicits a modified dulness.—2°. *A recognition of the circumstances under which cancer of the stomach mostly occurs* sometimes

* "Physical Diagnosis of Diseases of the Abdomen," p. 108.

assists the diagnosis, and these may be dismissed in a few words. It is most common in the male sex. It rarely occurs in persons under thirty years of age. It often follows the prolonged operation of intense mental anxiety, and is often traceable to hereditary or family taint. Assistance in the diagnosis is also sometimes afforded by the recognition of cancerous disease in other parts of the body, as in the liver or lymphatic glands. The *remedial treatment* can be but palliative, and consists of those measures which are enumerated as applicable to abnormal sensitiveness of the stomach in general (II.). In the early stages of the disease, it may suffice for the prevention of pain after food to avoid or remove every cause of unusual irritation (I.), and especially to obviate all the causes of delay in gastric digestion (I. B.), as the circumstances of each individual case may suggest; and, with this precaution, even in advanced and ulcerative cases, solid food may sometimes be taken without distress.

84. There are two kinds of *ulcer of the stomach* described by Rokitansky,* and generally recognised by pathologists; one which he terms "perforating ulcer," and the other which he names "hæmorrhagic erosion of the mucous membrane." The latter appears in the form of numerous small roundish depressions of the size of a pin's head or pea, each containing a little coagulum of blood. These ulcerations are, I believe, of acute formation, and due to impaired nutrition shortly before death in various diseases which

* "Pathological Anatomy," (Sydenham Society edition), vol. ii., p. 29.

need not be here enumerated, and consequently may be put out of the question as giving rise to pain after food. Similar small ulcerations without hæmorrhage have been noticed by Louis, as occurring in one-twelfth of the cases in which he examined bodies dead of phthisis, where the membrane around them was similar to that in all other parts of the stomach, so that they had the appearance of having been made with a punch. The other form of ulcer is generally solitary, and, though named "perforating," does not always or necessarily terminate in the symptoms of perforation of the stomach. The reason of this is, that adhesions occur between the corresponding peritoneal surface and adjacent organs, so that the peritoneum being destroyed in the progress of the disease, the base of the ulcer comes to be formed by some of the neighbouring organs or tissues. The slower the process of ulceration, and the more chronic its course, the more likely is this adhesive and protecting process to occur; and one can hardly escape the conclusion that some of the ulcers that terminate in the symptoms of perforation are to be regarded as of comparatively short duration. There is little in the nature and circumstances of the pain after food which distinguishes sensitiveness due to *chronic ulcer* from that which arises out of other conditions (73). Solid food and irritant substances generally induce it more readily than those which are soft, semi-liquid, and unirritating; but this is not without exception, since some patients suffer less after solid than after

liquid or semi-liquid food, or even after substances such as bacon, ham, or even uncooked vegetable substances which are usually regarded as difficult of digestion. Sometimes the pain is limited to one small spot which may be covered with the point of the finger, and the tenderness may be confined to the same locality; and occasionally the pain may fail to be perceived, except when the patient assumes some particular posture, such as the recumbent. With the exception of the chronicity of the morbid sensitiveness of the stomach, there may be no associated phenomena present calculated to throw light upon the nature of the disease, and in subjects of high nervous impressibility the practitioner is very liable to be misled in his opinion of the case. Just as in cases of nervous impressibility, too, paroxysms of pain (gastralgia) independently of food, usually occur; they are often severe, usually exasperated by pressure, but in occasional instances relieved by firm pressure; this pain may be due to flatulent distension of the stomach, or to secretion of irritant fluids independently of the presence of food: or the history may exhibit a liability for some time to attacks of pain after food, which are especially connected with acidity of the stomach (I. D. E.). In this respect it also resembles gastric cancer; it also resembles it in another, and that is the occasional occurrence of *hæmorrhage*. This, when it occurs, is one of its most characteristic symptoms, the ejection of blood being often the first symptom by which the serious nature of the disease is declared. The hæmorrhage

into the stomach may be rapid and profuse, as when one of the larger arteries, as the coronary or gastro-epiploic, is corroded; and then the blood may be vomited not long after its effusion in large quantities, and but little altered: or it may consist of a slow and gradual oozing into the cavity, and appear in the ejected matters in the form of coffee-ground or sooty-looking matter, such as has been referred to when speaking of gastric cancer (83). The importance of this symptom is greater where careful examination discovers no disease capable of obstructing the return of portal blood (II. B. *f.*), and when there has been no arrest of an habitual flux (II. B. *g.*). In place of being vomited, the blood may pass from the bowels in the form of pitchy stools. After hæmorrhage has been severe or frequently repeated, the patient acquires an anæmic appearance. The diagnosis is most difficult in those cases where no hæmorrhage has taken place. In these, other considerations must have weight, namely, want of complete freedom from pain, the tenderness on deep pressure persisting at a time when no severe pain is complained of, the presence of the symptoms of hyperæmia (79), and the previous operation of the more important causes of gastric vascular fulness and inflammation (80). In the progress of the cases also, more or less emaciation is presented, and when the ulcer is situated at the pylorus and accompanied by much thickening of the tissues at its base, it may occasion contraction of this orifice, dilatation of the stomach, prolonged delay of the food in the cavity

and its consequences (63). In fact the diagnosis after the occurrence of hæmorrhage usually comes to lie between chronic ulcer and cancer of the stomach. The following facts are the most useful to keep in mind in distinguishing between them. Gastric cancer mostly affects males; chronic ulcer is most frequently met with in females. Gastric cancer is rare before the age of thirty years: chronic ulcer, though limited to no age, often occurs much under this period of life. The symptoms of gastric cancer rarely last beyond two years at the utmost, before death terminates the sufferings of the patient; and emaciation occurs at an early period after the commencement of these symptoms, and often becomes excessive before death. The symptoms of chronic ulcer, however, may continue over a much longer period; emaciation occurs at a much later period from their commencement, and is less rapid in its progress, while the straw-coloured tint of the skin is wanting throughout the case. Lastly, the absence of palpable tumour, after prolonged duration of the symptoms and hæmorrhage, must ever have great weight in the diagnosis of chronic ulcer.

85. In treating a case of chronic ulcer the physician proposes to himself a higher aim than when the ulceration is cancerous, since pathological anatomy has demonstrated that absolute cure may take place by a process of cicatrisation.* The curative measures

* The cases of reputed cicatrisation of cancerous ulcer of the stomach give to the practical physician little encouragement or hope of ever effecting a *cure* in well marked cases of the disease.

are also the same as those required for the palliation of its symptoms, but no success can be hoped for unless they be rigidly carried out for a long period of time. To do this, however, requires what is commonly difficult to obtain, *the hearty, systematic, and self-denying co-operation of the patient,* who as soon as he finds that his digestive powers are stronger, and that the diet allowed can be taken without pain, is very apt to rebel against the restrictions to which he is still, as he thinks, unnecessarily subjected. The plan to be adopted is identical with that pursued by the surgeon in the cure of an ulcer of the skin, and consists, first, in *the removal of hyperæmia and its causes,* and next in repose, bland unirritating applications, approximation of the edges and general calmatives. In the present instance, *the hyperæmia* does not generally demand much depletion: the occasional application of a few *leeches* to the epigastrium, followed by warm poultices, will usually suffice; but much benefit is derived from the free use of the *suppurative counter-irritants,* such as the tartar-emetic ointment. Where the hyperæmia is conjoined with portal obstruction or suppression of the hæmorrhoidal flux, the leeches are best applied to the anus; when with suppression of the menses, to the vulva or groin, or where spinal tenderness is present (75), over the vertebræ which exhibit it. Repose is gained, and at the same time the edges approximated, by *the use of food in very small quantities at a time,* and taking care that all *irritant substances, food or medicines, either of which can excite the gastric movements, are avoided.*

A contracted state of the stomach is promoted, not only by limiting the quantity of food, but by *preventing by every means in our power the extrication of gas into the cavity* (IV. B.) The least irritating application to a healthy ulcer, to an ulcer in the process of cure, is its own secretion; and to avoid the removal of this by the rigid adoption of a *diet consisting of soft, semi-liquid, and unirritating matters*, and the prevention or immediate *neutralisation of acidity* in the secretions or contents of the stomach (71), is one of the most important and at the same time most difficult tasks before the practitioner. Even after all pain after food has ceased under the treatment, and especially under the diet applicable to this in common with other forms of gastric sensitiveness, the patient must *not be permitted to take regular meals;* half a teacupful or a teacupful, or in some cases smaller quantities, of bland food may be taken at intervals of two or three hours, the occurrence of the least pain after it being at once used as a warning either to reduce the quantity or extend the interval. If drink is separately required, the quantity taken at a time should be small, and it should rather be slowly sipped than swallowed in a draught. But while selecting the most bland articles of food for contact with the ulcer, they should be varied, not only because the diet is in this way rendered more tolerable by the patient, but also because the general health of the body is thus best maintained. Milk, bread crumbs softened and made into a pap with milk, rice very softly boiled and mashed, and well-made

gruel, are the most suitable articles: as the patient improves after three or four months' continuance of this diet, chicken or veal-broth or beef-tea free from fat may be allowed, and occasionally small quantities of tender animal food very finely minced or beaten in a mortar, with some real gravy and bread crumbs. The powers of the stomach too may be husbanded, and the healthy condition of the blood (without which the ulcer cannot be expected to heal quickly, if at all) promoted, by the use of *nutritive enemata*, and by *rubbing daily into the skin an ounce or two of cod liver oil*, which may be scented with oil of bergamot or lemons. The use of *opium* is, as before mentioned, indicated as a palliative remedy; but, in most cases, and especially in persons of irritable temperament, appears to promote also the healing of the ulceration. It is my firm belief that, with this exception, and perhaps with the exception of nitrate of bismuth, or such sedatives (77) or alkalies (71) as may be called for by special circumstances, all medicines given by the mouth, either with a view to assist in the healing of the ulcer, or as aperients, are best avoided. *If any purgative is administered* a small dose of castor oil, if it agrees with the stomach, is the most appropriate; if it should not agree, a few grains of calomel may be given alone; but on the whole *an enema*, which disturbs only the lower bowels, is the best aperient that can be employed. It has been supposed by some that the syphilitic taint may give rise to ulcer of the stomach, and though this connection is not satisfactorily proved, *antisyphilitic remedies*, e. g.,

small doses of the bichloride of mercury may perhaps prove serviceable where other signs of constitutional syphilis are present, or where the clinical history of the patient exhibits, in an obstinate case, the previous existence of the primary disease.

86. It does not follow because the alarming symptoms of *peritoneal perforation*, with effusion of foreign matter into the serous cavity, occur shortly after a meal, that the seat of this lesion is the stomach. The stimulus of food, by exciting the muscular movements of the whole of the alimentary canal, may occasion rupture of the peritoneum, isolated and badly nourished from the removal of the subjacent coats by an ulcer, in any part of the alimentary canal; or it may occasion the breaking down of adhesions which have, hitherto, prevented the effusion of foreign matters into the general sac of the peritoneum. The previous clinical history of the patient and diseases recognised as present, such as typhoid fever or phthisis, will commonly prevent any diagnostic error of this kind; but, even where the seat of perforation fails to be accurately determined, the treatment adapted to the one is also fitted for the other. *Perforation of the stomach* may be the termination either of cancerous or non-malignant chronic ulcer, and is thus preceded by the symptoms of these affections already described (83, 84). But there is another class of cases in which the symptoms of perforation occur without warning of any kind, and at a time when the presence of serious disease of the mucous membrane of the stomach is quite unsuspected. Attacks

of gastralgia (75, 90), indeed, may from time to time have been presented, or some of the symptoms of delay in the process of digestion may have occurred (39); but in other cases, no digestive disturbances at all have been remarked. It cannot, I think, be fairly considered that all these cases are of chronic origin, especially where the ulcer, whose base is the seat of perforation, is of a punched-out appearance, and where all inflammatory products are absent, both from its edges and circumference. It is also to be observed that these perforative ulcers occur, as shown by Dr. Crisp,* very commonly in young and unmarried females, who already exhibit signs of faulty nutrition by the presence of chlorosis and amenorrhœa. The perforation usually occurs shortly after a meal, not necessarily after a large one, but as soon as the movements of the stomach have become active enough to interfere with the integrity of the base of the ulceration. The perforation may also be determined after a meal by the occurrence of vomiting, by straining in muscular effort, or by external pressure. *Caution in the use of vomiting* then as a means of relieving the pain after food, in cases of ulcer of the stomach, is thus taught us. The pain is sudden and excruciating, the patient falls very rapidly into a state of collapse, and overwhelming faintness, the extremities are cold, the skin is covered with a cold sweat, there is complete pallor with anxiety or collapse of the countenance, the pulse is very rapid,

* *Lancet*, August 5, 1842.

weak and thready, and, by the time the medical man arrives, the patient is either dead or the symptoms of intense peritonitis have usually set in. In the latter case, there is, in addition, great tenderness over the whole abdomen, commencing and most intense in the epigastric region, the knees are elevated, and, if the case has lasted some hours, the abdomen is enlarged and tympanitic; the respirations are short and hurried, efforts at vomiting may be made and there is sometimes observed a constant desire to pass the urine. Now although little can be anticipated, judging from the nearly constant fatality of this accident, from the most skilful medical treatment, it is not to be doubted that *harm cannot fail to arise from the all but universal recourse to brandy and other stimulants* on the occurrence of the symptoms, either for the relief of the intense faintness, or because the attack is regarded as one of spasm, such as has been before relieved by similar means. There can be no question that the intended kindness and officiousness of friends and bystanders thus often ensure and hasten the fatal termination of the case. It is far better that in all sudden severe attacks of abdominal pain after food, the patient should be left without any interference until the arrival of the medical practitioner. Still, notwithstanding the alarming nature of the disease, it is not necessarily fatal when treated on principles now accepted by the profession in these cases, and illustrated by the successful case recorded a few years ago by Dr. Hughes.* The

* "Guy's Hospital Reports," October, 1846.

object of the treatment is to favour closure of the perforation through adhesion by maintaining the organ in a state of complete rest, by rigid *abstinence*, seclusion, perfect muscular *repose* and *opium*. In the case just referred to, the patient was required for eighteen days to maintain the *recumbent posture*, and on no account permitted to move; at first, the only nourishment allowed was a few tea-spoonfuls of toast and water occasionally, and after forty-eight hours a few ounces of beef-tea, with a few drops of laudanum, were administered by the rectum and repeated three times a day, and with the exception of a little beef-tea allowed after a few days to be taken by the mouth, this was her sustenance for about three weeks. Half grain doses of opium were given in a pill every three hours at first, the dose being diminished as the subsidence of the symptoms justified the reduction.

87. The occurrence of pain from gluttonous *over-distension of the stomach with food and drink* requires no other remark, than that the pain itself differs in its character in no respect from that which depends upon a similar distension of the same organ with excess of flatus, and the circumstances under which it has arisen are too obvious to allow of error. I shall therefore confine my observations to the characters and accompanying symptoms of pain arising from *distension of the stomach with gas*. Pain after food arising from this cause is often dull in its character, or consists merely of a sense of fulness and oppression, referred to the epigastrium, sternum, or back, but it is

commonly accompanied from time to time by darting pains, sometimes severe, about the upper regions of the abdomen, extending to the chest, region of the heart, back, or throat. Dyspnœa, palpitation, and globus are often conjoined. It may arise under two different circumstances. The stomach may be filled with flatus prior to the food being taken, or the flatus may be formed in the stomach after the ingestion of food. In the former case, food, adding to a state of gastric fulness already existing, may develope pain immediately it is taken, and this, when the gas is abundant, even if taken in small quantities, and whether solid or liquid in consistence. In the latter case, the pain does not occur so immediately, but may ensue shortly after the completion of a moderate or even small meal, or at a later period of gastric digestion. It is commonly associated with obvious swelling of the epigastric and hypochondriac regions, and often with nausea and retchings. The flatulent distension of the stomach also occasions, besides local fulness, alterations in the phenomena which the region occupied by that organ exhibits when subjected to inspection and percussion; for not only, when the surface is exposed, can the outline of the distended organ be sometimes clearly traced through the overlying abdominal parietes which it protrudes, but on percussion a drum-like note is elicited extending over an inordinately large space, and encroaching materially upon the natural percussion sounds of the neighbouring organs, the liver, lungs,

spleen, etc.* After lasting for a variable time, often several hours, the pain may gradually pass off, or, if previously severe, become duller and more tolerable. Temporary relief is sometimes obtained by loosening the clothes about the trunk, by gentle friction with the hand, or by small eructations or vomiting; but perfect relief is attainable only by the expulsion by the mouth of a large volume of gas. After a stomach has been once or several times thus excessively distended, the epigastrium becomes tender to the touch, and the patient usually removes from the dress all articles which may press inconveniently upon the surface. Pain from flatulent distension is often associated with pain from "acidity" (I. D. E.); and both are exasperated when there is, from any cause, an abnormal degree of sensitiveness of the stomach (II.). It may here be mentioned, in addition, that *gaseous fulness of the stomach* prevents that contraction of the stomach upon the food by which the movement of the latter over the surface of the organ is effected, and also that *free secretion of the gastric juice* to which the extensive contact of the food appears to be essential. A less amount of distension also, either from food or gas, may be productive of distress, when the space normally allotted to the stomach is encroached upon by parts extrinsic to that organ, or when neighbouring parts are preternaturally tender (VI.); in the last instance too, the seat of the pain may be different from what is otherwise customary.

88. The evolution of carbonic acid gas, during

* See also "Physical Diagnosis," p. 106.

the fermentation of the food, which takes place in sarcinous cases, has already been referred to (63), and may serve as one illustration of the manner in which *chemical changes in the food* occasion flatulent fulness of the stomach. Gas, the product of chemical decomposition, is also evolved in other cases where the digestion of food, delayed in the stomach, is retarded; and is most abundant when the nature of the food is such as to undergo spontaneous decomposition with readiness, under the influence of the warmth, moisture, and oxygen which it meets with in the stomach. Hence it is, too, that flatulence and acidity are so commonly conjoined as results of the various causes of retarded digestion (I. B.), and occur most readily after those meals and under those circumstances which have been fully discussed in earlier paragraphs of this Commentary. The pain arising out of flatulence from this cause, if associated with no other cause of pain, does not appear so early after a meal as in cases where the gas is developed by secretion from the membrane. The gas eructated is often accompanied by portions of food, and has either a putrid or fœtid odour and taste, or the latter have a nauseous resemblance to those of articles of food and drink previously swallowed. The second cause of flatulent distension productive of pain after food, noticed in the scheme, is *secretion or exhalation from the mucous membrane.* This may occur independently of food, so that the stomach is full of gas prior to the meal, and the pain may then be immediate upon the reception of the

latter; or it may take place, often with astonishing rapidity, at variable periods of the digestive process, sometimes immediately on a few mouthfuls of food being taken, compelling the patient to desist from eating before the completion of the meal. This form is most commonly observed in aged and debilitated subjects, and in those, especially females, of the nervous temperament, or in whom there is met with the nervous form of gastric sensitiveness (II. A.). The gas eructated in these instances is almost constantly odourless and free from taste. The remaining causes of gaseous distension operate chiefly by virtue of the obstacle they place to the expulsion of gas evolved by secretion, or decomposition of the food eaten, by the gullet and mouth, or by the pylorus into the intestine (90). In both instances, more or less obstinate and permanent gaseous fulness of the stomach exists, both after the taking of food and during abstinence; and when food is taken the pain is more quickly developed, and evidence of other gastric disorders (39, 63, 69, 72) is afforded by the patient. It is not necessary here to repeat the points of diagnosis which have been before made the subject of remarks (60, 63).

89. The only observations requisite here have reference to the palliative measures where pain arises from flatulent distension; and these must be directed to promote the expulsion of the flatus from the stomach, either by exciting its muscular fibres to the necessary contraction, or by mechanical aid. With a view to excite the stomach to expel flatus either by the gullet,

or through the pylorus into the intestine, *gentle circular frictions* over the epigastrium with the hand, which may be lubricated with camphor liniment, may be employed; and in persons, especially aged individuals, who habitually suffer in this way, this means of relief is preferable to the internal or external use of powerful stimulants, which may be reserved for unusually severe attacks. The *external applications* may consist of a flannel wrung dry out of hot water or hot decoction of poppy-heads, a tin filled with hot water and covered with a layer of flannel (if its weight can be borne), a turpentine fomentation or a sinapism. The *internal stimulants* may be one or more of the following:—a little very hot water, or in aged, gouty, or intemperate persons, hot spirits and water, warm ginger tea, a wineglassful of some aromatic water, as peppermint, a few drops of one of the essential oils, among which cajuput has appeared to me the most effectual, or a draught containing carbonate, or the aromatic or fœtid spirit of ammonia, sulphuric ether, an aromatic tincture, as compound tincture of lavender, with an aromatic water or infusion of valerian. Any of these may of course be combined with an alkali (71) or anodyne (77), should either be indicated. Capsicum and the fœtid gum-resins, as galbanum or assafœtida, may be also used with advantage, and are often conjoined in these cases with medicines administered with a view to restore defective tone of the stomach (61). Where the stomach cannot be stimulated to expel the accumulation of gas, and the distress is urgent,

it may be removed artificially, by *introducing the tube of the stomach-pump.*

90. There can be no doubt that the pain which succeeds the taking of food is sometimes due to irregular *spasmodic contraction of its muscular parietes.* The pain itself is in these instances of a character at once to betray its origin, not only resembling that which occurs in cramp of the muscles of the extremities, both in the nature of the sensation, in its severity and suddenness of accession, but sometimes being actually accompanied by cramps of the muscles of the abdomen or limbs. Patients, too, who suffer from pain from this source, are also apt to suffer, either under gastric or other irritation, from other phenomena of disordered reflex action, such as hiccup, convulsive cough, attacks of spasmodic dyspnœa, etc., and also from similar pains in the stomach when food has not been taken. This element of pain may be conjoined with that which arises from *flatulent or crapulous distension of the stomach* (IV.), exalted nervous sensitiveness (II. A.), or it may be brought into play in consequence of those various irritations to which the stomach may be exposed during the progress of digestion (I.). It is also not unlikely that *spasmodic contraction of the cardiac and pyloric orifices* of the stomach takes part in producing flatulent distension of the stomach by preventing the contractions of the organ (especially if feeble from *atony or atrophy of the muscular coat*) from effecting the expulsion of gas. The means of relieving spasmodic pain are those which

remove the irritation, on which it may in any case depend; whether this be excessive repletion, flatulent distension, acidity, or the presence of undigested or indigestible food. Should these means fail, or in addition to them, the more powerful *anti-spasmodics* may be used, sulphuric or chloric ether in doses of ʒ ß—ʒ j, chloroform in doses of ♏ xx—ʒ ß, tincture of opium or musk.

91. There are, in addition to the various causes of pain more immediately connected with the stomach which have been now discussed, *other conditions of disease* which must not be passed over, which may either promote the operation of the former, or are capable themselves of producing pain when food is taken into the stomach. *The space allotted to the stomach*, which in the healthy state permits of the free dilatation of the organ, is capable of being *encroached upon*, either by compression from without, or by enlargement or distension of parts which occupy, along with the stomach, the cavity of the abdomen. The *external compression* may be applied in various ways, and may either be of a temporary character, and thus capable of instant removal, or it may, by long continuance and repetition, produce a permanent contraction of the space allotted to the stomach, by pressing inwards the lower extremities of the sternum and ensiform cartilage, and the lower ribs, with their cartilages. This unfortunate state may indeed be the result of *original malformation, or of spinal curvature*, but similar depressions of bony and cartilaginous parts

may result from the compression exercised in prosecuting *certain trades,* and from the female practice of disfiguring the body by *tight lacing.* The *internal enlargements and accumulations* which may operate in the same way, are almost too numerous to mention; but among the more common, may be enumerated flatulent and fæcal accumulations in the intestines, enlargements of the liver or spleen, advanced pregnancy, and ovarian tumours. *Serous effusion into the peritoneum* acts in the same way. The pain which arises under this condition of contracted space is felt after a bulk of food has been taken, or an amount of flatus has accumulated, which in themselves would not have sufficed to produce pain by simple distension of the healthy organ. Of course all the causes of enlargement of parts within the abdomen must be made the separate objects of diagnosis, and the appropriate remedies must be applied—purgatives and emetics in the one case, tapping in another, etc., according to the nature or exigencies of the case. It need hardly be said, also, that all the causes of flatulency should be avoided (IV. B.), and that *no more food or drink* should be taken at once than the stomach can receive or digest without distress.

92. It would lead me beyond the limit which I have proposed to myself in this work, were I to discuss at any length *the diseased condition of parts external to the stomach* in which *pain is produced either by the distension of the organ, or by the gastric or intestinal movements* (12), set up by the ingestion of food or drink. Where there are

diseased parts or organs *in the immediate neighbourhood of the stomach* which are tender to external pressure, such as inflammatory, cancerous, or other affections of the peritoneum and its folds near the organ, of the liver, kidney, mesocolic or mesenteric glands, etc., pain equally arises when pressure is made upon them by a distended stomach, or if they are in any way disturbed by the movements of the organ during digestion. The pain in these cases may arise shortly after a meal, or after the stomach has been loaded with liquid, or it may be deferred to a period of digestion when flatus is extricated into the stomach. Its seat, too, is that of the diseased or tender part or organ, and often, from its being unusual, may direct the practitioner and assist his diagnosis. It sometimes disappears as gastric digestion concludes, just as if the stomach itself were the sensitive organ; in other cases it continues, in a less severe degree, after the stomach has become empty, and in others is more or less relieved by flatulent eructation. It has again been mentioned that the stimulus of food or drink in the stomach *excites the peristaltic movements of the intestinal canal* (12). This part of the alimentary tube may itself be *unusually irritable and disposed to spasmodic contraction*, or may be the seat of such disease, e.g. inflammation, cancer, etc., as is *accompanied with pain* during the muscular contraction of the tube for the propulsion of gas or fæces. Or again, as in the case of the stomach, there may be such *disease in parts external to the intestine*, as the movements of the tube may disturb. The pain

may occur almost immediately upon swallowing food, and, as in the instance of diseased organs near the stomach, its seat will be usually where the disease itself is situated; and often, from its low position in the abdomen, it directs the practitioner's attention to the organ which is the seat of disease, the special symptoms of which must guide and determine his diagnosis. Where the intestine, however, or parts in its vicinity are in fault, it commonly happens that the pain continues, and even may become more severe, after gastric digestion is completed, in consequence of the irritation produced by the food or flatus in their passage along the intestine itself, and it may, throughout, be associated with abdominal swelling and borborygmi. The *treatment* of pain after food from these several causes merges itself necessarily into *that which is appropriate to the diseased condition present*, and which is adapted to *remove the abnormal sensitiveness of the tender parts*. But, in addition, care should be taken to avoid the introduction of so much food and drink into the stomach, or such flatulent distension (IV. B.), as shall give rise to painful pressure, and also so to *limit the quantity of food taken at a time and to regulate its nature and temperature*, as to keep under control the stimulus under which gastric and intestinal contractions are called into play.

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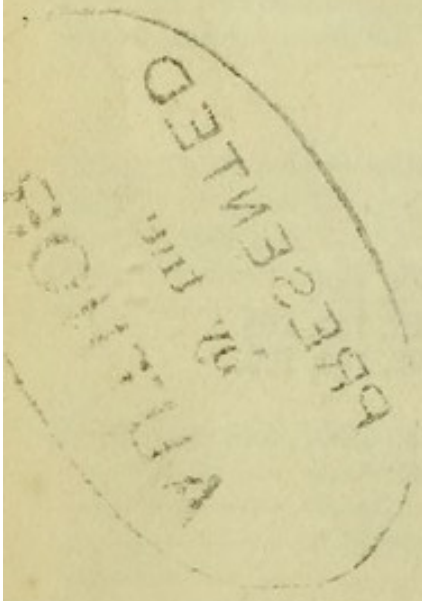

THE END.

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