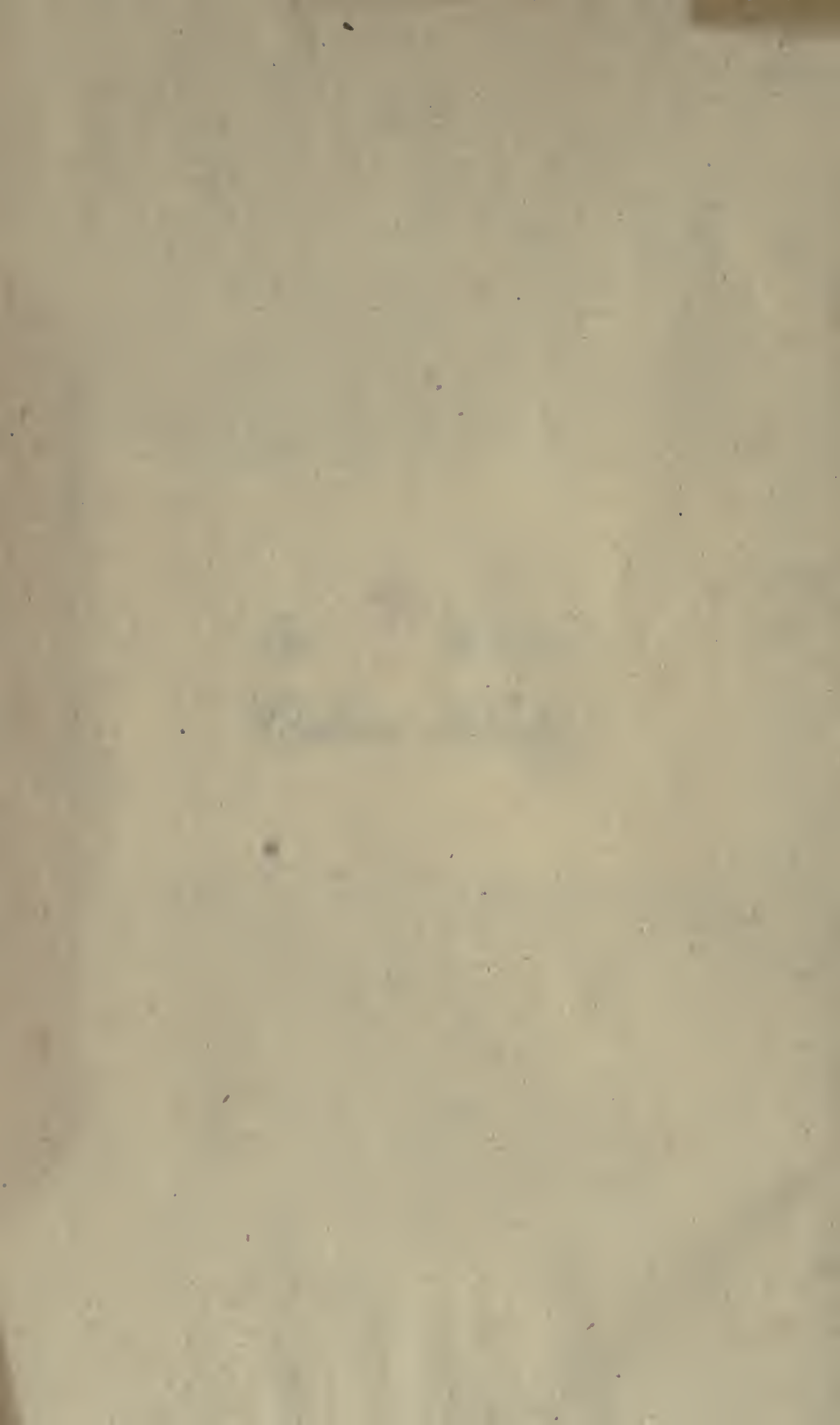


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TREATISE ON DIET

BY

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OF THE UNIVERSITY OF CAMBRIDGE

IN TWO VOLUMES

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*Albert G. Walter*

# TREATISE ON DIET:

WITH A VIEW TO ESTABLISH, ON PRACTICAL GROUNDS,

A SYSTEM OF RULES

FOR THE

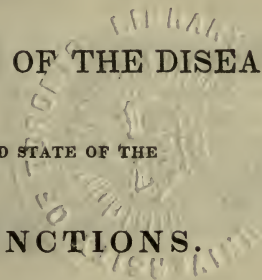
PREVENTION AND CURE OF THE DISEASES

INCIDENT TO A DISORDERED STATE OF THE

DIGESTIVE FUNCTIONS.

BY <sup>John Yinton</sup> J. A. PARIS, M. D. F. R. S.

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS, ETC. ETC.



Some Physiologists will have it that the stomach is a Mill;—others that it is a fermenting Vat;—others, again, that it is a Stew pan;—but in my view of the matter it is neither a Mill, a fermenting Vat, nor a Stew-pan—but a *Stomach*, Gentlemen, a *Stomach*."

*Manuscript Note from Hunter's Lectures.*

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It is common to regard milk as little else than mere drink. But this is an error. Milk is really an article of solid food, being coagulated soon after reaching the stomach. New milk contains thirty per cent. of digestible solids, and skim milk ten per cent.; that is, the former fully one-half, the latter above a third of nutriment contained in the lean part of beef and mutton.

SCIENCE IN THE KITCHEN.—Professor Leibig, in a letter to professor Silliman, says:

“The method of roasting is obviously the best to make flesh the most nutritious. But it does not follow that boiling is to be interdicted. If a piece of meat be put in cold water, and this heated to boiling until it is ‘done,’ it will become harder and have less taste than if the same piece had been thrown into water already boiling. In the first case, the matters grateful to the smell and taste, go into the extract—the soup; in the second, the albumen of the meat coagulates from the surface inward, and envelopes the interior with a layer which is impregnable to water.”

## A TREATISE

### INTRODUCTION.

The present edition considerably extended—Popular interest of the subject—Works on dietetics numerous, but not satisfactory—Contrariety of opinion begets scepticism—The fate of a patient who consults too many physicians—Quackery—The quantity of food, and the circumstances under which it is taken, more important than its quality—Dietetic precepts should not savour of ascetic austerities—Absurdity of the supposition that nature can direct us in the selection of food—Man has no natural food—The qualities of vegetables completely changed by cultivation—Cookery—The folly of denying the influence of regimen in the cure and prevention of disease—Digestion—Comprehensive meaning of the term.

1. Several years have passed away since this work was first given to the public, and from events to which it is not necessary to allude it has remained out of print for a considerable period; so far, however, from this being a subject of regret, I rejoice at the opportunity it now affords me of collecting from the stores of a wider experience, such facts as may tend to confirm and extend the doctrines, or to illustrate more clearly those general views which were submitted to the profession in the first edition of the treatise. I must here beg to repeat, that I did not entertain the idea of writing an essay on diet, without having been duly impressed with the high importance of the subject, and with the numerous difficulties by which it was encompassed.

In venturing to add a new work on a branch of medical science, which had already animated such a host of writers, and which for reasons to be hereafter stated, had retained only a dubious claim to the attention of the practitioner, I well knew that I should expose myself to a very severe ordeal, unless prepared either to increase the general fund of information by the addition of new facts, and the consequent developement of new views, or to render the often repeated tale more simple and intelligible, by divesting the subject of the various fallacies with which wild theory on the one hand, and vulgar prejudice on the other, might have contaminated and disfigured it. I did not, indeed, despair of rendering the work acceptable on the former of these grounds, but I certainly relied with

more confidence on pretensions founded on the latter ; for, let it be remembered, although many valuable works on dietetics have descended to us, that since their publication, the views as well as language of medical and physiological science have undergone many and considerable revolutions. It is true that facts are immutable, but if buried amidst the ruins of fallen systems, they remain unknown and without value until rescued from the confused mass, and re-arranged in conformity with the acknowledged theories of the day.

Since the publication of the first edition of the present treatise, a fresh impulse has been given to the inquiry, and some valuable productions have been the result ; and I must be permitted to remark, that the little reserve with which several of their authors have appropriated my own peculiar views and precepts affords, at least, some indication of their estimated, though not acknowledged, value.

2. It will be readily admitted that few subjects, connected with the medical art, have excited greater interest, or occasioned more sedulous inquiry, than that of which I propose to treat in the following pages ; and yet, were the popular works on dietetics subjected to a healthy digestion, how meagre would be the proportion of real aliment extracted from their bulky materials. Upon this occasion, at least, we may, with Diderot, ridicule the popular adage, "*the more heads the better counsel—because nothing is more common than heads, and nothing so unusual as good advice.*" Suppose an unprejudiced reader (my assumption I admit is violent) were to wade through the discordant mass to which I allude, would he not inevitably arrive at the mortifying conclusion, that nothing is known upon the subject in question ; or rather, that there does not exist any necessity for such knowledge ? Nothing cherishes the public scepticism, with regard to the efficacy of the medical art, so much as the publication of the adverse and contradictory opinions of its professors, upon points so apparently simple and obvious, that every superficially informed person constitutes himself a judge of their merits. If a reader is informed by one class of authors, that a weak stomach is unable to convert *liquid* food into aliment, and by another, that *solid* food is injurious to feeble stomachs, he at once infers that the question is one of perfect indifference ; and ultimately arrives, by a very simple process of reasoning, at the sweeping conclusion, that the stomach, ever kind and accommodating, indiscriminately converts every species of food into nourishment, and that he has therefore only to consult his own inclination in its selection. And let me here observe that a conclusion, when in accordance with our wishes and prejudices, is not only very readily adopted, but most pertinaciously maintained. If the truth were told, a large portion of dyspeptics seek the advice of a physician not so much for the adjustment and better regulation of their diet, as for the means by which they may counteract the ill effects of their indulgences—hence the popularity of

those "*antibilious*" remedies, which promise to take the sting out of their excesses, and to enable the unhappy dupes to fondle and play with vice as with a charmed serpent. On the valetudinarian, however, incapable of healthy reflection, and ever seeking for causes of fear and anxiety when they do not choose to come un-called, such adverse and conflicting opinions may have a contrary tendency, and lead him to suspect the seeds of disease in every dish, and poison in every cup.

3. To make the case still stronger, let us suppose that the unprejudiced person whom we have chosen to represent on this occasion, instead of a reader becomes a patient, and submits his complaints to the judgment of these discordant authors; might he not, like the Emperor Adrian, prepare an inscription<sup>1</sup> for his tombstone? This is not an imaginary case, but one of daily occurrence in this metropolis. A dyspeptic invalid, restless and impatient from the nature of his complaints, wanders from physician to physician, and from surgeon to surgeon, in the eager expectation of procuring some relief from his sufferings: under the direction of one, he takes the blue pill, and, like Sanctorius, measures with scrupulous accuracy the prescribed quantity of his ingesta; but, disappointed in the promised benefit, he solicits other advice, and is mortified by hearing that mercury, in every form of combination, must aggravate the evils he seeks to cure, and that a generous diet, and bitter stomachics, are alone calculated to meet the exigencies of his case; a trial is given to the plan, but with no better success: the unhappy patient at length determines to leave his case to nature; but at this critical juncture he meets a sympathising friend, by whom he is earnestly entreated to apply to a skilful physician, who had succeeded in curing a similar complaint, under which he had himself severely laboured: the anxious sufferer, with renewed confidence, sends for this long-sought-for doctor, and he hears with a mixture of horror and astonishment, that his disorder has been entirely mistaken, and that he must submit to the mortifications of a hermit, or his cure is hopeless. For a certain period he submits to the ordeal, but his general strength gives way, and in the extremity of despair he becomes the victim of some crafty knave, who undertakes his cure by the aid of the millionth part of a grain of blue pill, or some equally dishonest empiric, who, in one day, administers more pills than would suffice, according to homœopathic views, for every inhabitant of the solar system. I appeal to the candid and enlightened members of the profession to say whether I have caricatured the portrait. No one can believe that I intend to cast the slightest reproach upon any legitimate practitioner by these observations; it is to the unsettled state of professional opinion upon the subject of diet, and to the obscurity which involves the theory of digestion, that all these evils are to be attributed. But to return to the subject of dietetic works; it appears to me that

<sup>1</sup> "It was the *great number* of physicians that killed the Emperor."

their authors have laid far too great stress upon the quality of the different species of food, and have condemned particular aliments for those effects which should be attributed to the quantity, and still more perhaps to the circumstances<sup>1</sup> under which they were taken; their dietetic precepts have frequently assumed the air of ascetic austerities, and they have thus represented the cure far more formidable than the disease. It has been sarcastically observed, that there exists a more intimate connection between the doctrine of Tertullian and that of many a dietetic practitioner, than is generally supposed—that he is the ascetic intrenched in gallipots and blisters, preaching against beef and porter; terrifying his audience with fire and brimstone in one age, and in the other with gout and apoplexy. Now, while we must all deeply lament that the severity of this sarcasm should have been, in some measure, sanctioned by the theoretical absurdities of many of our minor writers, it is impossible that any reasonable person can seriously contend, that numerous diseases do not arise from an improper management of diet; much less, that a judicious regulation of it cannot be rendered subservient to their cure.

4. It has been affirmed, with an air of much confidence, that the management of our diet requires not the aid of reason or philosophy, since nature has implanted in us instincts sufficiently strong and intelligible to direct us to what is salutary, and to warn us from such aliments as are injurious. We may observe in reply, that man has so long forsaken the simple laws which nature had instituted for his direction, that it is to be feared she has abandoned her charge, and left him under the control of that faithless guide and usurper, to which civilisation has given dominion. Hunger, which expresses the true wants of the system, can no longer be distinguished from that feeling which induces us to prefer one species of food to another, and to seek it at the most improper periods of the day. Nor must it be forgotten that, during disease, the senses frequently lose their tact, and the invalid experiences an appetite for objects that would be prejudicial. That the natural relations which subsist between the qualities of food and the impressions made by them on the senses, are changed or destroyed by the refinements of artificial life, is a fact supported by too many powerful arguments to refute: how many kinds of aliments, originally disagreeable, become pleasant by habit; and how many substances, naturally agreeable, become disgusting from the creation of certain prejudices! I am acquainted with a lady who is constantly made sick by eating a green oyster; the cause of which may be traced to an

<sup>1</sup> I allude particularly to a class of phenomena termed "*Non-naturals*," upon which the ancients laid considerable stress, but which the moderns appear to have too hastily disclaimed; the name, it must be confessed, is very far from being philosophical; it was however derived from the fact of their not being essential to the mere nature or constitution of living animals, and which, besides the aliment, included air, exercise, sleep, the excretions, and passions of the mind.

erroneous impression she received with respect to the nature of the colouring matter being cupreous. It has also been frequently observed, that persons in social life have acquired a preternatural sensibility to vegetable odours, while the savage has a keener sense for the exhalations of animal bodies: we are, for instance, assured by Captain Cook, that the people of Kamschatka did not smell a vegetable essence placed near them, but that they discovered, by their olfactory sense, a rotten fish, or a stranded whale, at a considerable distance.

5. Dr. George Fordyce has urged a still more serious and conclusive objection to that hackneyed maxim—that we ought to live *naturally*, and on such food as is presented to us by nature; viz. that *man has no natural food*. It is decreed that he shall earn his bread by the sweat of his brow; or, in other words, that he shall by his industry, discover substances from which he is to procure subsistence; and that, if he cannot find such he must cultivate and alter them from their natural state.<sup>1</sup> There is scarcely a vegetable which we at present employ, that can be found growing naturally. Buffon states, that our wheat is a factitious production, raised to its present condition by the art of agriculture. Rice, rye, barley, or even oats, are not to be found wild; that is to say, growing naturally in any part of the earth, but have been altered, by the industry of mankind, from plants not now resembling them even in such a degree as to enable us to recognise their relations. The acrid and disagreeable *apium graveolens* has been thus transformed into delicious celery: and the *colewort*, a plant of scanty leaves, not weighing altogether half an ounce, has been improved into cabbage, whose leaves alone weigh many pounds, or into a cauliflower of considerable dimensions, being only the embryo of a few buds, which, in their natural state, would not have weighed many grains. The potato, again, whose introduction has added many millions to our population, derives its origin from a small and bitter root, which grows wild in Chili and at Monte Video.<sup>2</sup> These few instances may suffice to answer the object for which they were introduced: the reader will find many others in the introduction to my *Pharmacologia*.<sup>3</sup> If, however, any of my readers should be still sceptical upon the subject of such metamorphoses, let them visit the fairy bowers of horticulture, and they will there perceive that her magic wand has not only converted the tough, coriaceous covering of the almond into the soft and melting flesh of the peach, but that, by her spells, the sour sloe has ripened into

<sup>1</sup> A work was published some time since by a Mr. Newton, entitled "*A Return to Nature*:" in which the author advocates the necessity of vegetable diet, and of the abandonment of food which nature never intended for our use. I confess, that upon opening the work, I was not a little amused by the sentence which first met my eye:—"Our drink is distilled water, *having a still expressly for this purpose in our back kitchen*"!!! *Art versus Nature* would have been a more appropriate title for such a production.

<sup>2</sup> See *Pharmacologia*, edit. 8. p. 112.

<sup>3</sup> 114.

the delicious plum, and the austere crab of our woods into the golden pippin; that this, again, has been made to sport in almost endless variety, emulating in beauty of form and colour, in exuberance of fertility, and in richness of flavour, the rarer productions of warmer regions and more propitious climates.

6. If cultivation can ever be said to have left the transformation of vegetables imperfect, the genius of cookery is certainly entitled to the merit of having completed it: for, whatever traces of natural qualities may have remained, they are undoubtedly obliterated during their passage through her potent alembic. It has been observed, that the useful object of cookery is to render aliments agreeable to the senses, and of easy digestion; in short, to spare the stomach a drudgery which can be more easily performed by a spit or stewpan—that of loosening the texture, or softening the fibres of the food; and which are essential preliminaries to its digestion. A no less important effect is produced by rendering it more palatable; for it is a fact, which I shall have to consider on a future occasion, that the gratification which attends a favourite meal is, in itself, a specific stimulus to the organs of digestion, especially in weak and debilitated habits.

7. Experience can alone supply the want of instinct; and, unless we assume this as the basis of all our inquiries upon the subject of diet, our theories, however refined, and supported by chemical and physiological researches, will prove but Will-o'-th'-wisps, to lead us astray into numerous difficulties and embarrassments. Experience, for instance, dearly bought experience, has taught us that headache, flatulency, hypochondriasis, and a thousand nameless ills, have arisen from the too prevailing fashion of loading our tables with that host of French *entremets*, and *hors-d'œuvres*, which have so unfortunately usurped the roast beef of old England. The theorists, in the true spirit of philosophical refinement, laugh at our terrors: they admit, to be sure, that the man who eats round the table, "*ab ovo usque ad mala*," is a terrific glutton, but that after all, *he has only eaten words*; for, eat as he may, he can only eat animal matter, vegetable matter, and condiment, either cooked by the heat of water or by that of fire, figure or disfigure, serve, arrange, flavour, or adorn them as you please. There is not a physician of any practical knowledge who cannot, at once, refute such a doctrine; every nurse knows from experience, that certain mixtures produce deleterious compounds in the stomach, although the chemist may perhaps fail in explaining their nature, or the theory of their formation. What would such a reasoner say, if he were invited to a repast, and were presented only with charcoal and water? would he be reconciled to his fare by being told that his discontent was founded on a mere delusion? that the difference between them and the richest vegetable viands was merely ideal, an affair of words, as in either case he would only swallow *oxygen*, *hydrogen*, and *carbon*? And yet the presumption in such a case would not be more violent, nor would the argument be less tenable,

than that by which the chemist attempts to defend the innocence of a practice which converts our refreshments into burdens, and our food into poison. It is an ancient observation that, "under some circumstances, *words become things*;" and, in the instance before us, the words of the sophist are certainly things to the stomach. To those who question the value of dietetic regulations in the cure of disease, I have only to observe, that they may as well deny the utility of the medical art altogether, and assert that, in all disorders of function, nature is sufficiently powerful to rectify and cure them, without the intervention of art: unless this be granted, it is absurd to say that beneficial impressions may not be made as well through the medium of the *materia alimentaria*, as through that of the *materia medica*; or, to borrow the language of Dr. Arbuthnot, that what we take daily by POUNDS must be, at least, as important as what we take seldom, and only by grains or teaspoonsful; but the truth is that the practitioner of the present day, animated by an increasing confidence in the multiplied resources of chemistry, is unfortunately disposed to undervalue the therapeutic influence of diet; he feels with pride the full quiver at his shoulders, and he disdains the use of familiar weapons.

8. Those who have read my work on Pharmacology will easily discover the train of research by which my mind has been led, from the study of the operation of medicines, to that of the digestion of aliment; while those who are acquainted with the various works on dietetics will readily admit, that an ample apology may be found for giving to the public another volume on that subject.

9. Before the subject of dietetics can be systematically considered, or the principles upon which disease may be prevented or cured by an appropriate diet, can be properly understood, or profitably applied, the reader must be made acquainted with the complicated machinery by which nature extracts blood from food. The various processes engaged in this wonderful transmutation are expressed by the comprehensive term DIGESTION, although this word is sometimes employed, in a more limited sense, to denote only those preparatory changes which the food undergoes in the stomach. Mr. Abernethy would appear to use the term according to this latter acceptation, for he says—"Digestion takes place in the stomach, *chylification* in the small intestines, and a third process, hitherto undenominated, is performed in the large intestines." The reader, however, of this work is to understand that, by *digestion*, is meant the whole series of functions from mastication to sanguification; for in truth the changes which take place during the act of respiration, are as essential to nutrition as chymification, or the farther elaboration of the food into chyle. The relation of a tale which has been so often told may, perhaps, appear to many as superfluous: I must, however, remark, that every author is conventionally allowed to state the theme of his discussion in his own language, and the advantages which have hitherto attended the indulgence sufficiently sanction its continuance.

## ANATOMICAL VIEW OF THE DIGESTIVE ORGANS.

Their elaborate machinery.—Their structure varies according to the food of the animal to which they belong.—Enumeration of the several digestive organs.—Their extraordinary sympathetic relations.—The alimentary canal: its peristaltic motion.—The stomach: its figure, dimensions, situation, and structure.—Small intestines.—The duodenum: peculiarities of its functions entitle it to be considered as a second stomach: provisions to limit its motions.—Jejunum.—Ilium.—Large intestines.—Cæcum.—Colon.—Rectum.—The various glands, or secreting organs, for the preparation of the digestive fluids.—The salivary glands.—Glands of the stomach and intestines.—The liver.—The pancreas.—Observations on the supposed use of the spleen.—Vessels for carrying the nutritive product to the current of the circulation.—The lacteals.—Mesenteric glands.—The thoracic duct.—The lungs.—The kidneys.—The skin.

10. No function in the animal economy presents such elaborate machinery as that of digestion; but its complexity and extent have been found to vary according to the nature of the food upon which it is designed to act. If it greatly differ in composition from the matter of which the animal is constituted, the changes it has to undergo before it can be adapted for the support and reparation of the body which receives it, must necessarily be more considerable, and the organs are accordingly more extensive and elaborate in herbivorous than in carnivorous animals: while man, who derives his supplies of nourishment from both the kingdoms of nature, possesses an intermediate organisation. His digestive organs may be said to consist of

1. A long canal, extending from the mouth to the anus, varying in the diameter of its different parts, according to the distinct duties which each is destined to perform; and which are also capable of contracting or enlarging their dimensions according to the circumstances under which they act.

2. Various glands, or secreting organs, for the preparation of the liquids which are required for acting on the alimentary matters.

3. Vessels for conveying to the current of the circulation the nutritive product of the operation.

4. The lungs, which complete its assimilation with the blood.

5. The kidneys and skin, which carry off the remaining portion as excrementitious.

These different organs are not only intimately connected with each other, but they display an extraordinary sympathetic relation with the sanguiferous and cerebral systems: there is, for instance, no organ of the body which is not directly or indirectly affected by the operations of the stomach: we shall therefore cease to wonder that an impression made upon it by a medicinal agent, or by an alimentary substance, should afford the means of exciting an action in the most distant parts of the machine; nor can we be surprised that the aberrations of this central organ should give origin to the



greater number of maladies with which the body is afflicted ; nor that those applications should be so effective, which are directed, for their cure, through the medium of its sympathies. But that we may not, like the members in the ancient fable, wage an unjust war against the stomach for the maladies which it may thus inflict, it is necessary to state, that the stomach suffers equally, in its turn, from the derangement of distant organs. What practitioner has not witnessed the sudden sickness produced by the sprains of tendinous and ligamentous structures, or by blows on the head or other parts? To distinguish between the sympathetic and primary affections of the digestive organs, is a problem of the greatest practical importance ; and the profession is much indebted to Mr. Abernethy, for his endeavours to show how the stomach and bowels may become affected from local disorders, and *vice versa*.

11. Although it would be obviously foreign to the plan and-objects of this work to enter into minute anatomical investigations, yet as there are certain facts connected with the structure and locality of the alimentary organs, which it is essential for the practitioner to bear in mind, I shall here offer such a description of them as may appear necessary for his guidance, or for the maintenance of that perspicuity which I am anxious to bestow upon the following pages. In the performance of this task, I shall preserve the order of arrangement already noticed (10), viz.

### 1. THE ALIMENTARY CANAL.

12. In strict language the alimentary canal includes the whole passage from the mouth to the anus, but the term is more usually employed to express only the stomach and intestinal tube. It may be represented as a long canal, commonly calculated as being five or six times the length of the adult, differently twisted upon itself, and of different dimensions in various parts of its extent. Anatomists describe it as composed of several distinct tunics, or coats, the existence of which may be traced throughout its whole extent, although their structure undergoes variation in the different divisions of the canal ; but this will be better understood when we come to speak of its individual parts. The intestinal canal is susceptible of a peculiar motion, which arises from the successive or simultaneous contraction of its longitudinal or circular fibres, and has been differently denominated by authors ; some have named it *vermicular*, others *peristaltic*. This contraction always takes place slowly, and in an irregular manner ; it is, however, capable of being accelerated by the action of certain stimulants. It does not seem to be sensibly controlled by the will ; nor, indeed, does it appear to be dependent upon the nervous system, for it proceeds in the stomach after the section of the eighth pair of nerves, and it even continues, though the intestinal canal be entirely separated from the body : at the same time it appears, from the experiments related by Dr. W.

Philip, that although these muscular fibres be independent of the nervous system, they may in every instance be influenced through it; a fact of very great pathological importance, since it follows that the muscular fibres of the canal may not only be affected by causes acting directly on them, but by such as act through the medium of their nerves. M. Majendie observes, that the peristaltic motion becomes more active by the weakness of animals, and even by their death; and that in some, by this cause, it becomes considerably accelerated. The object of this motion is to propel forward the contents of the canal, and to favour those changes which they are destined to undergo. The intestinal canal is never in a state of complete collapse, it always contains gas or vapour, which prevents its sides from coming into contact. It has been stated that this canal is of different dimensions in various parts of its extent, and it is principally from this diversity of magnitude that anatomists have established those divisions which we have next to consider.

13. The stomach is a membranous bag, very much resembling in shape the pouch of a bag-pipe, or, more strictly speaking, a conoid bent upon itself. It is not easy to determine its exact capacity in the living body, nor is it a fact of much practical importance: in various states of disease, we have reason to believe that it is considerably augmented in size. It has two orifices: the one termed the *cardia*, which is a termination of the tube we call the œsophagus; the other, which communicates with the small intestine, and to which the term *pylorus* has been given. The latter is raised up, being nearly, but not quite level with the former, so that its upper and lower surfaces form, as it were, two concentric circles, one on the upper side, which is called the small curvature, and one on the lower, which is termed the great curvature. The stomach is situated immediately below the diaphragm, the *cardia* being nearly opposite to the middle of the vertebræ. From thence it bulges out to the left side, the great curvature coming forward and downward: it then passes on to the right side, rising upwards, so that the *pylorus* is not much farther from the diaphragm than the *cardia*; when, therefore, a man is in an erect posture, substances must ascend to pass through the pylorus. It is, however, evident that its situation, and relation with the neighbouring organs, will always suffer variations according to its degree of distention; the following observations will therefore deserve the attention of the pathologist:—in its flaccid state, it occupies the *epigastrium* and part of the left *hypochondrium*; whilst, when distended, it exchanges its flattened for a rounded form, and fills almost completely the left *hypochondrium*; the greater curvature descending towards the umbilicus, particularly on the left side; on account of the resistance opposed by the vertebral column, the posterior surface of the stomach cannot distend itself in that direction; this viscus is therefore wholly carried forward. The dilatation of the stomach produces very important changes in the abdomen: the total volume of the cavity augments; the belly juts out; the abdominal viscera are compressed

with greater force; and the necessity of passing urine or fæces is frequently experienced. At the same time, the diaphragm is pressed towards the breast, and it descends with some difficulty; whence the respiratory motions are impeded. The stomach, although a single bag, must be considered as divisible into two distinct cavities, to which different offices are evidently assigned. The left half has always larger dimensions than the right; and M. Majendie calls the one the *splenic* part, because it is supported on the spleen, and the other the *pyloric* part, since it is supported on the pylorus.

14. The stomach has been described as composed of several membranes, viz. the *peritoneal*, *muscular*, *nervous*, and *villous* coats. The nervous coat, however, of Haller and the old anatomists, is now acknowledged to be nothing more than cellular membrane; and we might with equal propriety dismiss the two former from the number. The peritoneal covering, being common to all the contents of the abdomen, can scarcely be recognised as one of the proper coats of the stomach; while it has been very justly observed, that the muscular fibres, arranged between the peritoneum and the villous membrane, cannot maintain the name of a *coat* with propriety, since the term signifies a containing membrane, whereas the muscular fibres owe their connection with each other to interposed cellular membrane. One layer of these fibres runs longitudinally from the cardia to the pylorus; another takes a circular course, embracing, as it were, the stomach from one curvature to the other, and constituting what are called the transverse fibres. There remains, then, only the villous membrane; and this, in fact, is the only proper intestinal coat, or containing membrane of the aliment. The same observations will apply to the structure of the alimentary canal generally.

15. The villous, or mucous membrane has a whitish-red appearance, and presents a singular velvet-like appearance, from which it has derived its name: not being elastic, it has numerous folds, or *rugæ*, which supply this deficiency, and serve to accommodate the capacity of the stomach to the bulk of its contents; and, at the same time, to retain the aliment until it is duly elaborated. It is usually lined with a mucous matter, especially in its splenic extremity: it also contains many follicles; and near the pylorus are to be seen several glands, to which is assigned a peculiar office to be hereafter described. At this spot also the mucous membrane thickens, and forms a circular fold, which performs the office of a valve; a fibrous dense tissue is also here found, which some authors have called the *pyloric muscle*. The stomach is abundantly vascular; indeed it may be observed, that few structures receive so much blood as this organ: four arteries, three of which are considerable, are exclusively devoted to its service; and their several branches communicate most freely with each other in all directions by innumerable anastomoses: and, being tortuous, they can thus accommodate themselves to the full and empty states of the cavity. Nor are its nerves less numerous: they are composed of the eighth pair, and a

great many filaments proceeding from the *solar plexus* of the great *sympathetic*.

16. Notwithstanding the important discoveries of Sir Charles Bell, there still remains some obscurity with respect to the influence of each particular nerve on the functions of the stomach. The *par-vagus*, or eighth nerve of Willis, (the *pneumo-gastric* nerve of the modern physiologists of France,) would appear, from various experiments, to be that which imparts to the stomach its peculiar sensibilities, and at the same time to connect it in a necessary tie of sympathy with the heart and respiratory organs; thus is it that a blow on the stomach "*doubles up*" the bruiser, and occasions that gasping and crowing which sufficiently indicate the course of the shock through the branches of the *pneumo-gastric nerves*; a little more severe and the blow is fatal. In like manner may we explain the irritation of the lungs and palpitation of the heart so often excited by gastric derangement; nor can the physiologist, unacquainted with these relations, assign any cause for certain disturbances of the stomach being accompanied by hiccup, vomiting, sneezing, &c.

17. The nerves derived from the *great sympathetic* minister to its other functions, and although it may be difficult to assign to each nerve the duty with which it is charged, of this we may be assured, that through their combined agency, the stomach is brought into communion with every part of the machine.

18. The *duodenum* comprehends that range of small intestine which commences at the pylorus, and extends for about twelve inches; and so important are the changes which the aliment undergoes in its cavity, that many authors have regarded it as entitled to the appellation of a second or accessory stomach; and I shall, hereafter, have occasion to state, that many diseases which have been erroneously attributed to the stomach, derive their origin from the functional aberrations of this intestine; a fact which renders a knowledge of its structure and situation of great importance to the pathologist. Unlike the stomach, which may be said to be comparatively loose and floating in the abdominal cavity, it is secured in its position by various attachments, and the manner in which it is protected strongly evinces the importance of its functions. The practitioner should ever keep in mind the position and bearings of this intestine; for patients, directed by their own uneasy feelings, will frequently trace, with most anatomical accuracy, the course of the duodenum with their finger, from the stomach to the loins on the right side, and back again across the abdomen to the umbilicus. The duodenum, at its commencement, turns backwards and downwards for a short way; it then turns towards the right kidney, to the capsule of which it is more or less attached; it here forms a sacculated angle, and in this depending part, the ducts for conveying the pancreatic and biliary secretions enter the intestine: it now ascends from the right to the left, just before the aorta and the last vertebræ of the back; it continues this direction from thence obliquely forward by a slight curvature, and makes its exit through the ring in

the mesentery. Its mucous membrane, which presents many villi, and a great number of follicles for the secretion of its own peculiar fluid, forms irregular circular folds, termed "*Valvulae conniventes*," which increase the surface of the intestine, while they prevent the too rapid passage of its contents. It is furnished with nerves from the *ganglions of the great sympathetic*; and it is also abundantly supplied with bloodvessels. It is impossible to view all the arrangements of this organ without being satisfied that nature was anxious to limit its motions; and a little reflection will convince us of the great importance of such a provision: Dr. Yeats, in his valuable paper on the duodenum,<sup>1</sup> which is published in the sixth volume of the Transactions of the College, has alluded to this fact in a very pointed manner. It is evident that, had this intestine been loose and floating, the food might have passed too rapidly through it: it might also have drawn the small end of the stomach out of its proper situation; and there would have been a constant disposition in the food to pass out of the stomach into the duodenum, upon every relaxation of the pylorus: besides which, had it been less confined, and consequently subject to greater distention, a regurgitation might have taken place into the *ductus communis*, from an alteration in that obliquity of its direction, which now so securely guards against such an occurrence. Dr. Fordyce, in noticing the fact of the peritoneum being wanting on the back of the duodenum, most erroneously concludes, that this was ordained with a view of allowing a greater distention than can take place in the lower intestines: had such been the design of nature, she certainly would not have discarded so highly elastic a membrane, and attached the back of the duodenum to the vertebræ.

19. The *Jejunum*. The precise point at which the duodenum terminates, and the jejunum commences, cannot perhaps be accurately defined; but this latter intestine is generally considered as beginning where the mesentery takes its rise. It appears to have derived its name from the fact of its usually being found empty; probably from its more rapid powers of absorption.

20. The *Ilium* is the continuation of the jejunum, and is the last division of the small intestine; it is said to have derived its name from the manner in which it is coiled up by the mesentery. Its parietes are thinner than those of the preceding portion of the canal; and this circumstance, together with the deep yellow colour of its contents, impart to it an appearance very distinct from that of the duodenum.

21. The large intestines exceed the others in diameter, but are less considerable in length; in structure they also differ materially from the small intestines: their mucous membrane does not present that villous appearance of which we have spoken; but is, on the

<sup>1</sup> Some observations on the Duodenum; with plates descriptive of its situation and connections. Extracted from the Gulstonian Lectures, by G. D. Yeats, M. D., &c.

contrary, smooth: the number of follicles is also less, and it is supplied with much fewer arteries, veins, and nerves.

22. The *Cæcum* constitutes the first division of this portion of the intestinal canal, although some anatomists consider it as merely the head of the colon, and restrict the term *cæcum* to a small gut which is usually described under the title of *Appendix Vermiformis*, and which takes its rise from the posterior part of the cæcum: it is about the size of a quill, resembling, in figure and diameter, a common earth-worm: its coat contains numerous mucous glands, and its cavity, which communicates freely with that of the cæcum, is usually filled with a thick mucous fluid: its use is not well understood, but it is evidently designed to supply a fluid of some kind; and if we admit that the essential parts of the digestion are completed before the aliment arrives at this part, we may fairly conclude that the object of such fluid is to lubricate the intestinal passage, and thus to facilitate the expulsion of the fæces. At its junction with the ilium, the cæcum, or, according to some anatomists, the colon, exhibits a valve, formed by the production of the interior coat of the intestine, designed, according to Fallopius, to permit matters to pass forwards, but to prevent their return into the ilium.

23. These views, however, regarding the cæcum, must be materially modified, if we accept the theory lately promulgated by Dr. Schultz, of Berlin, on what he considers "*Cæcal digestion*;" but of this hereafter.

24. The *Colon* constitutes the principal tract of the large intestines, and exceeds them all in diameter: as accumulations in its cavity frequently produce various ill effects from their pressure, it becomes essential for the practitioner to know its direction and bearings. It commences in the cavity of the os ilium, on the right side; from thence, ascending by the kidney on the same side, it passes under the concave side of the liver, to which it is sometimes tied, as also to the gall-bladder, which tinges it yellow in that place;<sup>1</sup> it then runs under the bottom of the stomach to the spleen, in the left side, to which it is also affixed; and thence, passing in the form of the Greek letter  $\Sigma$ , it terminates in the upper part of the os sacrum in the rectum. It appears, therefore, to be contiguous to all the digestive organs, and may consequently produce much disturbance by its morbid distention. Its connection with the duodenum is also a circumstance of much pathological importance: whatever motion takes place in the former intestine will be communicated, more or less, to the latter; and should it become unnaturally distended, it will press immediately upon the ascending part of the duodenum, and retard the progress of the alimentary matter, which has always to rise against gravity, when the body is in an erect position, or recumbent on the right side. The colon has been divided into the *ascending* portion, which extends from the cæcum to the right hypochondrium;

<sup>1</sup> At least such is its appearance in the dead subject; whether a similar transudation takes place during life is very doubtful.

into the *transverse* portion, or what is termed its *great arch*; and into the descending portion, including what has been called its *sigmoid flexure*. The coats of this intestine are much stronger than those of the others: its muscular layer has also a peculiar disposition; its longitudinal fibres form three straight bundles or bands, far separated from each other when the intestine is dilated; at the same time, its circular fibres form bands, equally separated from each other, but more numerous: from which arrangement it follows, that, in a great number of places, the intestine only consists of the peritoneum and its mucous membrane; these places are generally formed into distinct cavities, which have been termed the *cells of the colon*: they serve to promote a gradual descent of the excrement; but, when the action of the canal is torpid, they give origin to much mischief, by unduly retaining its contents.

25. Several physiologists have supposed that the colon performs some other function than that of a mere recipient. Sir E. Home imagined that it formed fat; an hypothesis which would have received some slight support from the fact that the fattest animals have generally the largest colons, did we not know that persons have lived and enjoyed good health for many years, with an artificial anus formed by the cœcal extremity of the small intestines, which sufficiently proves that the large intestines are not essential to perfect digestion, nor to the maintenance of life.

26. The *rectum* is the last portion of the intestinal canal; it begins at the upper part of the os sacrum, where the colon ends, and going straight down (whence its name,) it is tied to the extremities of the coccyx by the peritoneum behind, and to the neck of the bladder in men, but in women to the vagina uteri before; whence arises the sympathy between those parts. The coats of the rectum are more thick and fleshy than those of any other of the intestines: it has not in general any valves, but several rugæ; had the former existed, the expulsion of the fæces would have suffered inconvenient delay. The figure of the rectum varies, as it is full or empty; when empty, it is regularly cylindrical, and contracts in transverse folds: it is capable of very great distention, and may even be extended to the size of a large bladder: the quantity of fæces that sometimes accumulates is prodigious, and cannot be removed except by mechanical means.

## II. THE VARIOUS GLANDS WHICH ARE SUBSERVIENT TO THE SECRETION OF THE DIFFERENT FLUIDS INTENDED TO ACT ON THE ALIMENTARY MATTER.

27. There is nothing more mysterious in the digestive process than the great variety of the fluids which appear essential for its completion; each of which has appropriate glands for its secretion. These fluids are, the *saliva*, which is formed by glands whose excretory ducts open into the mouth; and *mucous matter*, which

results from the action of numerous follicles situated in the interior of the cheeks and palate, upon the back of the tongue, on the anterior aspect of the *velum*, and on the *uvula*;—the *gastric juice*, formed by glands in the stomach; and the *mucus* secreted by its membrane;—the "*succus intestinalis*," or proper juice of the duodenum and small intestines;—the *bile*, which being secreted in the liver, and rendered more stimulating in the gall-bladder, is afterwards carried into the duodenum;—the *pancreatic juice*, which is secreted in the pancreas, and carried into the duodenum along with the bile; to which may, perhaps, be added the *watery liquids* thrown into the intestines by the exhalants. Were I to describe the intimate structure of the several glands and vessels which furnish these fluids, we should be led into anatomical details of tedious length, and which would be wholly unattended by practical utility. It is, however, essential for the physiologist, as well as the practitioner, to become acquainted with the most recent account of the chemical history of these several secreted fluids.

28. The *Saliva*. The mixture under this name is probably variable in its physical and chemical properties, according to circumstances which have not hitherto been examined. When first discharged from the mouth, it always holds suspended a *mucus*, which is not dissolved, but imparts to it a frothy quality, by enabling it to retain the air which it absorbs from the atmosphere. It is readily separated by merely diluting the saliva as it flows from the mouth with distilled water, when it will gradually subside, and may be collected on a filter. It is a curious circumstance that, although no traces of *phosphate of lime* can be detected in this mucus by the application of re-agents, yet, after incineration, a considerable proportion appears in the ash.<sup>1</sup> It has been doubted whether this mucus be secreted by the salivary glands, or is the common mucus of the mouth; the latter appears more probable. The saliva, deprived of this mucus, consists, according to the analysis of Berzelius, of

Water . . . . .	992.9
A peculiar animal matter . . . . .	2.9
Alkaline muriates . . . . .	1.7
Lactate of soda and animal matter . . . . .	0.9
Pure soda . . . . .	9

The peculiar matter of the saliva is soluble in water, but not in alcohol; and the solution is not precipitated either by alkalis or

<sup>1</sup>It is this mucus that produces the *tartar* of the teeth, which, at first, is only mucus precipitated on the surface of the enamel; but it soon begins to decompose; its colour changes, by the influence of the air, from white to yellow; the warmth and moisture of the mouth contribute to complete the decomposition, and the same earthy phosphates, which are produced by oxidation and combustion in open fire, are here formed, and deposited on the surface of the tooth by a slower but a similar process. The *tartar* is, therefore, as it were, the *ash* of mucus crystallised on the tooth.



acids, or sub-acetate of lead, or muriate of mercury, or tannin; neither is it rendered turbid by boiling. The saliva derives its name from the saline qualities which it possesses; and although, under ordinary circumstances, we are not conscious of them, yet, when the stomach has been long empty, and the nervous system acquires increased sensibility, the saline taste is frequently perceptible. The same effect is produced by disease; and the disagreeable taste of which invalids complain, often depends upon chemical changes having been produced in this secreted fluid. The common furred tongue would appear to arise from an increased quantity of vitiated mucus. The peculiar milky tongue,<sup>1</sup> which appears in certain states of the system, occasionally derives its appearance from an innumerable number of microscopic bubbles of air, as I have ascertained by observation: in such cases, the quantity, rather than the quality of the mucus, appears to be affected. The black tongue of typhus, on the other hand, is indebted for its character to a decomposed state of the mucus; while a deficiency in the true salivary secretion will explain its dryness.

29. When we consider the size of the salivary glands, which altogether cannot weigh more than four ounces, the quantity of fluid which they continually secrete is truly astonishing. It would be a difficult matter to ascertain, with accuracy, the proportion of saliva which these glands can separate in a given time; but we know that a person unaccustomed to smoking, will, by the influence of such a stimulus, discharge half a pint in a very short period. In the case of a felon, who cut his throat in prison, and so completely divided both the larynx, a little above the cricoid cartilage, and the œsophagus at the same point, that whatever was introduced into the mouth escaped by the external wound; it was found that, during each meal, there was a discharge of saliva from the mouth, amounting to from five or six, to eight ounces, or even more. This is sufficient to disprove the opinion of Dr. Fordyce, who says, "As far as I can judge, the secretion during a meal can hardly exceed an ounce or two; and I should think that it serves only to lubricate the passages through which the food is to pass." With respect to this latter assumption, I shall have to offer some observations in a future part of the work. The influence of the passions over this secretion is extremely curious; the sight of a delicious repast to a hungry man is not more effectual in exciting it, than is the operation of fear and anxiety in repressing and suspending it. If the reader be a medical practitioner, we refer him for an illustration to the feelings he experienced during his examination before the medical colleges; if a barrister, he may remember with what a parched lip he gave utterance to his first address to a jury. There is a trial of ordeal in the Institutes of the Hindus, in which we fancy that

<sup>1</sup> I am induced to consider the milky tongue as rather indicating a *sympathetic*, than *primary* derangement of the stomach. It is thus constantly produced by mental anxiety.

we can discern through the dim mist of credulity, a ray of policy that may have been derived from the dawning of a rude philosophy. In the ordeal alluded to, persons suspected of theft were each made to chew a quantity of dried rice, and to throw it upon some leaves or the bark of a tree; they, from whose mouth it comes dry, or stained with blood, are deemed guilty, while those who are capable of returning it in a pulpy form, are at once pronounced innocent.

30. *The Gastric Juice.* Great difference of opinion has existed with regard to the qualities and composition of this fluid; it would, however, appear that other secretions of a mucous nature take place in the stomach, with which it may be mixed: this circumstance, together with the difficulty of obtaining it in an isolated form, are sufficient to explain the contradictory results which different chemists have obtained. It is, moreover, by no means improbable that this liquor may vary in different stomachs, or even in the same stomach under different circumstances. M. Majendie observes, that the contact of different sorts of food upon the mucous membrane may possible influence its composition: it is, at least, certain that the gastric juice varies in different animals; for example, that of man is incapable of acting upon bones, while that of the dog digests these substances perfectly; and according to the experiments of Tiedemann and Gmelin, its acidity is considerably increased by the presence of vegetables, or substances of difficult digestion. From high authorities upon this subject, the true gastric juice is stated to be a glairy fluid, not very diffusible in water, and possessing the power of coagulating certain fluids in a very eminent degree. Dr. Fordyce states, that six or seven grains of the inner coat of the stomach, infused in water, gave a liquor which coagulated more than a hundred ounces of milk. Some authors have regarded it as colourless, and without taste or smell, while others have described it as being acidulous.<sup>1</sup> Dr. Young, of Edinburgh, is stated to have found that an infusion of the inner coat of the stomach, which had been previously washed with water, and afterwards with a dilute solution of subcarbonate of potass, still retained the power of coagulating milk very readily. We see, therefore, how unfounded that opinion is which attributes to the potation of water the mischief of diluting the gastric fluid, and thus of weakening the digestive process. The coagulating and efficient principle, whatever it may be, is evidently not diffusible in that liquid. After one fit of vomiting, should another take place after a short interval, the matter brought up will be little more than water, with a slight saline impregnation, and some mucus: it will not be found to possess any power of coagulation; which, Dr. Fordyce observes, evidently shows, that even water flowing from the exhalants, and which we should there-

<sup>1</sup> Dr. Prout has read a paper before the Royal Society, in order to prove that the stomach always contains *muriatic acid*. And it is now generally admitted that the gastric juice, in its healthy state, is more or less sour.

fore expect would throw off the whole of any substance from the surface of the stomach, is incapable of detaching the gastric juice.

31. Since the foregoing paragraph was written, Dr. Combe, in a work entitled "On Digestion and Dietetics," has published from the work of Dr. Beaumont, of the American army, an account of the case of Alexis St. Martin, a young Canadian of eighteen years of age, good constitution, and robust health, who was accidentally wounded by a musket-ball; the ultimate result was a fistulous opening into the stomach, but with the perfect restoration of the digestive process, and all the other functions of the body. This enabled Dr. Beaumont to undertake a series of observations and experiments, which Dr. Combe has very ably introduced into the body of his work. For obvious reasons, such an investigation must be, more or less, obnoxious to the suspicion of fallacy, unless its results be supported by collateral testimony. In the case of Alexis St. Martin, however, this is remarkably striking, and we receive from Dr. Beaumont's history a confirmation of what we already regarded as facts, rather than any important addition to our previously acquired knowledge. The following appear to me to be the most interesting of the facts that were thus ascertained. 1. That the gastric juice is perfectly acid, and possesses the property of coagulating albumen; that it is never found free in the stomach, but is always excited to discharge itself by the introduction of food or some other irritant. 2. That on the entrance of food into the stomach, the peristaltic motion becomes greater, and its bloodvessels so distended as to change the colour of the mucous membrane from a pale pink to a red: from the villi are then seen to arise innumerable minute lucid points, from which distils a colourless, and slightly viscid fluid, which collects in drops, and trickles down the stomach till it is mingled with the food. This is the true gastric juice. 3. The contact not only of food, but of any mechanical irritant, such as the bulb of a thermometer, or other indigestible body, invariably gave rise to the exudation of the gastric fluid; but that in the latter cases the secretion always ceased in a short time, as soon, apparently, as the organ could ascertain that the foreign body was one over which the gastric juice had no power. 4. That the motions of the stomach produce a constant churning of its contents, and admixture of food and gastric juice. 5. That chyme is homogeneous, but variable in its colour and consistence. 6. That water, and most other fluids, are not affected by the gastric juice, but pass from the stomach soon after they have been received. 7. That the temperature of the stomach is about 100° of Fahr., but is not elevated by the injection of food.

Such are the only facts which I feel it necessary to enumerate in this place. I shall, hereafter, have occasion to advert to the observations of Dr. Beaumont.

32. The mucous membrane of the small intestines secretes also a peculiar liquid, to which Haller gave the name of *intestinal juice*: the quantity that is formed in twenty-four hours, he estimated at

eight pounds: and M. Majendie states, that if this mucous membrane be laid bare in a dog, and the layer of mucus absorbed by a sponge, it is renewed in a minute; and he says, that this observation may be repeated as often as we please, until the intestine becomes inflamed by the contact of the air and foreign bodies. It has never been submitted to an accurate analysis; it appears, however, to be viscous, thready, of a salt taste, and capable of reddening paper tinged with turnsol.

33. The *liver* is, by far, the largest gland in the human body, and is so disproportionate to the quantity of liquid secreted, that the bile must require a very extensive apparatus for its elaboration; and this inference is strengthened by an examination of its composition, for few fluids are so complex, and so different from the blood. A knowledge of the locality of the liver is a fact of considerable importance to the practitioner, as he is frequently called upon to investigate diseases which depend, or are supposed to depend, upon organic changes in the structure of this viscus. Under such circumstances, the patient must submit to a manual examination; and the medical student who is unacquainted with the situation of the liver, with respect to the general cavity of the abdomen, or with the changes which its position may undergo from various circumstances, will frequently find himself involved in difficulty and confusion.

34. The liver is situated in the superior part of the abdomen, principally on the right side: it generally occupies the epigastric and the right hypochondric regions; but, since the inferior part of the chest may be diminished in capacity, or altered in figure, these regions may, by suffering a corresponding alteration, become too much contracted to contain it; in which case it will extend into the left hypochondric region, and may even occupy no inconsiderable part of the umbilical region. This occurs in females, whose chests are naturally contracted, or have become so by the barbarous custom of tight lacing, and from which more mischief has arisen than from all the dietetic errors which I shall have occasion to enumerate.

35. As the liver is connected with the diaphragm by doublings of the peritoneum, termed *ligaments*, it follows that, in the living subject, it will vary with respect to the general cavity, in the acts of inspiration and expiration.

36. The figure of the liver is also found to vary in different animals, being generally determined by that of the animal itself, or by that of the cavity in which it is contained. In the human subject it is somewhat convex on its anterior, irregular but concave on its posterior surface; it is extremely broad superiorly, but gradually becomes thinner inferiorly, and terminates in a thin margin. Its surfaces are smooth, being covered by the peritoneum, which forms its several ligaments. At the inferior edge of the liver there is a fissure extending some way up, particularly on its posterior surface, which divides it into two lobes of unequal size. These, from their

situation in the abdominal cavity, are distinguished by the names of the right and left lobes, of which the right is the larger. Besides these, there is a smaller lobe, situated at the superior and posterior part, called, after its describer, *lobulus Spigelii*. The liver usually weighs, in a middle-sized man, about three pounds twelve ounces.

37. In a depression on the concave surface of the right lobe, a pyriform-shaped bag, termed the *gall-bladder*, is lodged; it has a duct inosculating with that from the liver, through which the bile enters its cavity, and, at the same time, it constitutes the only outlet through which that fluid can pass into the intestine.

38. The pyloric portion of the stomach is generally covered by the left lobe of the liver, and the gall-bladder would appear to rest usually on the duodenum.

39. The liver is composed of arteries, veins, nerves, lymphatics, and excretory ducts, united by a peculiar parenchymatous structure. In every other gland in the body, the same blood which supplies it with nutrition is also adapted to its secretory office, and is conveyed to the organ by the same vessel: but the liver requires *arterial* blood for its nourishment, and *venous* blood for the materials of its secretion; the *hepatic* artery supplies the former, and the *vena portarum* conveys the latter. This vein is formed by the concurrence of all the veins of the abdominal viscera, which gather together and constitute one large trunk, called the *sinus* of the vena portarum, which enters the liver, and divides in the manner of an artery. This peculiar arrangement induced some physiologists to suppose, that the bile was prepared in the abdominal viscera, or rather, that the blood underwent some peculiar modification in the intestines, which prepared it for the peculiar change it was destined to undergo in the liver; and they have supported this opinion by another equally gratuitous, that the blood of the vena portarum is better adapted for the secretion of bile, on account of the larger proportion of carbon and hydrogen which it must contain; but Bichat has observed, that fat, which is a highly hydrogenated fluid, does not require venous blood for its secretion; and contends that the bile is secreted from the arterial blood of the liver, since the quantity of the latter sent to the liver is more in relation with the quantity of bile formed, than that of the venous blood; and that the volume of the hepatic canal is not in proportion with that of the vena portarum. M. Majendie seems inclined to believe that both kinds of blood may serve in the secretion: he thinks that such a theory is indicated by anatomy; for injections prove that all the vessels of the liver, arterial, venous, lymphatic, and excretory, communicate with each other. This idea, however, is highly repugnant to that simplicity which nature observes in all her operations; and, although I am not prepared to prove that the blood of the vena portarum has more analogy with the bile than the arterial blood, still, the peculiar structure, disposition, and terminations of this singular vein appear to testify the important function it is destined to discharge. M. Simon has shown, by recent experiments upon pigeons, that when

the hepatic artery is tied, the secretion of bile continues: but that if the vena portarum and the hepatic canals be tied, no trace of bile can be subsequently found in the liver: several pigeons survived the latter operation for six-and-thirty hours. It appears evident, therefore, that in these animals the secretion of bile takes place from venous blood. M. Simon further observed, that if the hepatic ducts were alone tied, the liver became choked up and filled with globules of a green tint, which colour was diffused over the whole surface of the organ; and what was very remarkable, that from ten to twenty hours after this experiment, the animals discharged absolutely green matter of the colour of bile, with which the liver was overloaded, a result which would seem to have proceeded from a vicarious secretion of the kidneys. In opposition to these experiments, we are bound to adduce the case related in the Philosophical Transactions, by Mr. Abernethy, and to which the physiologist will attach all the importance which can be fairly given to evidence furnished by monstrosity. The body of the infant, which forms the subject under inquiry, was found to measure two feet in length, and appeared of the age of about ten months. Its muscles were large and firm, and covered by a considerable quantity of healthy fat, and the general aspect of the body implied that the child had possessed much vigour. The liver was of the ordinary size, but had not the usual inclination to the right side of the body; it was situated in the middle of the upper part of the abdomen, and nearly an equal portion of the gland extended into either hypochondrium. The gall-bladder lay collapsed in its usual situation, and, although rather smaller than usual, presented a natural structure; it contained about a teaspoonful of bile, resembling in colour the bile of children, being of a deep yellow; it was also bitter, but not so acridly and nauseously bitter as common bile. But in this infant the vena portarum terminated in the inferior cava, and the entire supply of the liver was derived through an hepatic artery of an extraordinary size. Dr. Saunders,<sup>1</sup> who has devoted much attention to the investigation of the liver, observes, that as the function of the vena portarum differs from that of other organs, so has it been supposed to possess certain peculiarities of structure; but that the only marked difference consists in its tunica being thicker, in proportion to the capacity of its canal, than that of a common vein.

40. From the *sinus* of the vena portarum, three principal branches usually take their origin: these, by forming subordinate ramifications, in a regular series, at length arrive at their terminations, which are of two distinct kinds; the one with respect to the circulation of the blood; the other, as connected with their economy as secreting vessels. In the first point of view, they inosculate with branches of hepatic veins, and, through that channel, return to the inferior cava all that blood which is not employed in the business

<sup>1</sup>A Treatise on the Structure, Economy, and Diseases of the Liver, by W. Saunders, M. D.

of secretion. It appears, therefore, that the hepatic veins are the common recipients of the contents of the hepatic artery, and likewise those of the vena portarum. The secreting termination of this vein is the beginning of the hepatic ducts, which, Dr. Fordyce has observed, have improperly been called *pori biliarii*; for how can we, says he, with propriety, call a tube of many inches in length a pore? These ducts must be exceedingly minute at their origin, since they preclude the admission of the red globules. They gradually enlarge by a union of branches, until at length they pass out from the liver, and form the trunk of the *hepatic duct*. From the side of this rises another tube that leads into the gall-bladder, and the union of the two constitutes the common duct, or *ductus communis choledochus*; through which, it is obvious, that either the bile arising from the liver immediately, or that part of it which has stagnated for some time in the gall-bladder, may pass into the duodenum.

41. With respect to the chemical changes which the blood undergoes during its passage into bile, we are entirely ignorant; nor are we acquainted with any of the affinities by which the transmutation can be effected.

42. The liver is plentifully supplied with absorbents, which take their origin from every part of its substance, but more especially from the branches of the hepatic duct: this latter circumstance renders it probable that the bile loses a quantity of its aqueous particles as it passes through these passages, and changes from a diluted to a concentrated state.

43. The liver is supplied with nerves, which arise principally from the *hepatic plexus*, and enter the substance of the liver with the hepatic artery.

44. M. Majendie states, that the secretion of bile appears constant; for, in whatever circumstances an animal is placed, if the orifice of the *ductus choledochus* is laid bare, this liquid is seen to flow, drop by drop, at the surface of the intestine: but we are not to conclude that, in the living body, its discharge into the duodenum is uniformly progressive, and without interruption; on the contrary, the termination of the duct will be occasionally pressed upon, during the peristaltic action of the intestine; at which periods the duct will suffer a degree of distention, and the bile will find its way through the cystic duct into the gall-bladder. This effect will, in some measure, be promoted by the oblique manner in which the common duct perforates the intestine, although the more obvious utility of such an arrangement is to prevent the regurgitation of bile from the duodenum. To prevent the evils which must arise from a distended state of the gall-bladder, this viscus is so situated as to be pressed upon by the stomach: I also entertain but little doubt that, in such a morbid condition of this receptacle, an irritation is communicated to the stomach, by which vomiting is produced, which must effectually contribute to the expulsion of its bile. M. Majendie has generally found it empty in animals that have died by the effect of

an emetic poison. It seems very doubtful whether its coats are endowed with muscular powers to eject its contents.

45. Bile appears as a perfectly homogeneous fluid, of a yellowish green, or sometimes of a brown colour; in consistence, it is viscid and unctuous; its taste is bitter and pungent; and its odour peculiarly faint and nauseous. It is well known that the older chemists considered the bile as an animal soap, composed of soda and a resin; and this opinion received no small degree of support from the appearance of lather, which is produced by its agitation in a phial, and from that detergent quality so well known to every scourer of cloth. But in the present advanced state of science, the chemist is little disposed to infer the composition of a body from its external characters; he submits it to the ordeal of experiment, and tortures it by the most refined operations: the happiest results have followed this rigorous process of inquiry. To the labours of Fourcroy, Thénard, and Berzelius, we are principally indebted for our knowledge of the composition of bile; and as the subject is one of deep interest to the physiologist and physician, I shall here give some account of their researches.

46. Boerhaave, by an extravagant error, regarded the bile as one of the most putrescible fluids; and hence originated many hypothetical and absurd theories on diseases and their treatment. Dr. Saunders has shown, by a comparative experiment, that the bile of a healthy animal is far less disposed to putrefy than its blood. The bile of the ox, from the greater quantity which may be procured, has been usually the subject of experiment. The odour, colour, and taste of bile appear to reside in a resinous matter, which is solid, very bitter, and, when pure, green; but when melted, it passes to yellow. It is soluble in alcohol and in pure alkalis; and is precipitable from the former by water, and from the latter by acids. The uncombined soda in bile does not exceed one two hundredth its weight; and, as this very minute quantity of alkali must be quite incapable of dissolving the large proportion of resin which exists in bile, Thénard was induced to turn his attention to the discovery of some other solvent of resin, existing as a component part in that fluid. Acetate of lead (the common sugar of lead of commerce) precipitates, he found, not only the resin, but the peculiar substance of which he was in search, in union with oxide of lead. But an acetate, with a larger proportion of base, (formed from eight parts of sugar of lead and one of litharge,) produced a different effect, and precipitated only the albumen and the resin. When the remaining liquid was filtered, and the lead separated by means of sulphuretted hydrogen gas, it gave, on evaporation, a residue having less bitterness and considerably more sweetness. In this state the solvent of the resin could not be considered as pure, since it retained in solution a quantity of acetate of soda, arising from the decomposition, by the acetate of lead, of the salts of soda existing in the bile. He again, therefore, precipitated the solution by the acetate of lead saturated with oxide, and obtained an insoluble compound of the



peculiar matter and oxide of lead. This was dissolved in vinegar, the oxide of lead separated by sulphuretted hydrogen, and the acid driven off by evaporation.

47. This substance, to which Thénard has given the name of *picromel*, possesses the property of rendering the resin of bile easily soluble in water. Three parts are sufficient to one of the resin. The characters of *picromel* are, that it is insoluble in water and alcohol, and incapable of being crystallised; that it precipitates nitrate of mercury, and acetate of lead with excess of oxide; and that it forms, with resin and a minute quantity of soda, a triple compound, which is not decomposable by acids, nor by alkaline or earthy salts. Chevallier has shown that it exists in human bile taken from the gall-bladder after death, but he could not detect it in bile discharged by vomiting.<sup>1</sup> It has been analysed by Dr. Thomson, who obtained products indicating five atoms of carbon + three of oxygen + one of hydrogen.<sup>2</sup>

48. Besides *picromel*, there exists a peculiar principle in bile, to which the name of *yellow matter* has been given. It is precipitated by acids. It appears to be the source of those concretions which form in the gall-bladders of oxen, and which are valuable as a pigment, on account of the extreme beauty of their colour.

49. The composition of ox-bile has been determined as follows:—

Water . . . . .	700
Resin . . . . .	24
Picromel . . . . .	60.5
Yellow mater . . . . .	4 <i>but variable.</i>
Soda . . . . .	4
Phosphate of soda . . . . .	2
Muriate of soda . . . . .	3.2
Sulphate of soda . . . . .	0.8
Phosphate of lime . . . . .	1.2
Oxide of iron . . . . .	<i>a trace.</i>

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800

50. In analysing the bile of other animals, a similarity of composition was discovered, which little accords with the known diversity of their aliments; thus, that of the dog, the sheep, the cat, and the calf, was found to be precisely similar. The bile of the pig, on the contrary, contained neither *yellow mater* nor *picromel*. It consisted merely of resin in great quantity, of soda, and of salts, the nature of which has not been ascertained. It was entirely decomposed by acids, and even by the weakest—the acetic.

51. Berzelius is not disposed to regard the peculiar matter, which is considered to be *resin*, as strictly falling under that denomination. He says it is precipitable by acids; and the precipitate is a compound of the acid employed with the green colouring matter of

<sup>1</sup> Ann. de Chim. et. Phys. ix. 400.

<sup>2</sup> Ann. of Phil. xiv. 70.

bile. This characteristic ingredient he calls *biliary matter*. He finds bile composed of

Water . . . . .	907.4
Biliary matter . . . . .	80.0
Mucus of the gall-bladder . . . . .	3.0
Alkalies and salts . . . . .	9.6
	<hr/>
	1000

One circumstance, adds M. Berzelius, relating to this biliary matter, has much surprised me, which is, that it gives no ammonia by destructive distillation; therefore it contains no azote: but what can have become of the azote of the albuminous matter of the blood? for no vestige of it is found in any other of the constituent parts of the bile, nor does bile contain any ammonia.

52. M. Thénard also analysed human bile; and he is of opinion that his experiments have led him to as accurate a knowledge of it as of any other species. All the acids decompose it, and precipitate from it a large quantity of albumen and resin. These may be separated from each other by alcohol. By the application of acetate of lead no *picromel* can be discovered; nor is any other ingredient found in human bile than yellow matter, albumen, resin, and salts. The proportions are the following:—

Water . . . . .	1000, or more
Yellow matter, insoluble, and floating in the bile, a variable quantity, from 2 to	10
Yellow matter in solution . . . . .	<i>a trace.</i>
Albumen . . . . .	42
Resin . . . . .	41
Soda . . . . .	5.6
Phosphates of soda and lime, sulphate and muriate of soda, and oxide of iron . . .	4.5
	<hr/>
	1100

53. The yellow matter appears to be in every respect, similar to that of ox-bile. The resin is yellowish; very fusible; bitter, but less so than that of ox-bile; soluble in alcohol, from which it is precipitated by water; and soluble in alkalies, from which it is thrown down by acids. In water it appears scarcely to dissolve; and yet sulphuric and nitric acids occasion a precipitate from water which has been digested on it.

54. The *pancreas*, vulgarly called the *sweetbread*, is a large gland of the salivary kind, lying across the upper and back part of the abdomen, near the duodenum, behind the stomach and between the liver and spleen. Its length is eight or nine inches, its breadth is about two fingers and a half, and its thickness about one finger: it generally weighs about three ounces. It is composed of innumerable small glands, the excretory ducts of which unite, and form

the pancreatic duct ; which, in the human subject, always enters the duodenum with the ductus communis choledochus. Although the granulous structure of the pancreas has induced anatomists to regard it as a salivary gland, yet M. Majendie observes, that it differs in the smallness of the arteries which supply it, as well as in not appearing to receive any cerebral nerve. The peculiar fluid it secretes is, doubtless, necessary to digestion, but we are totally ignorant of the particular duty assigned to it. As we descend in the scale of animals, the pancreas disappears : it is found in the shark and skate, but in other fishes its place is supplied by *cecal appendices*, which afford a copious secretion analogous to the pancreatic liquor. The quantity of fluid prepared by this gland does not appear to bear a just proportion to its size. Dr. Fordyce first attempted to collect a quantity of it, by inserting a small quill into its duct, in a living dog : when there flowed out a colourless fluid, almost watery, having a saltish taste ; and on letting it evaporate on a plate of glass, he observed crystals of common salt, and muriate of ammonia, together with a colourless mucilage. This experiment, however, as its author candidly confesses, cannot be considered as satisfactory, since the secretion did not take place in its natural state ; the quill might stimulate the duct, and produce a different fluid. M. Majendie employed a simpler mode : he laid bare the orifice of the canal in a dog, wiped the surrounding mucous membrane with a very fine cloth, and then waited until a drop of liquid passed out ; as soon as it appeared, he sucked it up with a capillary tube ; and in this manner he succeeded in collecting some drops, but never enough to analyse it with any precision : he recognised in it a slightly yellow colour, a salt taste, but no odour ; and he found that it was alkaline, and partly coagulable by heat. The circumstance, says this able experimentalist, which most struck me, was the smallness of its quantity ; a drop scarcely passed out in half an hour, and I have sometimes waited longer for it. That the pancreatic fluid plays an important part in the elaboration of chyle, appears evident from the fact, that diseases of that viscus are attended with extreme emaciation.

55. The *spleen* is a viscus of a deep blackish red colour, situated on the left hypochondrium, immediately under the diaphragm, and above the kidney. Its figure may be said to be that of a depressed oval, nearly twice as long as it is broad, and almost twice as broad as it is thick. However ingeniously we may speculate upon the uses of this organ, nothing satisfactory has been hitherto obtained upon the subject. It certainly does not appear to be essential to life, for Mr. John Hunter removed it from a wounded man, and the patient did well. Various other instances of a similar kind stand on record. Mr. Herbert Mayo, in whose accuracy I place the highest reliance, says, "a dog, from which I removed the spleen twenty-eight months ago, became upon recovering from the wound fatter than before ; at present there is not any essential difference

in its appearance or habits from those of other dogs."<sup>1</sup> Hoffman also relates that, when the spleen is removed from dogs, they rapidly increase in fatness. It cannot supply any fluid for the digestive process, since it has no excretory duct. Some have supposed, from the peculiarly dark livid colour of its blood, and the difficulty with which it coagulates, that its use is to produce some change upon the blood, in order to adapt it for the secretion of bile. I think it very probable, from the relations which its blood-vessels bear to those of the liver, that it administers, in some way or other, to the latter viscus; but it cannot be instrumental in the formation of bile, as we have seen that this fluid can be properly elaborated without it. Is it not an organ of compensation—a waste pipe, for the removal of any redundant blood which may be thrown into the liver? or a reservoir, to supply any deficiency which circumstances may create? and that, in this respect, it is to its sanguiferous, what the gall bladder is to its biliary system?

56. Having completed the history of the glands destined for the secretion of the several fluids which are essential to the digestive process, I shall pause a short time, in order to offer a few observations upon the nature of those wonderful phenomena, which arise, as it were, on the doubtful confines of chemistry and vitality. What is secretion? How are we to explain the fact of blood being successively converted into saliva, gastric juice, bile, and a variety of other equally dissimilar fluids, by its mere transmission through a series of minute tubes? If we direct our attention to the most simple form of secretion, termed *serous exhalation*, we shall hastily arrive at the conclusion, that a separation of the thinner from the thicker parts of the blood is all that has been effected by the operation, and that the organs by which the several membranes are thus supplied, are consequently mere *sieves*, for if we examine the composition of the fluid secreted by the serous membranes, it will appear to be the serum of the blood, deprived of a certain quantity of albumen. The following very interesting observations by M. Magendie prove that the physical disposition of the small vessels has an influence upon the exhalation. When, in the dead body, tepid water is injected into an artery that goes into a serous membrane, as soon as the current is established from the artery to the vein, a great number of small drops pass out of the membrane, and quickly evaporate. This phenomenon has certainly a close analogy to exhalation. If we employ a solution of gelatine, coloured with vermilion, to inject a whole body, it frequently happens that the gelatine is deposited round the circumvolutions, and in the cerebral anfractuositities, without the colouring matter having escaped from the vessels; on the contrary, the whole injection spreads at the external and internal surface of the *choroid*. If linseed oil be used, coloured also by vermilion, the oil, deprived of the colouring matter, is often seen deposited in the great synovial capsule of arti-

<sup>1</sup> "Outlines of Human Physiology."

culations; whilst there is no transudation at the surface of the brain, nor in the interior of the eye. With such results before us, and observing, at the same time, that the structure of all glands agrees in this fact, that they are composed of vessels of infinitely small diameter, we are bound to conclude, that one part, at least, of the process of secretion is mechanical, and that, whatever other office a gland may perform, it undoubtedly acts as a sieve or filter. In reflecting upon all the circumstances and bearings of this important and interesting subject, I have often been struck with the wisdom and extreme simplicity of the process by which the blood is separated, by the structure of the eye, into those parts which are of such striking utility in its economy. It was essential that the crystalline humour should be perfectly transparent, and that the interior surface of the choroid coat should be impregnated with a dark pigment, in order to absorb the light immediately after it has traversed the retina: now, if we submit the matter of the lens to analysis, we shall find that it coagulates by boiling, and has all the chemical properties of the colouring matter of blood, except colour, which is entirely absent. What then has become of this colouring ingredient? we shall find that it has been appropriated by the vessels of the choroid, for the important purpose above stated. On examining this pigment, its composition will be found to confirm such a theory; for, when dried and ignited, it will burn as easily as a vegetable substance, and the ash will contain much iron. For these results we are indebted to the labours of Berzelius; and they certainly show that the circulating blood is decomposed on the interior surface of the choroid, leaving there its colouring matter, and conveying the remainder to the inner part of the eye perfectly limpid and colourless.

57. But filtration cannot explain the developement of those secreted fluids which contain proximate principles that do not exist in the blood; no foreign ingredient is added, no chemical re-agent is interposed, and yet the fluid which flows from the organised laboratory has acquired chemical properties, which render it decidedly different from the common circulating mass. The agent in this case can only be the nervous influence, or, in other words, the influence of life—and thus is it ever with our physiological researches; sooner or later we are obliged to abandon the light of chemistry, and to seek some unknown agent for the explication of the phenomena.

58. Every attempt to understand the manner in which the nervous fluid produces the phenomena of secretion has hitherto completely failed; the changes to which it gives origin no art can imitate, nor any philosophy explain; but although we are thus unable to trace the steps of nature, we may venture to inquire into the general direction of the path which she follows. It must be allowed that a considerable analogy subsists between the operations of the nervous fluid, as an agent of secretion, and that of galvanic electricity; they both suspend the natural affinities of bodies, dis sever

elements between which the strongest attractions exist, and determine them to unite in different forms and proportions. In illustration of this truth, the following ingenious experiment of Dr. Wollaston may be introduced:—he took a glass tube, two inches long, and three quarters of an inch in diameter, and closed one of its extremities with a piece of bladder: he then poured a little water into the tube, with one two hundred and fortieth part of its weight of common salt: he wetted the bladder on the outside, and placed it on a piece of silver: he then bent a zinc wire, so that one of its ends touched the silver, and the other entered the tube the length of an inch: in the same instant, the external face of the bladder gave indications of the presence of pure soda; so that, under the influence of this very weak electricity, there was a decomposition of muriate of soda, and a passage of the soda, separated from the acid, through the bladder. It seems rational to believe that something analogous may happen in the act of secretion. Dr. Young has developed this idea still further; and has observed, that we may easily imagine that, at the subdivision of a minute artery, a nervous filament may pierce it on one side, and afford a pole positively electrical, and another opposite filament a negative one; then the particles of oxygen and nitrogen contained in the blood being most attracted by the positive pole, will tend towards the branch which is nearest to it, while those of the hydrogen and carbon will take the opposite channel; and that both these portions may be again subdivided, if it be required: and the fluid thus analysed may be re-combined into new forms by a re-union of a certain number of each of the kinds of minute ramifications.

### III. VESSELS FOR CARRYING THE NUTRITIVE PRODUCT TO THE CURRENT OF THE CIRCULATION.

59. The *lacteals*, so called from the milky appearance of the liquor they are destined to carry, arise, by numberless open mouths, from the inner surface of the intestines. Each lacteal takes its origin upon one of the villi, by numerous short radiated branches, and each branch is furnished with an orifice for imbibing the chyle. The radiated branches are collected in fasciculi, which are enclosed in processes of the inner coat of the intestines. These fasciculi are of a roundish form, and have been called *ampullulæ* of Leiberkuhn, from the author considering them as little bottles receiving the chyle. From the villi, the lacteals run a considerable way under the muscular coat of the intestines, and then pass obliquely through it, uniting in their course into larger branches. Upon the surface of the intestines an external set appears; it runs between the peritoneal and muscular coats, and commonly proceeds some way in the direction of the intestine, and with few ramifications. The superficial and deep seated lacteals communicate freely in the substance of the intestines: those of the *jejunum*

are larger and more numerous than those of the *ilium*, the principal part of the chyle being contained in the former. The absorbents of the *great* are proportionally of an inferior size to those of the *small* intestines, and have seldom, though sometimes, been observed to be filled with chyle. In their course they pass through a great number of lacteal or *mesenteric* glands, which, like the lacteals themselves, are largest and most numerous in that part of the mesentery which belongs to the jejunum.

60. The *mesenteric glands* are seated in the fat, between the layers of the mesentery, near the branches of the blood-vessels. They are commonly scattered over the mesentery, at a little distance from each other; but there are seldom any observed within two or three inches of the intestines. They differ from each other in size, some being about half or two thirds of an inch in diameter, while others are so small as to be traced with difficulty. Their structure is the same as that of the absorbent glands in other parts of the body, but they are generally flatter, and are of a pale colour. When filled with chyle, they are nearly as white as the fluid contained in them. The lacteals, having passed through these glands, proceed forward, and by anastomosing form a set of trunks, which, together with those of the lymphatics, unite and constitute the *thoracic duct*, which ultimately opens into the subclavian vein. Much discussion has arisen as to the mechanism by which the chyle is made to pass forward through the lacteal system: capillary attraction would appear to have some influence in the operation, since absorption continues after death; during life, the pressure of the abdominal muscles, and the pulsation of the arteries, no doubt contribute to the effect. In the interior of the thoracic duct, and in the lacteals, there exist valves, so disposed as to permit the fluid to pass forward towards the subclavian vein, but to prevent its return.

#### IV. THE LUNGS.

61. Although the lungs perform several essential operations not immediately connected with nutrition, still, as the chyle is incapable of becoming blood without their assistance, they necessarily constitute an important link in the chain of assimilative functions. It would be digressing too much from the plan of this work, to enter into anatomical details of their structure; but it may be necessary to remind the practitioner, that the lungs are supplied with a part of the nerve of the eighth pair, and some filaments of the sympathetic, which will account for the sympathies which subsist between the respiratory and digestive organs.

#### V. THE KIDNEYS.

62. These organs are situated upon the sides of the vertebral column, just before the last false ribs. From their oblong figure,

they have been compared in shape to large beans. The right kidney lies under the left lobe of the liver, and is consequently lower than the left, which lies under the spleen. Their volume is small when compared with the large quantity of fluid which they secrete; and it appears probable, that the chemical functions which they perform are less extensive than those which may be regarded as more strictly mechanical. They are generally surrounded with a considerable quantity of fat: their parenchyma is composed of two substances; the one exterior, vascular, or *cortical*; the other, called *tubular*, disposed in a certain number of cones, the bases of which correspond to the surface of the organ, while their summits unite in the membranous cavity called *pelvis*. These cones appear to be formed by a great number of small hollow fibres, which are excretory canals of a particular kind, and which are generally filled with urine. It is a curious fact, that if a slight compression be made upon these uriniferous cones, the urine will pass out in considerable quantity; but, instead of being limpid, as when it passes out naturally, it is muddy and thick, which evidently proves that the hollow fibres act as filters. In respect to its volume, no organ receives so much blood as the kidney: the artery which is directed there is large, short, and proceeds immediately from the aorta. Haller has decided, that no less than a thousand ounces of blood may pass through the renal structure in the space of an hour; and the extreme facility with which the coarsest injections pass through the renal arteries into the *ureters*, or excretory ducts, affords a convincing proof of the immediate connection which exists between all the different parts of the structure of the kidney. The filaments of the great sympathetic are alone distributed to these organs.

## VI. THE SKIN.

63. The skin forms the envelope of the body, and is lost in the mucous membranes at the entrance of all the cavities; although some assert that these membranes are only a continuation of it, and thus account for the sympathy which subsists between such structures. Be this as it may, it is evident that the interior organs, especially the stomach, alimentary canal, the lungs, the liver, and the kidneys, sympathise in a very remarkable degree with the surface of the body. So striking and constant is the sympathy between these latter organs and the skin, that they appear capable of reciprocally assisting each other in their operations: where cold contracts the pores of the surface, we find the kidneys excited to a greater degree of activity; and changes in the secretions of the skin are attended with corresponding alterations in the alimentary excretions. Its sympathy with the stomach is also evinced by the phenomena which accompany digestion. It has been ascertained by Lavoisier and Seguin, that the cutaneous transpiration is at its minimum during chymification, and at its maximum after its com-



pletion. No organ of the body, however, is in such close and intimate alliance with the skin as the brain; nor is this surprising when we consider the universal expansion of the sentient extremities of its nerves. That the sympathies of the skin are more direct with the brain than with the heart is shown, as Mr. Travers<sup>1</sup> very acutely observes, by the blush preceding the sensible increase of the heart's action, as well as by the pallor which precedes the state of syncope. "So also," he adds, "we may observe that the fever of scarlatina, measles, and small-pox, precedes the eruption, and that the inflammation of erysipelas precedes the fever." In a pathological point of view this principle is extremely important, and is capable of explaining hitherto unintelligible or obscure phenomena.

64. According to M. Thénard, the liquid that escapes from the skin is composed of a great deal of water, a small quantity of acetic acid, of muriate of soda and potass, a small proportion of earthy phosphate, an atom of oxide of iron, and a trace of animal matter: the skin exhales also carbonic acid. The average amount of perspired fluid during twenty-four hours may be stated at about thirty ounces.

65. Much controversy has existed with regard to the absorbing powers of the skin: the experiments of M. Seguin would seem to show that, as long as the epidermis remains entire, substances in contact with the surface will not pass into the circulation, but that as soon as it is abraded, absorption takes place. If, however, friction be employed, an effect follows which simple application would not produce; it cannot, for instance, be doubted that mercury and other bodies may be thus made to pass into the system. This question is one of great importance, inasmuch as it would enable us to appreciate the value of nourishing baths of milk and broth; but at present considerable doubt hangs over it. In opposition to the opinion of Seguin, Dr. Dill has lately published a paper in the second volume of the *Transactions of the Medico-Chirurgical Society of Edinburgh*, on the subject of cutaneous absorption. His belief in the existence of such a function, is founded in the fact that in some cases, both of health and disease, an immoderate quantity of urine is discharged, which he maintains cannot be accounted for on any other principle than that of cuticular inhalation; and in order to confirm such an opinion, Dr. Dill instituted a series of experiments, with a view of discovering whether or not the weight of the body is affected by immersion in the warm bath. I am bound to say that the results he obtained are far from carrying conviction to my mind.

66. I have thus, with as much brevity as the subject will allow, offered a sketch of the different organs by which aliment is converted into blood. My object has been to bring into one point of view all those facts which are capable of practical application, and

<sup>1</sup> "A Further Inquiry concerning Constitutional Irritation," &c. by B. Travers, F. R. S.

to exclude, as far as possible, those which have no other than theoretical relations to the subject before us. Minute anatomy is of little service to the physician; but without a knowledge of the positions and localities of the different organs which constitute the seats of the diseases he may be called upon to cure, he will be inevitably led into error. In consequence of such deficiency, a practitioner at once refers a fulness of the right epigastrium to the liver, forgetting that a distended state of the duodenum may account for the symptom; in like manner, he will attribute to the kidney pains which ought to be referred to the posterior edge of the liver. A hundred parallel examples might be adduced, but those above stated will answer every purpose of illustration.

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#### PHYSIOLOGICAL HISTORY OF DIGESTION, AND ITS CONSEQUENCES.

Nutrition:—its final cause.—Old age:—Sir A. Carlisle's View of the Disorders of Senility objectionable.—The author's opinion.—Chemical and mechanical agents of digestion.—Conventional acceptance of the term chemical.—Mastication.—Insalivation.—Erroneous opinion of Dr. Fordyce and others with respect to the use of the saliva.—Deglutition.—Action of the gastric juice.—Chymification:—Artificial digestion.—Office of the pylorus.—Vomiting.—Duodenal digestion.—Chylification:—Uses of the bile.—Sir B. Brodie's experiments.—Chemical nature of the chyle:—its absorption.—Excrementitious matter.—Liquid aliments:—how decomposed in the stomach.—The liquid part absorbed or coagulated.—Digestion of milk, broth, wine, oil, &c.—Lymphatic absorption.—Sanguification.—Respiration.—Practical conclusions.—Urinary secretion.—Acidifying powers of the kidney.—The quality of urine influenced by the digestive process.—Necessity of urinary secretion.—A general view of the digestive process.—Reasons for believing in the existence of an agent analogous to electricity.—Experiments of Dr. Wilson Philip.—Speculations of the author.

67. A very superficial examination of an organised body will convince us, that it is constantly losing portions of the matter of which it is composed: several of its organs are incessantly engaged in separating fluids, which are loaded with its more solid constituents; and it is on the necessity of repairing these habitual losses, that the want of aliment is founded; while the assimilation of such nutritive materials with the composition of the organs which they are destined to supply, constitutes NUTRITION. And with such nicety are these processes of waste and repair adjusted, that whatever may be the quantity of food taken, or however the circumstances under which it is consumed may vary, the same individual, after having augmented in weight in proportion to the quantity of ingesta, will return, in the space of twenty-four hours, to nearly the same standard, provided he is not growing, nor has suffered any disorder of function. During this period the food has been decomposed, and

re-combined into compounds analogous to those which compose the organs to which it is carried; and this appears to take place with the same facility, however remote the composition of the aliment may be from that of the substances with which it assimilated. Living bodies, then, have not inaptly been compared to furnaces, into which inert substances are successively thrown, which combine amongst themselves in various manners, maintain a certain place, and perform an action determined by the nature of the combinations they have formed, and at last fly off, in order to become again subject to the laws of inanimate nature. These views naturally suggest several important questions for our consideration. If every part of the machine be thus capable of immediate and constant repair, why should it ever wear out? Does there exist some secret spring which is incapable of renewal, and at whose expense all the subordinate parts of the machinery are kept in repair? And why should life be terminated by the hardening of fibres, and the obstruction of vessels, when those very fibres and vessels are susceptible of renewal? These are mysteries which cannot be cleared up until the sealed fountain of vitality be laid open. It seems probable, that every individual has a certain measure of living energy assigned to him, which is gradually expended in directing and maintaining the performance of certain functions: when this is exhausted, the individual must perish, for it is incapable of renewal. Sir A. Carlisle, in his work on the Disorders of Old Age, remarks, that it seems little better than a vulgar error, to consider the termination of advanced life as the inevitable consequence of time, when the immediate cause of death in old persons is generally known to be some well-marked disease. I have directed some attention to this subject, and I feel warranted by experience to state, that the greater number of those who terminate their existence at an advanced age, die from the exhaustion of vital power, and that this is manifested in some one of their principal organs, the consequence of which is an ill-marked species of inflammation. Symptoms indicating the existence of peritonitis are by no means uncommon; in some cases the lungs or the brain appear to be the seats of disease. The arterial system owes its regularity of action to the presiding influence of the nervous power; and if this be withdrawn, or irregularly supplied, inflammation follows. It is to such a cause that the local congestions and topical inflammations, which so frequently occur in fever, are to be attributed. With all due respect, therefore, for the experience and skill of the author to whom I allude, I must differ with him in the view he has taken of the disorders of senility: the doctrine he inculcates is dangerous, and may lead to practical mischief. In cases of congestion, blood-letting is undoubtedly a judicious remedy, when directed with measured caution, because it removes an effect which may contribute to aggravate the original disease, or to obstruct the sanative operations which nature institutes for her own relief: but we should perfectly understand the mode in which it operates, and not mistake secondary for primary diseases.

68. Although these views may disparage every effort to prolong the natural term of existence, they afford us the satisfaction of knowing that we may ward off those accidents which would otherwise lead to its premature termination. Although we cannot augment the allotted measure of our vital energy, we can, at least, learn to husband its resources, and not to consume, with wanton indifference, the unrecrutable oil by which the lamp of life is supported.

69. In examining the phenomena of waste and supply, we shall observe that there is a marked difference, depending on age, health, temperament, and bodily exercise, in the proportion of the parts which enter into this current, and of those which abandon it; and that the velocity of the motions usually varies according to the different conditions of each living being. A knowledge of these differences, which is to be discovered only by ample experience and well-directed observation, must constitute the basis of a true theory, for the regulation of diet. If it be said, that a deficient quantity of food is indicated by our feelings, and that an excess is carried off without inconvenience, I shall reply, that, under ordinary circumstances, nature rarely suffers from abstinence, but continually from repletion; that while, in one case, she limits her expenditure to meet the exigencies of her income, in the other she is called upon to exercise an injurious liberality to throw off by various secretions and exhalations the useless burden. In the vigour of health and youth, the evils of such a system may not be felt, but as life advances organic changes are slowly and imperceptibly produced, which ultimately, by their aggregate effect, clog the machine and lead to disease and premature death. No one has illustrated this subject more forcibly and philosophically than Mr. Travers in a late work, to which I shall have occasion to refer more fully on a future occasion.

70. If there be one law in the animal economy which, above every other is irresistibly forced upon our attention, and which must command our unqualified assent, it is this, that THE ADJUSTMENT OF SUPPLIES SHOULD ALWAYS BEAR A DIRECT RELATION TO THE WASTE AND GROWTH OF THE INDIVIDUAL—and yet it would be difficult to point out a principle so little regarded, and so generally abused. Do we not daily see the adult indulging in an excess adapted only to the demands of a rapid growth?—the sedentary and indolent feeding like the active and laborious? Do we not witness the greatest alterations and changes in the habits of men—the active countryman becoming the sedentary artist,—the sportsman, inhaling the invigorating breezes of the morning, converted into the legislator, doomed to breathe during the greater portion of the twenty-four hours, smoke, carbonic acid, and animal effluvia? Do we not, I repeat, see these, and equally violent changes in the habits of men; but when, let me ask, do we see alterations in the diet in accordance with such changes?

71. If *chemical* change be defined that change of composition in which the elements of bodies are differently arranged, with regard to

their proportions and modes of combination, the conversion of aliment into blood strictly falls under that description; but the definition generally includes the operation of certain known laws, by which such changes are produced. In this latter sense the analogy fails us; for the forces which determine the decomposition of food, and its recombination into chyle, are undoubtedly not to be measured or appreciated by the laws which govern the transmutations of inanimate matter: we may, nevertheless, conventionally retain the term, in order to distinguish such actions from those which are more strictly mechanical; and although, in the progress of such discussions, we may lapse into the common language of chemistry, the reader will, from this explanation, readily understand the latitude with which it is to be received.

72. In every change which the aliment undergoes, from its introduction into the mouth to the exclusion of its refuse, we shall discover the combined operation of chemical and mechanical agents. When, for instance, the food enters the mouth, it is at once submitted to the mechanical process of division by the teeth; and, during its mastication, it becomes intimately mixed and combined with a chemical agent, which prepares it for the process which it has shortly to undergo in the stomach.

73. But there exists, moreover, a *vital* action which no natural philosophy can elucidate—the lights of chemistry, feeble as they are in the stomach and first intestine, fail us altogether after the change produced by the admixture of bile with the chyme in the duodenum. At this period of the process it is probable that certain organic molecules result, and are developed and modified by a new class of actions, wholly different from what we understand by *chemical* transmutation; in short, the organisation, and not the composition, of the products is to be regarded, and which during their passage through the different glands, are doubtless elaborated by a series of ascending changes into forms of increasing complication.

74. The quantity of the salivary secretion appears to be augmented by the pressure occasioned upon the glands by the act of mastication; but its flow, although perhaps less in quantity, equally takes place without the aid of such pressure, as is proved by the phenomena observed during the repast of the criminal already alluded to (29.) The glands appointed to secrete this fluid seem to act in sympathy with those of the stomach, both of which are simultaneously excited by the stimulus of the food, or even by the contemplation of a favourite meal. Macbride considered the saliva as a ferment.<sup>1</sup> The ground of this opinion arose from his having made experiments, in which pieces of meat and water were mixed together alone in one vessel, and in another the same substances were mixed with saliva: in the former case no bubbles of air were perceptible, but in the latter a copious evolution of them took place. This, however, was a fallacy, depending upon the viscosity which

<sup>1</sup> This opinion has been revived by M. Raspail.

the saliva imparted to the water, by which the escape of air was prevented until it became sensible. Dr. Fordyce, on the other hand, contends, that the saliva answers no other purpose than to lubricate the passages through which the food is to pass, because he cannot discover in the composition of that fluid any ingredients which are likely to act as powerful solvents. But the processes of nature are more refined than those of art; and where chemistry refuses its aid, we may often derive information from simple experience. This happens in the question before us; the introduction of saliva into the stomach is obviously essential to a healthy digestion. That a dry state of the fauces should be attended with loss of appetite, may, perhaps, be reconciled, on the supposition that the salivary glands sympathise with those of the stomach, and that, therefore such a condition of the fauces is merely indicative of a deranged state of the gastric secretion; but this explanation will not apply to those cases of anorexia, in which the saliva is duly secreted, but is, from some mechanical cause, not swallowed. Ruysch knew a man who was wholly deprived of his appetite by a fistula in one of the salivary ducts; and it is well known to the physician who has attended maniacal patients, that the constant spitting in which such persons occasionally indulge, is invariably attended with loss of appetite, dyspepsia, and emaciation. Insalivation, therefore, is as essential as mastication; and although it will not supersede the necessity of this latter operation, as we find that persons who do not chew their food have often, on that account, a laborious digestion, yet it may, to a certain degree, compensate for it; and it is probable that the abundance of saliva in children may render mastication less necessary; in like manner, we find that, in old age, the loss of teeth is followed by an increased salivary discharge. The change which the savour and odour of food undergo in the mouth sufficiently testifies some chemical action; but it must, at the same time, be admitted, that the deglutition is assisted by the moisture and lubrication which the saliva affords.

75. M. Majendie says, we are informed that mastication and insalivation are carried sufficiently far by the degree of resistance and savour of the food; besides, the sides of the mouth being endowed with *tact*, and the tongue with a real sense of *touch*, they are very capable of appreciating the physical changes which the food undergoes. Though deglutition is very simple in appearance, it is nevertheless the most complicated of all the muscular actions that serve for digestion. It is produced by the contraction of a great number of muscles, and requires the concurrence of many important organs. It has been divided into three periods: in the first, the food passes from the mouth to the pharynx; in the second, it passes the opening of the glottis, and that of the nasal canals, and arrives at the œsophagus; in the third, it passes through this tube, and enters the stomach. The progress of the alimentary bolus is facilitated by mucus, which is pressed out of the follicles over which it passes. Its passage through the œsophagus appears to be compara-

tively slow, and it sometimes stops for several seconds : every person must be convinced of this fact from his own sensations ; and where the bolus has been very large, its passage has been accompanied with vivid pain, occasioned by the distention of the nervous filaments which surround the pectoral portion of the canal ; thus then is the morsel passed on by the successive contractions of the muscular fibres of the canal, and not by its own weight, as we might be apt to consider : we should also remember that during the feeding of graminivorous animals it is propelled upwards into the stomach, and even man, as a matter of experiment, has often swallowed liquids, while standing on his head.

76. The sensations excited upon the œsophagus by pressure, laceration, &c. are analogous to those of the skin on similar occasions ; but this mode of sensibility would appear to terminate at the cardia ; for the stomach, in a healthy state, does not experience any sensation on the contact of food.

77. When the aliment is introduced into the stomach, it appears to remain there but a short period before it undergoes a change ; but this varies according to its nature, and other circumstances. It has been stated (13) that, although the stomach is a single bag, it may be considered, with respect to its functions, as divisible into two distinct cavities, the one termed the *pyloric*, the other the *splenic* extremity ;<sup>1</sup> and these portions are, during the activity of the stomach, separated from each other by a peculiar muscular contraction. These chambers evidently appear to perform different offices in the process of digestion. The splenic portion would seem to separate from the food the superfluous quantity of water, and then to transmit it to the pyloric division, where it undergoes the first great alimentary change, or is converted into *chyme* : during this operation both orifices of the stomach are closed. It has been stated that, as the food accumulates within the cardiac chamber, the stomach becomes prominent in the epigastrium, the abdomen is distended, and the neighbouring viscera are compressed. Under such circumstances it is evident that the reflux of food along the œsophagus would readily take place, had not some provision been established to prevent it ; it has been accordingly observed that the muscular fibres of the tube fall into frequent contractions, at such a period, and which more especially occur during the act of inspiration, when the pressure upon the abdomen is the greatest. In certain morbid states these muscular efforts are too feeble to accomplish their object, and a species of *rumination* takes place, which greatly infests the dyspeptic sufferer. I shall not consume the time of the reader by relating the numerous theories of putrefaction, concoction, fermentation, and trituration, which have been suggested by physiologists of

<sup>1</sup> In the horse, the mucous membrane of the two extremities of the stomach has a striking difference of structure ; the horse being a graminivorous animal, this arrangement may, in some degree, perhaps, answer the purpose of the more complicated stomachs of the *ruminantia*.

different ages, to account for the changes which the food undergoes: it will be sufficient to state, that this question is at length determined, and that the solvent energy of the peculiar liquid, which has been already described (30) under the appellation of *gastric juice*, together with the motions of the stomach, alone produce that change upon the aliment which we have next to consider.

78. It is not easy to define the exact nature of *chyme*; but authors agree in considering it a homogeneous paste, grayish, of a sweetish taste, slightly acid, and retaining some of the properties of the food. M. Majendie has lately examined the subject with greater precision, and it follows from his experiments, that there are as many species of chyme as there are varieties of food; if, at least, we may judge by colour, consistence, and sensible qualities.

79. The *gastric juice* is remarkable for three qualities,—a coagulating, antiputrescent, and solvent power. I have already spoken of its coagulating properties. Of its antiseptic powers abundant proofs have been furnished by the experiments of several physiologists. Dr. Fordyce found that the most putrid meat, after remaining a short time in the stomach of a dog, became perfectly sweet. Spallanzani ascertained that the gastric juice of the crow and the dog will preserve veal and mutton, and without loss of weight, for thirty-seven days in winter; whereas, the same meats, immersed in water, emit a fetid smell as early as the seventh day, and by the thirtieth are resolved into a state of most offensive putridity. The solvent powers of the stomach are equally remarkable. Reaumur and Spallanzani inclosed pieces of the toughest meats, and of the hardest bones, in small perforated tin cases, to guard against the effects of muscular action, and then introduced them into the stomach of a buzzard: the meats were uniformly found diminished to three-fourths of their bulk in the space of twenty-four hours, and reduced to slender threads, and the bones were wholly digested, either upon the first trial, or after a few repetitions. To ascertain whether the chymification of food were entirely attributable to this gastric solvent, experiments were instituted in order to produce what has been termed *artificial digestion*. After having macerated food, Spallanzani mixed it with gastric juice, and then exposed it, in a tube, to a temperature equal to that of the stomach; it is said that the experiment succeeded, and that *chyme* was produced. M. de Montegre, however, has shown the fallacy of this conclusion; but, says M. Majendie, we are not to conclude, from the failure of such an experiment, that the same fluid cannot dissolve the food when it is introduced into the stomach. The circumstances are indeed far from being the same: in the stomach, the temperature is constant, the food is pressed and agitated, and the saliva and gastric juice are constantly renewed; as soon as the chyme is formed it is carried away,—circumstances which do not occur in a tube containing a mixture of the food and gastric juice. It seems probable that the gastric juice remains on the surface of the stomach, and is secreted as the digestion proceeds. The chymification of the food



commences on its surface, and gradually proceeds towards its centre: a soft layer may be easily detached, which presents the appearance of a corroded and half-dissolved substance. The white of a hard egg, for instance, very shortly assumes an appearance like that which would be produced upon it by immersion in vinegar, or an alkaline solution. This change, if duly performed, is not accompanied with any notable extrication of gas; but, should the vital powers of the stomach be deficient, a different species of decomposition takes place, the laws of chemistry gain the ascendancy, and results are produced more or less analogous to those which would arise from the same materials, if placed under similar circumstances of temperature and motion, in a vessel out of the body.

80. Whatever may be the alimentary substance introduced, the chyme will present the invariable property of reddening paper coloured with turnsol, and it has always a sharp odour and taste; vegetables, however, would appear to elicit a more acidulated solvent from the secreting surface of the stomach, than food derived from the animal kingdom.

81. The period necessary for chymification must vary according to the nature and volume of the food, the degree of mastication and insalivation it may have previously undergone, and the degree of vital energy possessed by the stomach. According to the observations of Majendie, fat, tendon, cartilage, coagulated albumen, mucilaginous and saccharine vegetables, resist the action of the stomach longer than fibrinous and glutinous substances. In experiments made by Sir A. Cooper, fat was found to be digested in the stomach of a dog, considerably quicker than muscular flesh, cheese, skin, cartilage, tendon, or bone, each of which had lost less in weight than the preceding, in a given time, through the influence of the gastric solvent. The whole of the aliment is not simultaneously converted, but portions, as they are perfected, are successively passed out of the stomach into the duodenum, there to undergo further changes, to be presently described. In this case the *pylorus* must, as its name implies, be endowed with a peculiar sensibility and vigilance, by which it is enabled to distinguish between the crude and chymified portions, so as to admit the latter, while it opposes the passage of the former. To this theory it has been objected, that various foreign bodies have been known to pass from the stomach into the intestines, as buttons, pieces of iron, &c.: but it must be remembered, that such substances may be even less irritating than crude food, and that they are, besides, not admitted into the intestines until they have been frequently presented to the pylorus, and the sensibility of this valve has been diminished. Nature has endowed the eye with an irritability which instantly causes it to close upon the contact of an extraneous substance; but the oculist who is in the habit of performing operations on that organ, knows that, after the instrument has touched the eye several times, its irritability ceases, and it becomes passive. M. Majendie, however, expresses his scepticism with regard to this elective power of the pylorus. He seems to

consider the idea as fanciful ; but I would ask whether there is anything improbable in the supposition ? Is not every part of the machine endowed with a sensibility adapted to the office it is destined to perform ? The eye is stimulated by light, the heart by blood ; and why may we not suppose that the pylorus is, in a like manner, stimulated by the contact of chyme ? . If we reject this idea, can we propose a less objectionable explanation of the phenomena ?—certainly not : on the contrary, the whole economy of the stomach is adverse to any other belief. If an unnatural stimulus be given to this viscus, so as to increase its motions, with a view of accelerating the progress of its contents into the duodenum, before they have been duly converted, what happens ? The pylorus refuses its assent to their egress, and the motions of the stomach are inverted, so as to expel the crude food by vomiting.

82. In order to facilitate the expulsion of chyme through the pylorus, numerous glands are placed around it, which furnish a lubricating fluid. For the same purpose, glands are found in the crops of birds, near the entrance into the gizzard. In the human subject we recognise a similar provision in the lower part of the rectum, in order to assist the alvine evacuation.

83. After the chyme has passed into the duodenum, it becomes mixed and incorporated with the peculiar fluid secreted by that intestine ; it still, however, preserves its colour, its semi-fluid consistence, its sharp odour, and its slightly acid savour, until it reaches the sacculated angle, where it meets with the biliary and pancreatic fluids, with which it mixes, and undergoes an important chemical change, which has been very accurately examined by M. Majendie ; and as the results of his inquiry are capable of throwing some light upon the subject, I shall offer a summary view of them. As soon as the chyme mingles with the chylopoietic fluids, it assumes a yellow colour and a bitter taste, and its sharp odour is diminished ; but those changes, as well as the phenomena which accompany them, are variable, and appear to be influenced by the quality of the food. If the chyme proceed from animal or vegetable matters containing fat or oil, irregular filaments, sometimes flat, and at other times rounded, are seen to form here and there on its surface, and to attach themselves quickly to the *valvulæ conniventes*. They appear to consist of crude chyle. This matter, however, was not observed when the aliment did not contain fat: in the latter case, the product appeared as a grayish layer, more or less thick, adhering to the mucous membrane, and might possibly contain only the elements of chyle. This change, whatever may be its chemical nature, is evidently produced by the action of the biliary and pancreatic liquids, aided by the agitation which the substances undergo by the motions of the duodenum itself, as well as by that communicated to it from the colon, to which it is attached.

84. Various opinions have existed, with regard to the use of the bile : some physiologists have considered it as merely excrementitious, and with this opinion the general mass of mankind would

appear to coincide; for there is scarcely a patient who does not complain of being tormented with bile, while the shop of the druggist groans with the weight of pills which are calculated to expel this fearful enemy from the system. The situation alone of the liver, connected as it is, in every instance, with the upper part of the alimentary canal, would be sufficient to repel such an idea. Others have imagined, that it is a natural and habitual stimulus to the intestines, keeping up their energy and peristaltic motion. It cannot be denied that this is one of its secondary uses; it likewise from its saponaceous and soluble qualities, diminishes the adhesive nature of the fæces, and, by smoothing their surfaces, promotes their evacuation; but its first and most important use is to change the nutritive part of the *chyme* into a new and more highly animalised product, termed *chyle*,<sup>1</sup> and to separate from it the useless and excrementitious part. That such is the truth, is at once proved by the fact, that *chylification* takes place just at the part where the bile flows into the intestine: nothing like chyle is ever found in the stomach; and Dr. Prout, whose able researches in animal chemistry are well known, has ascertained that albumen, which is the characteristic part of chyle, is never to be discovered in herbivorous animals higher than the pylorus. The question is, moreover, set at rest by the experimental inquiries of Sir Benjamin Brodie. He tied a ligature round a common duct of a cat, so as completely to prevent the entrance of the bile into the intestine; he then noted the effects produced in the digestion of the food which the animal had swallowed, either immediately before, or after the operation. The experiment was repeated several times, and the results were uniform. The production of chyme took place as usual, but the conversion of chyme into chyle was invariably and completely interrupted. Not the smallest trace of this latter fluid was discoverable, either in the intestines or in the lacteals. The former contained a semi-fluid substance, resembling the chyme found in the stomach, with this difference, that it became of a thicker consistence, in proportion as it was at a greater distance from the stomach, and that, as it approached the termination of the ilium, the fluid part of it had altogether disappeared, and there remained only a solid substance, differing in appearance from ordinary fæces. The lacteals contained a transparent fluid, which probably consisted partly of lymph, partly of the more fluid

<sup>1</sup> With respect to the terms *chyme* and *chyle*, Dr. Bostock makes the following observation:—"It does not appear that there is any thing in their etymology which would lead to the distinction thus admitted, nor was it recognised by the old authors, nor even by some of those of the last century, who appear to have used the words indifferently, or to have considered them as synonymous. The distinction between chyme and chyle is not recognised by Boerhaave; he appears, indeed, not to contemplate any essential difference between the contents of the stomach and the duodenum, except what depended upon the mixture of bile and pancreatic juice with the latter. I have not been able to ascertain who it was that first assigned to the words their present signification."—*Bostock's Physiology*.

parts of the chyme which had been absorbed. These experiments, then, clearly demonstrate, that the office of the bile is to change the nutritive part of the chyme into chyle, and to separate from it the excrementitious matter. How, then, it may be asked, does it happen, that persons live to a considerable period, in whom the flow of bile into the duodenum is interrupted? The truth is, that the obstruction of the duct by disease is seldom so complete as to prevent the passage of bile altogether, and the white appearance of the *fæces* may prove the deficiency, or morbid condition, but not the total absence of bile. To ascertain how far this supposition might be supported by experiment, I poured some dilute muriatic acid upon a portion of *fæces* that was perfectly white, when a green colour was immediately produced, which could not have happened without the presence of bile.

85. The experiment of Sir B. Brodie, as above related, was repeated by M. Majendie upon adult animals. He found that few of the subjects survived the operation, but that in two cases, wherein they outlived the experiment for several days, white chyle was formed, and *fæcal* matter produced, although not of the usual colour. The animals had not, however, become tinged, as in the parallel experiment of Sir B. Brodie, in which they were deeply jaundiced, the *tunica conjunctiva* being yellow, and the urine loaded with bile. Results, so contradictory to each other, are certainly very perplexing, and we are, therefore, much indebted to Mr. Herbert Mayo for the important weight of evidence which he has thrown into the scale of the English physiologist. The following are the experiments which agree in their results with those of Sir B. Brodie:—

“The *ductus communis choledochus* was tied in three cats, each about four months old, which had fasted for twenty-four hours previously. They each took food after the operation, which they threw up; but they afterwards again took food, consisting of milk and raw or boiled meat, and continued to eat occasionally with a natural appetite.

“One of these animals was killed between five and six hours after the duct had been tied. The stomach contained a full meal of meat, consisting in part of morsels, which were softened by the action of the gastric juice, but had undergone no further alteration, in part of a pulpy mass of a reddish gray colour, in part of a brownish gray viscid liquid, in which innumerable small globules of oil floated. The small intestines were perfectly empty.

“The second died within fifty hours after the experiment. The stomach contained a small quantity of half digested food; the small intestines contained scarcely a trace of a grayish semi-fluid substance, which here and there admitted of being scraped from the villous surface.

“The third was killed three days after the operation. The stomach contained half digested food; the small intestines contained a quantity of grayish viscid liquid, very like the liquid contents of

the stomach. The great intestines, in this and the preceding instance, were distended with a grayish, tenacious, and highly offensive semi-fluid matter.

“An adult dog, in which the duct had been tied, was found dead on the second morning of the experiment. The mucous membrane of the stomach and bowels was inflamed. The stomach contained water only; the small intestines held a quantity of yellowish soapy liquid.

“Finally, the duct was tied in two young dogs, which had fasted for twenty-four hours; one died, the second was killed about forty-eight hours after the operation. Both had eaten boiled flesh, and had taken milk. In the first, the stomach contained half digested food; and the small intestines contained a quantity of gray liquid, separate from a viscid ropy material that adhered to the villous surface. In the second, the stomach contained a frothy mucus only; but the small intestine was moderately distended with a quantity of yellowish liquid.

“The animals which were killed were immediately examined; those which died were examined from four to five hours afterwards. In each case the duct was found to have been accurately secured; the gall bladder and gall duct were distended with bile; *there was no trace whatever of chyle in the lacteal vessels.*”<sup>1</sup>

86. In the few authenticated cases of the total obliteration of the duct, the emaciation has been extreme, and the circumstance of the patient having lived a few weeks or months, under such circumstances, only proves that nutrition may take place, to some extent, without any chyle being formed. In the above experiments of Sir B. Brodie, it appeared that the more fluid parts of the chyme had been absorbed; and probably this would have been sufficient to maintain life for a limited period, especially where but little exhaustion had been occasioned by exercise. We know that nutritive glysters will afford support, and yet we are quite certain that no chyle can be formed under such circumstances. Sir E. Home has related the case of a child in which no gall ducts existed. The child did not live long, but it appears to have died rather of a marasmus than of any intestinal affection; and from this fact he concludes, that one of the offices of the bile is that of converting mucus, or the refuse of the chyle as it passes into the colon, into fat, which is absorbed and diffused over the system. I have already offered an objection to this theory (25.)

87. When perfectly formed chyle, as that obtained from the thoracic duct, is chemically examined, it will present a difference in composition, according to the nature of the aliment from which it was elaborated. If the animal has eaten substances of a fatty nature, the chyle will be found milky white, a little heavier than distilled water, with a strong and peculiar odour, and a saline and sensibly alkaline taste; but if the food should not have contained

<sup>1</sup> “Mayo’s Outlines of Physiology,” Appendix.

fat, it will be opaline and almost transparent. Very shortly after chyle is extracted from the living animal, it becomes firm, and almost solid : it then gradually separates into three distinct parts ; the one solid, which remains at the bottom of the vessel, the second liquid, and a third that forms a very thin layer at the surface. The chyle at the same time assumes a rose colour. Of the three parts into which chyle thus spontaneously resolves itself, that on the surface, of an opaque white, and which imparts to the fluid the appearance of milk,<sup>1</sup> is a fatty body ; the solid part, or coagulum, seems to be an intermediate substance between albumen and fibrin, for it unites several properties which are common to the two : it wants the fibrous texture as well as the strength and elasticity of the fibrin of the blood ; it is also more readily and completely dissolved by caustic potass. The liquid part of chyle resembles the serum of the blood. The proportion, however, of these several parts varies according to the nature of the food. There are species of chyle, such as that from sugar, which contain very little *albuminous fibrin* ; others, such as that from flesh, contain more. The fatty part is very abundant where the food has contained grease or oil, while there is scarcely any under other circumstances. Dr. Marcet instituted a series of experiments upon the chyle, with a view of comparing that produced by vegetable and animal food in the same kind of animal, for which purpose he produced it from the thoracic duct of dogs ; in all essential points his results agree with those of Vauquelin. The vegetable chyle generally bore less resemblance to blood than that derived from animal food ; the latter was more disposed to become putrid, and upon the addition of potass, it evolved a quantity of ammonia, which was not the case with the vegetable chyle, while the oily matter was only found in the animal chyle. The two species were of the same specific gravity, and contained the same weight of saline matter, but the solid residuum of the animal chyle, as obtained by evaporation, was considerably greater than from the vegetable chyle. When they were both submitted to destructive distillation, the vegetable chyle produced three times as much carbon as the animal chyle, whence we may conclude, that the latter contains a much greater proportion of hydrogen and nitrogen. Dr. Prout has also given us the results of a comparative series of experiments upon the same subject, and although upon the whole he found less difference between the two kinds of chyle than had been noticed by Dr. Marcet, yet the difference was sufficiently distinct and satisfactory.

88. These observations are of great value to the physiologist, as well as to the pathologist, as they demonstrate the fallacy of that proposition which has been so frequently advanced ; viz. "that

<sup>1</sup> The comparison which has been established between chyle and milk has no real foundation ; for the former contains nothing which agrees exactly with the constituents of the latter. There is also this curious fact, that in the milk traces of certain vegetable principles may be frequently detected ; in the chyle this never occurs.

there are *many* species of food, but only *one* aliment;" intimating thereby, that all substances, by decomposition, contribute to form one identical, invariable, essentially nutritive principle—the "*quod nutrit*" of ancient authors; whereas, nothing is more clear, than that the nature and composition of the chyle will vary with each individual aliment.

89. Having explained all that is known with respect to the formation of chyle, we may next consider the manner in which it is absorbed and carried into the blood. The chyloferous vessels by which this office is performed have been already described (59.) It is probable that the mesenteric glands, through which they pass, produce an important change on the chyle, but the nature of this change is wholly unknown: it is certain that these glands receive many bloodvessels, in proportion to their volume, and that they secrete a peculiar fluid, which may be extracted by compressing them between the fingers: whence some physiologists have supposed, that they add a fluid to the chyle in order to purify it; while others, again, have contended, that their use is to produce a more intimate mixture of the elements which compose it. I have already hinted my belief that something, partaking more of an organising process, is effected by this glandular structure. Much discussion has also arisen upon the existence of the *tact*, or sensibility of these vessels; and although M. Majendie ridicules the supposition, there are not wanting facts to support the belief, that their mouths, like the pylorus, possess the power of discriminating between chyle and other less congenial fluids, which enables them to absorb the former and to reject the latter: and it is equally probable, that this selecting tact may be destroyed by disease, from which many evil consequences may arise. The chyle is poured into the thoracic duct, together with the lymph which is brought hither from every part of the body by the lymphatic vessels, and thence carried into the subclavian vein, to be submitted to the action of the respiratory organs. It will, therefore, be remembered, that a portion of the decayed and broken down materials is conveyed into the lungs, together with the new materials which are to repair the waste.

90. The nutritive principles of the aliment have now been traced, through all their changes, to the circulation. Let us then return to the excrementitious part which was left in the duodenum. This matter is pressed forward, by the peristaltic motion of the intestine, losing as it proceeds any portion of chyle which may have escaped the lacteals in the higher part of the small intestines, into the *cæcum*: its return being prevented by the valve already described (22.)

91. Since the last edition of this work, Dr. Schultz of Berlin has very ingeniously maintained that where the food is of a vegetable nature, it undergoes a second digestion in the *cæcum*. He argues that in vegetable eaters, a large quantity of digestible, but as yet undigested matter, passes with the chyme into the intestine, and would be lost as refuse, if another digestion did not take place in

the cæcum, whereby the residual part of the nourishing matter is separated from the food. Now what proofs have we of the existence of such a function? In the first place, there is ample evidence to show that vegetable substances undergo some important changes in the intestinal canal beyond those which take place in the duodenum. The Baron Dupuytren in vigilantly observing the evacuations of those who had intestinal openings, at different distances from the stomach, invariably found that the ingesta always presented themselves at the opening of the wound in the *inverse* order of their digestibility; for example, fresh vegetables, still retaining their characteristic structure, appeared first, whereas animal matter was scarcely to be recognised. In examining the former, however, after its natural evacuation through the rectum, the vegetable structure, above described, had wholly disappeared. If we apply to the comparative anatomist for assistance on this occasion, he will point out to us the digestion of the horse, in which it is evident that the intestinal canal performs an essential part; he will also compare the development of the *cæcum* in herbivorous and carnivorous animals, and show that in the latter the stomach is nearly the only organ of activity. What further evidence is there in proof of the *cæcum* being the seat of this second digestion? Viridet had remarked that in rabbits the food became a second time *sour*, after it had been neutralised in the duodenum; and this fact has been since established by repeated experiments; while in its future progress it is once more neutralised by the access of bile; changes which correspond exactly with those the food undergoes in the stomach and first intestine. Now it is evident that, in consequence of this twofold consumption of bile in the duodenum and cæcum, there must exist an "*antagonism*" between the two digestions; for when the bile is consumed by the digestion in the duodenum, the *cæcal digestion* cannot be perfected; and on the other hand, when the bile flows into the cæcum the neutralisation of the acidity in the duodenum cannot take place. It is probable that in those cases in which the cæcal digestion is most perfectly developed, this *antagonism* is so prevented that each digestion has its particular period of action, so that when the one is in progress, the other is either lessened, or at rest. If these views be correct, we have no longer any difficulty in assigning to the valve of the cæcum its proper office; for, that cæcal digestion may take place, the still indigestible mass must be *acidified*, as in the stomach; now this could never happen, if the bile was allowed to flow without interruption into the cæcum; its opening into the small intestine is therefore closed during the process, as the stomach is closed during chymification, with such a difference only as the different state of circumstances requires; thus, the stomach is closed at its pyloric orifice to prevent the egress of food, and the cæcum at its iliac opening to prevent the ingress of bile.

92. After the changes above related, the refuse matter accumulates in the colon, having now acquired that peculiar fetor which



distinguishes excrement; it is considerably retarded in this part of its passage by the cells or compartments into which this intestine is divided; at length, however, it enters the rectum, and, by forming a mass of considerable bulk, frequently distends its parietes, and thus creates a sensation of uneasiness, which announces the necessity of relief. If, however, this call be not imperious, and we neglect to obey it, the intestine becoming insensible to the stimulus of distention, the desire ceases, and may not recur for some time. This effect is greatly modified by the consistence of the fecal matter; if it be soft, or almost liquid, we shall be less able to resist its expulsion. The intervals at which this operation is performed will vary extremely in different individuals: some persons evacuate their fæces twice or thrice a day; others, not more than once in two days; and there are those who, although in perfect health, pass over a week or ten days without any evacuation. Habit also exerts a wonderful influence in regulating such periods: a person accustomed to the act at a certain hour of the day, will generally feel an inclination at the appointed season.

93. With regard to the relative proportion which the *caput mortuum* bears to the quantity of food, it is important to observe that different articles of diet yield very different quantities of residual matter, and in selecting a diet for particular forms of disease, this consideration becomes a circumstance of great importance.

94. We have hitherto only considered the digestion of solid aliments: it now becomes necessary that we should investigate the changes which liquids undergo, when introduced into the stomach. The subject teems with many curious physiological facts, and it is one of much importance to the pathologist, as it will enable him to appreciate the utility of liquid diet, and to understand the circumstances which should decide its preference.

95. It was long supposed that liquids, like solids, passed through the pylorus into the small intestine, and were absorbed together with the chyle, or rejected with the excrement. It is not asserted that this never occurs; but it is evident, beyond contradiction, that there exists another passage by which liquids can be conveyed to the circulation: for it has been proved, that if a ligature be applied round the pyloric orifice, in such a manner as to obstruct the passage into the duodenum, the disappearance of the liquid from the cavity of the stomach is not so much as retarded. It is evident, therefore, that there must exist some other passage, although its nature and direction remain a matter of conjecture. I am strongly persuaded, that the *vena portæ* constitutes one of the avenues through which liquids enter the circulation; and, in the Pharmacologia, I have expressed my belief,<sup>1</sup> and supported it by various arguments, that through this channel certain medicinal bodies find their way into the blood. In order to discover whether drinks are absorbed along with the chyle, M. Majendie made a dog swallow a

<sup>1</sup> Pharmacologia, 8th edit. page 101.

certain quantity of diluted alcohol during the digestion of his food; in half an hour afterwards the chyle was extracted and examined: it exhibited no trace of spirit; but the blood exhaled a strong odour of it, and by distillation yielded a sensible quantity.

96. When liquids are introduced into the stomach, the changes which they undergo are determined by the nature of their composition.

97. If a liquid, holding nutritive matter in solution, be introduced into the stomach, it is either coagulated by the gastric juice, or its watery part is absorbed, and the solid matter deposited in the stomach; in both cases the product is afterwards chymified in the manner already described. Milk appears to be the only liquid aliment which nature has prepared for our nourishment; but it seems that she has, at the same time, provided an agent for rendering it solid: hence we may conclude that this form is an indispensable condition of bodies which are destined to undergo the processes of chymification and chylification; and that, unless some provision had existed for the removal of aqueous fluid from the stomach, the digestive functions could not have been properly performed. When the broth of meat is introduced into the stomach, the watery part is carried off, and the gelatine, albumen, and fat are then converted into chyme. Wine and fermented liquors undergo a similar change; the alcohol which they contain coagulates a portion of the gastric juices, and this residue, together with the extractive matter, gum, resin, and other principles which the liquid may contain, are then digested. Under certain circumstances, these liquids may observe a different law of decomposition, which will perhaps in some measure explain the different effects which such potations produce: for example, the spirit may undergo a partial change in the stomach, and be even digested with the solid matter, or, on some occasions, converted into an acid by a fermentative process: this will be more likely to occur in vinous liquors, which contain ingredients favourable to the production of such a change; and hence the less permanent and mischievous effects of wines than of spirits.<sup>1</sup> The liquor termed *punch* will certainly, *cæteris paribus*, produce a less intoxicating effect than an equivalent quantity of spirit and water; although it may, at the same time, be more liable to derange the stomach: this may be accounted for, by supposing that a portion of the alcohol is digested by the stomach into an acid, a process which is determined and accelerated by the presence of a fermentable acid like that of lemon, aided, perhaps, by the saccharine matter.

98. Oil, although possessed of the fluid form, does not appear to observe the law which governs the disposal of these bodies; it is not absorbed, but is entirely transformed into chyme in the stomach. To effect this, however, it seems essential that the stomach should be in a state of high energy, or it undergoes chemical decomposi-

<sup>1</sup> See *Pharmacologia*, edit. 8. art. *Vinum*.

tion, and becomes rancid: nor will the stomach, unless it be educated to it, like those of some northern nations, digest any considerable quantity of it; and since it cannot be absorbed, it must find its exit through the alimentary canal, and consequently prove laxative.

99. I have endeavoured to show in the Pharmacologia, that certain salts are absorbed with the water which holds them in solution, unless they so far increase the peristaltic motion as to produce catharsis, in which case they pass at once through the alimentary passage; but should this not occur, they enter the circulation, and will sometimes exhibit their effects on distant organs. It is on this account that sulphate of magnesia proves diuretic in horses, for the bowels of these animals are not stimulated by that salt; and the same theory will explain why persons frequently experience an increase in their urine on drinking the weaker waters of Cheltenham.

100. It has been stated that the chyle, together with the lymph, is poured into the sub-clavian vein. We know very little of the use of this latter fluid: it is conveyed by vessels, termed *lymphatics*, which appear to spring from extremely small roots in the substance of the membranes and of the cellular tissue, and in the parenchyma of the different organs. In man, these vessels uniformly traverse glands before they arrive at the venous system. The general opinion entertained upon the subject of lymphatic absorption, assigns to this order of vessels the office of returning the broken-down and useless parts of the various structures to the blood, in order that they may be finally ejected from the body. In examining the chemical composition of lymph, we find it to have a considerable analogy with the blood; which has induced M. Majendie to conclude that it is a part of that fluid, which, instead of returning to the heart by the veins, follows the course of the lymphatic vessels; for what object, it is impossible even to offer a conjecture. He therefore doubts whether these vessels have any absorbing power, but endeavours to prove by experiments, which certainly have the merit of great plausibility, that the faculty of absorption is possessed by veins. Be this, however, as it may, it is certain that the chyle, as well as those fluids which are absorbed from the stomach, are transmitted through the lungs for the purpose of undergoing such changes as may perfectly assimilate them with the blood. Every meal, therefore, must impose a certain labour upon these organs; and it is probable, that the extent of this labour will vary with the nature of the food. It becomes, then, an object of the greatest pathological interest, to inquire into the relations which subsist between the functions of chylification and respiration, and to ascertain what species of food will require the greatest, what the least effort of the lungs, to complete its sanguification. In cases of pulmonary disease, such a discovery would be of the highest value, in order that we may not impose upon an enfeebled organ more duty than is necessary for the preservation of life. Unfortunately, the

facts which have been collected upon this subject are few, and even discordant. The faint light which science afforded us in the investigation of the preceding stages of digestion is here extinguished, and experience, embarrassed with a thousand sources of fallacy, is all that remains for us. Notwithstanding the numerous experiments which have been instituted, and the various theories which have been formed, how extremely vague and doubtful is our knowledge respecting the physiology of respiration! It is true, that the chemist, by a refined examination of the air, before and after it has been respired, has ascertained that a quantity of oxygen is absorbed, and replaced by an equivalent proportion of carbonic acid; but can any person accustomed to reflection believe, that respiration serves no other purpose than that of the removal of a certain portion of carbon from the blood? A function which cannot be suspended for a minute without the certain destruction of life, must surely have some relation with the vital energy more intimate and far more important.<sup>1</sup> The quantity of carbonic acid does not appear to have that striking connection with the quality or quantity of our ingesta which theory would have led us to suppose. Whoever will read an account of the results obtained by Dr. Prout, in his examination of the "quantity of carbonic acid gas emitted from the lungs during respiration, at different times, and under different circumstances,"<sup>2</sup> will retire from the perusal of the essay with the mortifying conviction, that little or nothing is known upon the subject: such, at least, was my conviction upon that occasion. It must, however, teach us the folly of hasty generalisation, for nothing tends more to the perpetuation of error.

101. If no material influence is produced upon the sum of oxygen absorbed, or of carbonic acid disengaged, by the different quantities and nature of our aliments, it follows, that the conversion of chyle into blood is produced by some other agent than that of the atmospheric air. At the same time, ample experience has taught us, that the nature of our ingesta is not a matter of indifference to the respiratory organs: diseased lungs are exasperated by a certain diet, and pacified by one of an opposite kind. The celebrated diver, Mr. Spalding, observed, that whenever he used a diet of animal food, or drank spirituous liquors, he consumed in a much shorter period the oxygen of the atmospheric air in his diving-bell; and he, therefore, had learnt from experience to confine himself upon such occasions to vegetable diet. He also found the same effect to arise from the use of fermented liquors; and he accordingly restricted himself to the potation of simple water. The truth of these results is confirmed by the habits of the Indian pearl-divers, who always abstain from every alimentary stimulus previous to their descent into the ocean.

<sup>1</sup> Linnæus considered the great object of respiration to be the extraction of the electric fluid from the air by the lungs, and then to transmit it to the *Medulla*, becoming, as it were, the *Spiritus Animalis*. Linnæus's Diary, in Maton's edition of Pultney's "Life and writings," p. 353.

<sup>2</sup> Annals of Philosophy, vol. ii. p. 328.

Those physicians who have witnessed the ravages of pulmonary disease will readily concur in the justness of these views. The experiments of Dr. Prout would lead us to the conclusion, that less carbonic acid is given off from the lungs during the influence of an alcoholic stimulant: but he justly observes, that this may arise from the specific action upon the nerves; and, indeed, it appears probable, that the evolution of carbon from the blood is determined by nervous energy.<sup>1</sup> The principal changes which the chyle undergoes during its passage through the respiratory organs appear to consist in the more perfect elaboration of some of its principles; for instance, the albumen is converted into fibrin, and the colouring matter acquires its most decided characteristics. But these changes may be in a great measure produced by the action of the pulmonary vessels. It has been estimated, that about eleven ounces of carbon and twenty ounces of water are given off by the lungs during the twenty-four hours; but what portion of these products are to be placed to the account of the aliment has not been ascertained. It does not even appear that the useless carbon is always evolved from the blood during its passage through these organs; it may be retained for want of sufficient nervous energy, and thus produce a morbid change upon the body.

102. The quantity of pulmonary transpiration is also influenced by various circumstances, especially the liquid nature of the food, and the quantity of fluids taken into the stomach. I have paid some attention to this circumstance, for it suggests many important links in the treatment of disease.<sup>2</sup>

103. The only safe conclusions at which we can arrive upon this intricate subject, may be embodied in the following canons, viz. 1st, That animal food proves more stimulant to the lungs than vegetable aliment. 2d, That fermented liquors are injurious to these organs, both on account of their general effects upon the circulation, and their specific action upon the nervous system; increasing, on the one hand, the necessity of respiratory changes, and on the other, diminishing the energies of the organs by which they are accomplished. 3d, That moderate exercise, hilarity of mind, free ventilation, and abstinence from fermented liquors, are essentially necessary in that stage of the digestive process at which the chyle is poured into the bloodvessels, in order to promote the free evolution of carbonic acid.

<sup>1</sup> The experiments of Drs. Prout and Fyfe have shown, that whatever depresses the nervous energy, diminishes the quantity of carbonic acid expired. The depressing passions, violent and long continued exercise, low diet, mercurial irritation, and spirituous liquors, uniformly produce this effect. The quantity is also, for the same reason, diminished during sleep. Sir A. Cooper has very lately shown, by what may be regarded as an *experimentum crucis*, that "the changes of the blood are not chemical alterations merely, but dependent also upon the vital agency of the nerves and bloodvessels." *On the effects of placing ligatures on the pneumo-gastric nerves, &c.* by Sir A. Cooper, Bart. Published in the *Guy's Hospital Reports*, No. III.

<sup>2</sup> See Pharmacologia, p. 150.

104. The office of the kidneys in secreting urine may, in reference to the present subject, be considered in a double point of view; as removing from the body, generally, certain principles whose presence must be noxious; and in carrying off some portion of the aliment which cannot be assimilated with the blood, or such useless products as may arise during the progress of its elaboration. In examining the composition of urine, we shall find certain ingredients which existed in the blood, and which have therefore passed through the urinary organs without change; we shall, at the same time, discover peculiar compounds which owe their existence to the *acidifying* action of the kidneys upon certain substances contained in the blood. The principles derived from the blood by filtration are *water*, *lactic acid*, with its accompanying animal matters, the *fixed alkalies*, and *lime*. The new compounds formed are *sulphuric* and *phosphoric acids*, from the sulphur and phosphorus in the blood; *urea*, probably derived from albumen; and *lithic acid*. Dr. Prout observes, that in certain forms of disease the acidifying tendency of the kidneys is carried to an excess, and that *nitric acid*, *oxalic acid*, &c. are produced; whereas, on the other hand, it is occasionally suspended, diminished, or altogether subverted; and unchanged *albumen* or *blood*, neutral substances, as *sugar*, or even alkaline substances, as *ammonia*, &c. are separated in abundance; while the *phosphorus* and *sulphur*, at the same time, pass without being acidified.

105. With respect to the character of the diseases attending these states of the urine, it will, says Dr. Prout, be generally found, that when acids are generated in excess, the urine is commonly small in quantity, and high-coloured, and the disease inflammatory; when neutral or alkaline substances, the urine, on the contrary, is generally pale-coloured, and larger in quantity, and the diseases are those of irritation and debility. In examining, however, the state of the urine, with reference to its pathognomonic indications, we must carefully distinguish between that which is voided after abstinence, and which is termed *urina potus*, and that which is voided five or six hours after a meal, and which is distinguished by the appellation of *urina sanguinis*. The temperature and hygrometric state of the atmosphere ought also to be taken into consideration; for these circumstances, by modifying the quantity of water given off by the skin, will exert a considerable influence upon the urinary secretion. Nothing, however, produces a greater effect upon the character of the urine than the state of the digestive functions; and by carefully inspecting its appearances, many valuable indications may be obtained. It is true, that the practice of examining the urine has fallen into discredit, from the abuse which it has suffered in the hands of empiricism and imposture;<sup>1</sup> but the new views

<sup>1</sup>The vulgar have ever considered the urine as a glass, in which the physician may behold everything that passes within the body; and the quacks have, for obvious reasons, been willing to indulge the credulity. It has been

which modern chemistry has unfolded, and the valuable practical purposes to which they have been made subservient by the labours of Wollaston, Marcet, and Prout, ought to restore it to its merited reputation.

106. I shall conclude these remarks by stating that one of the objects of the urinary secretion appears to be the removal of a portion of nitrogen, and perhaps also of oxygen, from the blood, as that of respiration is the abstraction of carbon. This hypothesis is supported by the ultimate analysis of lithic acid and urea. It is, at least, evident, that some principle is withdrawn from the circulation, whose presence would act upon the system as a destructive poison; total suppression of urine is followed in a few hours by insensibility; but this consequence is prevented by the discharge of a few drops only of the secretion.

107. The function of the skin may be considered as the last link in the chain of the digestive process. It removes from the blood a considerable portion of water, with some saline matter; and in this respect, it may be compared to the office of the kidneys, although, unlike them, its function may be suspended without immediately fatal consequences. Experiments have also proved that an acid is discharged by the cutaneous emunctories; and if this be suppressed, it appears to pass off by the kidneys, and to give origin to a deposit to be hereafter noticed.

108. From a review of all the transformations which the aliment undergoes, from its conversion into chyme to that into blood, can we arrange the different changes under distinct heads, so as to bring each under the operation of any general law? I fear that our present state of chemical knowledge will not afford a satisfactory solution of this problem. The production of chyle in the duodenum certainly differs in its nature from that of any of the secreted fluids, since the mass from which it is evolved is acted upon by foreign re-agents, as the bile and pancreatic liquor; whereas a secreted fluid is at once separated from the blood without the aid of any precipitant. In this point of view, the operation bears a closer analogy to a chemical process; but here the comparison must end, for we are unable to account for the presence of any of the new compounds by an analysis of the ingredients from which they are produced. If we admit the operation of a galvanic power, generated by the nerves, and directed through their means to the decomposition of the alimentary materials, and to their recombination into other forms, we shall obtain, if not a satisfactory solution of the problem, at least some clue for its investigation. We shall thus perceive, that elements having a strong chemical affinity for each other, may be separated and re-united in different proportions; and we shall be

stated, that the origin of the imposition of *urine-casting* is to be looked for in the ignorance and barbarism of the middle ages, when the greater part of physicians were ecclesiastics, who either saw their patients in their churches, or were satisfied with inspecting their urine.

able to explain why substances, distinguished by their strong attractions for each other, do not combine in the alimentary organs, as they would in the vessels of our laboratory. But it will be asked, what reason there is for believing in the existence of any power analogous in its operation to electricity? This question cannot be better answered than by a relation of the ingenious experiments of Dr. Wilson Philip, who has shown that when a nerve is divided, so as entirely to intercept the transmission of its energy, its function may, to a certain degree, be supplied by an electrical stream from the galvanic battery. The eighth pair of nerves were divided in the necks of three recently-fed rabbits, and every precaution was taken to keep their divided ends asunder. One of these animals, when subjected to the galvanic influence, remained singularly quiet, breathing freely, and with no more apparent distress than the twitches usually produced by electric action, which was in this case kept up without interruption. The other rabbits laboured strongly in their respiration. They were all three killed at the same period, and their stomachs successively opened. In the two non-galvanised animals chymification had scarcely made any progress; but in that which had been galvanised, the process appeared to have been completed.

109. It is not my intention, in this work, to enter into any speculations with respect to the more minute changes which may be supposed to take place under this galvanic influence of the nerves; such details would be wholly inconsistent with the practical objects of my present publication. I shall therefore conclude this part of my subject by observing, that most of the digestive products are acid: the chyme is uniformly distinguished by this character; and, if the experiments of Dr. Prout be correct, muriatic acid is always present in the stomach: we may, therefore, suppose that the nerves of this organ have the power of decomposing the muriatic salts, and transferring its alkali to some distant reservoir, perhaps the liver. The intestinal juices are also acid; the fæces, unless they have undergone a degree of putrefactive decomposition, redden litmus; the urine, as well as the perspirable matter, are likewise acid; and it is scarcely necessary to observe, that the only product of the respiratory function is carbonic acid.

110. If the nerves act like galvanic conductors, may we not explain the transference of matter from one organ to another, without the necessity of supposing the existence of tubes or hollow vessels?

111. There still remains for our consideration a phenomenon, intimately connected with the digestive process and with the derangements to which it is liable,—the formation of FAT. This substance may be regarded as the least animalised product of the animal body, since it does not contain any nitrogen, an element which, it will be remembered, is peculiarly characteristic of animalisation; nor does it contain any considerable proportion of oxygen, but consists principally of hydrogen and carbon, the latter element



being far less in its proportion than that which occurs in any of the constituents of the blood, from which fat is secreted. It is true that we have no certain data for enabling us to judge from what part of the blood the fat is immediately produced, nor does there appear to be any specific organ for its secretion; but, as its deposition is evidently connected with the state of the digestive functions, and bears a relation to the quantity of chyle produced, and as fat is deposited in so many parts of the body, or, at least, is connected with textures of such various descriptions, it is fair to conclude that the blood must be the source from which it proceeds, and the medium through which it is distributed; and, moreover, that the capillary vessels must constitute the organ for its secretion. Dr. Bostock observes that there are two modes in which we may suppose the fat to be produced—while in the vessels themselves, or not until it is just upon the point of being excreted from them. In the first case the operation must consist in the abstraction, from the albumen or fibrin, of its nitrogen and oxygen, and a part of its carbon; in the other, of the hydrogen and a part of the carbon, while the remainder of the elements is left in the vessels.

112. Since an excess of nutritive matter received into the blood, while the various secretions and excretions remain unchanged in quantity, is the circumstance which favours the deposition of fat, we may conclude that, in such a case, nature has ordained a provision for the discharge of the superfluous matter, and that this is effected by various means, and by different organs. The principal part of the hydrogen appears to be disposed of in the formation of fat; the carbon is also carried off partly by these means, and partly by the lungs; while the nitrogen is, perhaps, principally removed by the kidneys. But it will be observed that the elements eliminated by these latter organs are at once excluded beyond the sphere of the system, whilst those removed from the circulation by the former are deposited as it were in a storehouse, to be again used whenever the waste of the body should call for supplementary nutriment, whence, in cases of extreme hunger, or of abstinence from food, fat is re-absorbed and carried into the bloodvessels.

RECIPROCAL RELATIONS OF THE DIGESTIVE FUNCTIONS WITH OUR SENSATIONS; AND OF THE LATTER, WITH THE WASTE AND CONSEQUENT WANTS OF THE SYSTEM.

Hunger:—Theories to explain the sensation—Referred by the author to a peculiar condition of the nerves—Destroyed by narcotics—Practice of the Indians to counteract its cravings—Its connection with the state of the stomach only secondary—Chymification, chylickation, and sanguification, may be considered as incompatible with each other—Why an interruption during a meal destroys the appetite—The quality and not the quantity of food produces satiety—Thirst:—Its final cause—Its proximate cause—General phenomena of inanition—Sanguification attended by a desire of activity—Of exercise immediately before and after meals.

HUNGER.

113. When the stomach is in a healthy condition, and has remained for some time empty, the well-known sensation of hunger is produced; to account for which, various hypotheses have been devised. Some have attributed its origin to the friction of the sides of the stomach upon each other, or to the dragging of the liver upon the diaphragm; others to the action of bile or acid vapours upon the stomach; to the compression of the nerves, or to the fatigue of the contracted fibres of the stomach: but such theories are subverted by the fact, that the stomach may remain empty for a long interval, during disease, without any sensation of hunger; and that, when present, it may cease or be allayed by various causes, although food should not have been taken; as often happens after the accustomed period of repast is over, or from the sudden communication of news that overwhelms us with grief or disappointment. Sleep also allays it. The physiologists of the present day attribute the phenomenon to the stimulant action of the gastric juice upon the nerves of the stomach; and to support this opinion, Dr. Wilson Philip relates the following experiment. A person in good health was prevailed upon to abstain from eating for more than twenty-four hours, and during that interval to increase the appetite by more than ordinary exercise. At the end of this time he was extremely hungry; but, instead of eating, he excited vomiting by drinking warm water, and irritating the fauces. The water returned mixed only with a ropy fluid, such as the gastric juice is described to be. After this operation, not only all desire to eat was removed, but a degree of disgust was excited by seeing others eat. He, however, was prevailed upon to take a little bread and milk, which in a very short time ran into the acetous fermentation, as indicated by flatulence and acid eructation. I do not mean to deny that the presence of a portion of gastric juice may not contribute to the sensation of hunger; but I feel more disposed to refer the phenomenon to a peculiar state of the gastric nerves, in consequence of a species of indirect sympathy with the waning powers of the body,

by which their peculiar sensibilities are exalted in proportion as those of other parts of the system decline, and thus are they constituted monitors, to demand the supplies that are essential for the general resuscitation. With regard to the experiment of Dr. Philip, as above described, we may observe that it merely goes to show that disturbance of the stomach will destroy appetite for food: the existence of nausea, short of vomiting, will produce the same effect, and yet in this latter case the gastric juice is not removed; nay, we know from actual experiment that nausea is wholly independent of the stomach, for the sensation, and the spasm of retching, may be produced by the injection of tartar emetic into the veins of an animal, from which the stomach has been previously removed. Nausea, then, although like hunger it be referred to the stomach, is evidently independent of it; and if nausea can exist, why may not hunger also, even though the animal should have lost its stomach by excision?

14. With respect to the actual quantity of gastric fluid in an empty stomach, some doubts have arisen. It seems most probable that it is supplied only during digestion,<sup>1</sup> and that its secretion corresponds with the nature and quantity of the ingesta. If a narcotic be applied to the nerves, their power is paralysed, and the sensation of hunger ceases; such an effect is produced by the juice of tobacco, although by long habit the stomach may become indifferent to its operation. Whenever the Indians of Asia and America undertake a long journey, and are likely to be destitute of provisions, they mix the juice of tobacco with powdered shells, in the form of small balls, which they retain in their mouths, the gradual solution of which serves to counteract the uneasy craving of the stomach. In like manner we may explain the operation of spirit in taking away the appetite of those who are not accustomed to it; while those who indulge the habit receive its stimulant without its narcotic impression. Lord Byron entertained a great dread of becoming corpulent, and on that account frequently abstained from food for several days together, appeasing the cravings of hunger by a wafer and a glass of brandy.<sup>2</sup>

115. In farther proof of the direct relation between the sense of appetite and the healthy influence of the brain, it may be stated, that in certain cases of idiocy the individuals are so low in the scale of intelligence, as not to manifest any desire for food, although they will eat and digest, when fed. From the conclusive experiments of M. Brochet of Lyons, we receive additional evidence of our theory of hunger. This intelligent physiologist kept a dog without any food for twenty-four hours, when it had become extremely ravenous; he then divided the *par vagum*, and placed meat before it, but the animal, which had just before betrayed signs

<sup>1</sup> See the experiments of Dr. Beaumont, at page 37.

<sup>2</sup> I state this fact on the authority of Dr. John Badeley, who informed me that he received it from his lordship's domestic physician, Dr. Polidori.

of the greatest impatience for a meal, lay quietly down. When the meat was brought into contact with its mouth, it began to eat, and continued to do so, without any reference to the quantity received by the stomach: in fact, the tie between that organ and the brain had no longer any existence, and the animal, therefore, influenced only by the gratification of the sense of taste, continued to eat until the gullet could no longer receive a supply.

116. Natural appetite, which is only the first degree of hunger, never appears to recur until the aliment previously introduced has been duly assimilated. It cannot, therefore, strictly speaking, be said to have an immediate reference to the state of the stomach; for although all the chyme may have long since passed out of that organ, if any delay occurs in its ulterior changes, appetite will not return, for the nervous energy is engaged in their completion, and cannot therefore accumulate in the stomach: on the contrary, in certain diseases, as in *tabes mesenterica*, notwithstanding the presence of alimentary matter in the stomach, the appetite is never pacified, in consequence, probably, of the gastric nerves not receiving that satisfaction which is the necessary consequence of healthy digestion. The circumstance of young persons daily losing flesh, while the appetite for food remained vigorous, appeared to the ancient physicians so extraordinary, that Sennertus, Etmuller, and others, have gravely inquired whether *marasmus* might not be owing to magical incantation. Voracity, or canine appetite, may sometimes depend upon a morbid state of the pylorus, which suffers the food to pass out of the stomach before it is properly chymified: such cases are attended with extreme emaciation. It may also arise from nervous irritation, produced by accumulations in the colon. From these views we may deduce the following important corollary—that the several processes by which aliment is converted into blood cannot be simultaneously performed, without such an increased expenditure of vital energy as weak persons cannot, without inconvenience, sustain: thus, chylification would appear to require the quiescence of the stomach, and sanguification to be still more incompatible with the act of chymification. If, therefore, the stomach be set to work during the latter stages of digestion, the processes will in weak persons be much disturbed, if not entirely suspended. Certain circumstances cause hunger to return at nearer intervals, by accelerating the nutritive process; while others, by producing an opposite tendency, lengthen such intervals.

117. It is a well known fact, that if a person be interrupted in his meal for a quarter of an hour, he finds, on resuming it, that his appetite is gone, although he may not have eaten half the quantity which he required. Dr. Wilson Philip explains this circumstance by supposing that the gastric fluid which had accumulated has had time to combine with, and be neutralised by, the food he had taken; but those who believe with me, that a new supply of gastric fluid is furnished, on the contact of every fresh portion of food, must seek

for some other explanation. Will not the views which I have offered in the preceding paragraph afford a solution of the problem? viz. that during the suspension of the meal the food had entered upon its ulterior changes, and that the energies of the stomach had therefore declined.

118. The subsidence of appetite, or the feeling of satiety, is not produced by the *quantity*, but the *quality* of the food—the very reverse of what would happen, were the mere volume of the aliment alone necessary to pacify the cravings of the stomach. This is remarkably displayed in the habits of ruminating animals; for in wet and gloomy seasons, when the grass contains a diminished portion of nutritive matter, these animals are never satisfied—they are constantly in the act of grazing; whereas, in hot and dry weather, they consume the greater portion of their time in ruminating, or chewing their cud. I apprehend that this is not to be explained, as M. Majendie believes, by the sensibility of the mucous membrane of the stomach, but is to be solely referred to the fact, that the vital energy is only expended in decomposing such substances as are capable of furnishing chyle. Volume or bulk, however, is a necessary condition of wholesome food: the capacity of our digestive organs sufficiently proves that nature never intended them for the reception of highly-concentrated food. I some years ago directed considerable attention, in conjunction with some well known agriculturists, to the nutritive value of different crops, as the food of cattle, and I constructed a logometric scale for the solution of various problems connected with the subject; but I soon found that mere *bulk* produced a very important influence, and that, to render one species of nutriment equivalent in its value to another, it was necessary to take into consideration the quantity of inert matter which furnished excrement.

## THIRST.

119. This instinctive feeling announces to the individual the necessity of introducing a certain quantity of liquid into the system, in order to repair the waste which the body has sustained in the exercise of its functions; or to impart a due degree of solubility to the aliments which have been taken. We accordingly find that excessive perspiration increases the demand, and dry food is followed by the same effect. With the history of morbid thirst we have at present nothing to do. The sensation is usually referred to the throat and fauces, as that of hunger is to the stomach; and yet the intensity of this feeling does not bear any relation to the dryness of these parts: for in some cases, where the tongue, to its very root, is covered with a thick and dry crust, there is little thirst: while, on the other hand, it is frequently intolerable at the very time the mouth is surcharged with a preternatural quantity of saliva: like hunger, I apprehend it must be referred to a particular

condition of the nerves wisely ordained to express the wants of the system. Dr. Gardner has remarked that, in the case of a person who had cut through the œsophagus, several buckets full of water were swallowed daily, and discharged through the wound, without quenching the thirst, which was afterwards found to abate by the injection of diluted spirit into the stomach. Were I to consult my sensations, the seat of thirst would be referred to the upper orifice of the stomach. The desire for drink after long speaking has some analogy to thirst, but must not be confounded with it. The influence of salted food in exciting this sensation is to be explained upon the simple principle that saline bodies require dilution to mitigate their acrimony.

120. Thirst is certainly under the control of habit: those who indulge in frequent potation are rendered thirsty by its privation. There are some persons who have never experienced the sensation, and who only drink from a sort of sympathy, but who could live a long time without thinking of it, or without suffering from the want of it. I have a lady, of fifty years of age, at this time under my care, who has declared that she is perfectly unacquainted with the nature of the sensation. Sauvage relates two similar instances that occurred to himself; and Blumenbach, also, quotes several examples of the same idiosyncrasy.

121. The sensations of hunger and thirst generally appear to be incompatible with each other: when the stomach requires food, there is rarely any inclination to drink; and when thirst rages, the idea of solid aliment disgusts us. So, again, those circumstances which tend to destroy appetite may even excite thirst, such as the passions of the mind, &c.

122. When the healthy system is in a condition to require food, besides the local sensation of hunger, there are certain general phenomena which deserve notice; a universal lassitude of the body is experienced; there is also a sensation of pressure, or drawing down, in the epigastric region; the diameter of the intestines becomes diminished, and their peristaltic motion being at the same time increased, portions of contained air are successively displaced, which give rise to gurgling sounds. There is, besides, an alteration in the situation of some of the abdominal viscera; they are less capable of sustaining pressure, and they receive a less quantity of blood. M. Majendie also supposes, that when the stomach is empty, all the reservoirs contained in the abdomen are more easily distended by the matters which remain some time in them; and he believes that this is the principal reason why bile then accumulates in the gall-bladder. As soon as a certain quantity of food has entered the stomach, the general feeling of lassitude gives place to that of renewed force, and this usually occurs more rapidly after the ingestion of liquid than of solid aliment; which is sufficient to prove that the phenomenon results from a local action upon the nerves of the stomach, since in neither case is it possible that any nutritive principle can have been so rapidly transferred to the system.

123. As soon as digestion commences, the blood flows with increased force to the organs destined for its completion ; whence, in delicate persons, the operation is frequently attended with a diminution in the power of the senses, and a slight shiver is even experienced : the skin becomes contracted, and the insensible perspiration is diminished. As the process, however, proceeds, a reaction takes place ; and, after it is completed, the perspiration becomes free, and often abundant. When the chyle enters the blood, the body becomes enlivened, and the stomach and small intestines, having been liberated from their burden, oppose no obstacle to the free indulgence of that desire for activity, which nature has thus instinctively excited for our benefit. Then it is that animals are roused from that repose into which they had subsided during the earlier stages of digestion, and betake themselves to action ; then it is that civilised man feels an aptness for exertion, although he mistakes the nature and object of the impulse, and, as Dr. Prout justly observes, is inclined to regard it as nothing more than a healthy sensation, by which he is summoned to that occupation to which inclination or duty may prompt him. Thus, instead of being *bodily* active, the studious man receives it as a summons to *mental* exertion ; the indolent man, perhaps, merely to *sit up and enjoy himself* ; the libertine to commence his libations ; and the votary of fashion to attend the crowded circles of gaiety and dissipation : in short, this feeling of renovated energy is used, or abused, in a thousand ways by different individuals, without their ever dreaming that *bodily exercise, and that alone*, is implied by it. The result of which is, that imperfect assimilation, and all its train of consequences, take place.

124. Some difference of opinion has existed with regard to the utility or mischief of exercise immediately after eating ; but in this question, as in most others of the like nature, the truth will be found to lie between the extremes. Those who, from confounding the effects of gentle with those of exhausting exercise, maintain the necessity of rest for the perfect performance of the digestive process, appeal to the experiment of Sir Busick Harwood, the mere relation of which will be sufficient to negative the inference which they would deduce from its result. The Downing Professor took two pointers, equally hungry, and equally well fed ; the one he suffered to lie quiet after his meal, the other he kept for above two hours in constant exercise. On returning home he had them both killed. In the stomach of the dog that had remained quiet and asleep, all the food was found chymified ; but in the stomach of the other dog, the process of digestion had scarcely commenced. Exercise, let it be remembered, must be measured in relation to the strength and habits of the individual : we have daily experience to prove that the husbandman may return to his daily labour, and the schoolboy to his gambols, immediately after a frugal meal, without inconvenience or injury ; but the same degree of exercise to a person of sedentary habits, or of weak stamina, would probably arrest

and subvert the whole process of digestion. The influence of habit, in rendering exercise salutary or injurious, is shown in a variety of instances: a person who would suffer from the slightest exertion after dinner, will undertake a fatiguing labour after breakfast, however solid and copious that meal may have been. If we assent to the proposition of the Cambridge Professor, we must in consistency acknowledge, that exercise, *before* a meal, is at least as injurious as he would lead us to suppose it is *after* a repast: for if the valetudinarian take his dinner in a state of fatigue, he will assuredly experience some impediment in its digestion; but are we to argue that, on this account, exercise is neither to precede nor follow a meal? We may as well, without further discussion, subscribe to the opinion of Hieronymus Cardanus, who, insisting upon the advantages of perfect rest, observes, that *trees live longer than animals, because they never stir from their places.*



## PART II.

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### OF DIETETIC OBSERVANCES.

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General remarks—Population of a country depends upon the quantity and not the quality of its food—Immunity from disease how connected with salubrity of diet—The views of the political economist opposed to those of the physician—On the periods best adapted for meals, and on the intervals which should elapse between each—Breakfast—Dinner—Tea—Supper—On the quantity of food that should be taken at each meal—On the quantity or volume of liquids that should be taken at meals—Conduct to be pursued previous and subsequent to meals.

125. The necessity of dietetic regulations has ever been opposed by that popular and sweeping proposition—that *man is omnivorous*; that there scarcely exists a species of animal or vegetable being that has not been applied as food by some nation or horde, without inconvenience; that, while one race subsists on roots and fruits, another lives, as exclusively, on raw flesh of the grossest description; and another, again, on a mixed diet, partly animal, and partly vegetable; and yet that all are equally nourished, equally healthy, and equally competent to discharge the various duties which circumstances may have imposed upon them. It would be vain to deny that the Author of nature has so constructed us and our organs of digestion, as to enable us gradually to accommodate ourselves to every species of aliment, without injury. By the same train of reasoning, the quantity, as well as the period of a repast, would appear as immaterial as its quality. The Esquimaux, who feeds voraciously on the walrus, is frequently, from the precarious nature of its supply, deprived for days of his favourite meal; and yet bodily disease neither follows repletion in the one case, nor privation in the other. Is it, then, immaterial to our health whether we feast with Apicius or fast with Pythagoras? Such, doubtless, is the conclusion at which those who disparage the utility of a regulated regimen are so anxious to arrive; but it becomes the duty of a writer upon dietetics to inquire how far such opinions are founded in truth. In the first place, it may be observed, that the population of a country must always advance in proportion to the facility with which children can be supported. The fecundity of

the several ichthyophagous nations, as well as that of the inhabitants of our fishing towns, is to be thus explained, and is not to be attributed, as Montesquieu believed, to the peculiar nature of their diet. In accounting, therefore, for the populousness of a district, the *quantity*, and not the *quality*, of the food is to be principally considered. With respect to the general health and vigour of a population, we must be extremely cautious how we attempt to connect the immunity from disease with peculiarity of diet. 'The robust and healthy will sustain a regimen which would prove destructive to their less hardy brethren. An innutritious diet may thus contribute to the general health of a community at the expense of its weaker individuals; for, by weeding out the latter, the proportion of the former must be augmented. The same observation applies with equal force to the other *non-naturals*.' In this respect, then, the views of the political economist are in direct opposition to those of the physician: the object of the one, is the promotion of the general good of a community, while that of the other is the preservation of its more feeble individuals.

127. Whether nature originally intended that man should feed on animal or vegetable substances has afforded a fertile theme for discussion. It is not my intention to follow the various speculative authors who have attempted to prove that animal food was not eaten before the deluge, but was introduced in consequence of the deterioration which the herbage sustained on that occasion. Such

<sup>1</sup> What numerous examples might be adduced in illustration of this subject! The troops of uncivilised countries compensate for their deficiency in discipline by superiority of animal strength; because the less robust are swept from the ranks by the hardships to which they are exposed. This fact has been generally acknowledged, although the explanation of it has been frequently erroneous: the regimen of the Spartans has been a common theme of discussion; and the exclamation of Pausanias, after the battle of Platæa, will readily occur to the reader. But a Spartan regimen will not give vigour to those who are naturally weak; and yet the practitioners of modern times have not unfrequently acted upon such a belief. In examining the bills of mortality, with the view of ascertaining the numbers who have died at different ages, in successive years, it will appear that the number of deaths under two years of age, from the year 1728 to that of 1750, annually fluctuated between nine and ten thousand; and that in the latter half of the last century, it was diminished to six or seven thousand: while, since the commencement of the present century, the number has averaged under five thousand five hundred. This striking diminution of mortality among children seems imputable to the correction of that vulgar error which led nurses to expose children to cold, in order to "*harden* their constitutions." The political economist may, perhaps, censure the modern physician, as Plato did Herodicus, for teaching the infirm to regulate their exercise and diet in such a manner as to prolong their lives. If by care and good nursing the sickly infant be carried through the first years of his life, he may possibly fall a victim to the diseases of puberty; and the same principle, therefore, which explains the diminished number of early deaths, will also explain the increasing rates of those of maturer age, and the more frequent occurrence of pulmonary disease: but are the terrors of the spring to encourage the apathy of the nurseryman during the season of winter?

questions may serve to exercise the ingenuity of the casuist, but they present no interest to the physician. It is sufficiently evident, from the structure of our teeth, and from the extent of the alimentary canal being less than that of the vegetable eater, and greater than that of the carnivorous animal, that man is *omnivorous*, and capable of subsisting on aliment of every description. Broussonet, however, is inclined to believe that man is more herbivorous than carnivorous in his nature; and, from the proportion which the different teeth bear to each other, he even ventures to conclude, that his mixed diet should consist of animal and vegetable food in the proportion of 20 to 12. No rule, however, of this nature can possibly be established; we have only to consider the different effects produced upon the body by these two species of aliment, to perceive that the circumstances of climate, season, exercise, habit, age, and individual peculiarity, must oppose such an attempt at generalisation.

128. It would, however, appear, that although man is capable of subsisting upon almost every variety of food, he cannot bear with impunity a sudden and abrupt transition from one species to another. This fact was very strikingly exemplified in the eastern part of France in the year 1817, where the failure of the crops occasioned such a famine that the poor were compelled to feed upon such vegetable productions as could be obtained; the consequences are stated to have been general anasarca, interruption of the menstrual discharge, and a permanent loss of strength; the sudden return even to barley bread, after this miserable regimen, was not unattended with danger. Avicenna remarks, that after fasting people should live sparingly; and he tells us that after the famine which occurred in the city of Bochara, many of those who had lived on roots and herbs, and retained their health, became diseased as soon as they returned to a full diet of bread and flesh. A more modern illustration of this principle is to be found in the history of the celebrated but disastrous retreat of Sir John Moore's army, in which many of those who had braved its hardships and privations became victims to the liberality with which they were regaled on a return to their native shores. Spallanzani has long since shown that animals may be brought to live on food of the most opposite kind, provided always that the change be gradually accomplished; such, for example, as a pigeon on flesh, an eagle on bread, &c. We know that in certain maritime districts of the east, horses are not unfrequently fed on fish, while on the coast of Coromandel they are fattened upon balls of boiled flesh mixed with grain; and it is on record, that a lamb kept on ship-board was fed with flesh until it actually refused the grass when turned into a meadow.<sup>1</sup>

<sup>1</sup> The reader may perhaps smile when, in support of this general truth, he is led to examine the strata of our globe; when he is told that amidst the ruins of a former world he will find ample evidence of the fatal consequences of a sudden change in the habits and diet of animals. Mr. Mantell,

129. As every description of food, whether derived from the animal or vegetable kingdom, is converted into blood, it may be inferred that the ultimate effect of all aliments must be virtually the same; and that the several species can only differ from each other in the quantity and concentration of nutriment they afford, in the comparative degree of stimulus they impart to the organs through which they pass, and in the proportion of vital energy they require for their assimilation. Were the degree of excitement which attends the digestion of a meal commensurate with the labour imposed upon the organs which perform it, less irritation and heat would attend the digestion of animal than of vegetable food; for, in the one case, the aliment already possesses a composition analogous to that of the structure which it is designed to supply, and requires little more than division and depuration; whereas, in the other, a complicated series of decompositions and recompositions must be effected before the matter can be animalised, or assimilated to the body. But the *digestive fever*, if we may be allowed the use of that expression, and the complexity of the alimentary changes, would appear, in every case, to bear an inverse relation to each other. This must depend upon the fact of animal food affording a more highly animalised chyle, or a greater proportion of that principle which is essentially nutritive, as well as upon the immediate stimulus which the alimentary nerves receive from its contact. In hot countries, therefore, or during the heats of summer, we are instinctively led to prefer vegetable food; and we accordingly find that the inhabitants of tropical climates select a diet of this description; the Bramins in India, and the people of the Canary Islands, Brazils, &c. live almost entirely on herbage, grains, and roots, whilst those of the north use little besides animal food. On account of the superior nutritive

of Brighton, who has added to his reputation as a medical practitioner that of an original geological discoverer, has observed that, from an examination of the deposit in the chalk of the South-downs, it is clearly demonstrable, that after the catastrophe which broke through the chalk hills, and thus formed their transverse valleys, the basins of the chalk were filled with salt water; the currents of fresh water flowing from the interior brought down clay, silt, and decaying vegetables, and soon occasioned an intermixture of *lacustral testacea*; and at length so far changed the nature of the element, as to render it alone fit for the habitation of fresh-water shell-fish. This conclusion results from the exclusive occurrence of marine shells in the lower beds, and that of fresh-water ones in the upper; both species, however, appearing intermixed in the intermediate layers. Now, the experiments of M. Beudant (*Ann. de Chim.* ii. 32.) have proved that if fresh-water mollusca be suddenly introduced into sea-water, they die in a very short time; whereas, if the fresh water be gradually impregnated with salt, they will even live in it, when of the strength of sea-water, without sustaining any injury. Similar experiments on fresh-water mollusca gave corresponding results. I have introduced these facts to the notice of the physiologist, because they establish a uniform law, operating alike upon all living beings, from the insect to man; principally, however, for the purpose of showing that branches of science, however unconnected with, and alien to, each other, may nevertheless be brought to interchange their mutual lights.

power of animal matter, it is equally evident that the degree of bodily exertion or exercise sustained by an individual, should not be overlooked in an attempt to adjust the proportion in which animal and vegetable food should be mixed. Persons of sedentary habits are oppressed, and ultimately become diseased, from the excess of nutriment which a full diet of animal food will occasion : such a condition is best corrected by acescent vegetables. It is well known that artisans and labourers, in the confined manufactories of large towns, suffer prodigiously in their health whenever a failure occurs in the crops of common fruits ; this fact was remarkably striking in the years 1804 and 1805. Growing<sup>1</sup> youths generally thrive upon a generous diet of animal food ; the excess of nutritive matter is consumed in the development of the body, and, if properly digested, imparts strength without repletion. Adults and old persons comparatively require but a small proportion of aliment, unless the nutritive movement be accelerated by violent exercise and hard labour.

130. Those who advocate the exclusive value of animal food, and deny the utility of its admixture with vegetable matter, adduce in proof of their system the rude health and Herculean strength of our hardy ancestors. The British aborigines, when first visited by the Romans, certainly do not appear to have been conversant with the cultivation of the ground, and, according to the early writers, Cæsar, Strabo, Diodorus Siculus, and others, their principal subsistence was on flesh and milk ; but before any valid conclusion can be deduced from this circumstance, the habits of the people must be compared with those of their descendants. The history of later times will furnish us with a satisfactory answer to those who deny the necessity of vegetable aliment. We learn from the London bills, that scurvy raged to such an excess in the seventeenth century as to have occasioned a very great mortality : at this period the art of gardening had not long been introduced. It appears that the most common articles of the kitchen garden, such as cabbages, were not cultivated in England until the reign of Catherine of Arragon ; indeed, we are told that this queen could not procure a salad until a gardener was sent for from the Netherlands to raise it. Since the change thus happily introduced into our diet, the ravages of the scurvy have been less severely experienced.

131. It follows, then, that in our climate a diet of animal food cannot, with safety, be exclusively employed. It is too highly stimulant ; the springs of life are urged on too fast ; and disease necessarily follows. There may, nevertheless, exist certain states of the system which require such a preternatural stimulus ; and the physician may, therefore, confine his patient to an animal regimen with as much propriety as he would prescribe opium, or any other

<sup>1</sup> The aliment of almost every animal, in its first stage of life, is composed of animal matter ; even graminivorous birds are nourished by the yolk for several days after being hatched.

remedy. By a parity of reasoning, the exclusive use of vegetable food may be shown to be inconsistent with the acknowledged principles of dietetics, and to be incapable of conveying a nourishment sufficiently stimulating for the active exertions which belong to our present civilised condition.<sup>1</sup> At the same time it must be allowed, that an adherence to vegetable diet is usually productive of far less evil than that which follows the use of an exclusively animal regimen. I must not quit this subject without adverting to the popular error by which vegetables were denounced as most dangerous articles of food during the late prevalence of malignant cholera. The great safeguard in all epidemics is a healthy condition of the digestive organs, which the sudden abstraction of all vegetable food is by no means calculated to promote.

ON THE PERIODS BEST ADAPTED FOR MEALS, AND ON THE INTERVALS WHICH SHOULD ELAPSE BETWEEN EACH.

132. It is not extraordinary that a discrepancy of opinion should exist upon a question which involves so many fluctuating circumstances. Controversy upon this, as upon many other subjects of diet, has engendered a disbelief in its importance; and this scepticism has given a plausible pretext for indulgence on the one hand, and protracted fasting on the other, as the wishes or habits of mankind may have rendered most agreeable. It will, therefore, be difficult to convince the public of the necessity of those regulations which are so essential for the maintenance of health or for the cure of disease. We have been told that the best time for dining is, "for a rich man, when he can get an appetite, and for a poor one, when he can get food." But appetite in health is regulated by habit, and in disease it acts but as an imperfect monitor. Certain general principles, therefore, deduced from observation and experience, must be laid down for our guidance; and these again in their application must be modified and adapted to the circumstances of every particular case.

<sup>1</sup> The following is an extract from the letter of a highly intelligent gentleman, lately written during a tour through France:—"The quantity of work done by a French labourer is about equal to that done by an English one; but then he is much longer about it, commencing work at sunrise the year round, and leaving off perhaps two hours later than ours. This inability of the French to do the same quantity of work in a given time as the English, is universally ascribed to the meagreness of their diet. The peasantry eat little meat, from habit rather than from inability to afford it. A gentleman compels his own men to do so, and gives them wine (which the peasantry do not usually drink); he says that this system pays well in the increased quantity of work they perform. A neighbour of his, an Englishman, has some English labourers, who live in the English manner, eating much meat, and who do more work in a given time than their fellow French labourers.

"Generally speaking, all the evidence and opinions I have heard tend to establish the immediate connection between the goodness of the diet and the quantity of work done."

133. All physicians concur in advocating the importance of regularity, both as it regards the number of meals and the periods at which they are taken. Those who have weak stomachs will, by such a system, not only digest more food, but will be less liable to those affections which arise from its imperfect assimilation, because, as Dr. Darwin has justly observed, they have, in such a case, both the stimulus of the aliment they take, and the periodical habit to assist the process. The periods of hunger and thirst are undoubtedly catenated with certain portions of time, or degrees of exhaustion, or other diurnal habits of life; and if the pain of hunger be not relieved by taking food at the usual time, it is liable to cease till the next period of time or other habits recur. As these periods must vary in every individual, according to the powers of digestion, the degree of exercise taken, the age, and the rapidity of growth,<sup>1</sup> as well as the quality of the food, it frequently becomes necessary, in civilised life, to have recourse to intermediate meals, or *luncheons*, in order to support the powers of the stomach during the long interval which may occur between the conventional periods of repast. But to the dyspeptic patient, in search of health, such indulgences are rarely to be permitted; unless, indeed, the circumstances under which he is placed leave him no option between long fasting and supplementary refectation. I am more anxious to impress this precept upon the minds of invalids, as the anxiety of friends, and the popular errors which exist upon the subject of diet, are too apt to establish the mischievous belief, that "a little and often" will be more likely to restore the languid stomach to its healthy tone than moderate meals at more protracted intervals. The specious aphorism of Sir William Temple, that "the stomach of an invalid is like a schoolboy, always at mischief unless it be employed," has occasioned more dyspeptic disease than that respectable physician could ever have cured, had he been as successful in practice as *Æsculapius*, and his life been protracted to the age of an antediluvian. The theory upon which this objection rests has already been explained (116.) The natural process of digestion is thus disturbed, and the healthy action of the stomach, as evinced by the return of moderate appetite, is entirely prevented. In answer to this reasoning, the patient will sometimes tell you, that frequent refreshment is essential to his comfort; that a sensation of faintness obliges him to fly to such a resource, in order to rescue himself from the distress which it occasions. This, in general, is an artificial want, created by habit, and must be cured by restoring the patient to regular meals, which is to be effected by gradually lengthening the intervals of eating. The animal machine possesses almost miraculous powers of accommodation, but then it must be trained according to its own

<sup>1</sup> Dr. Roget illustrates this subject by the caterpillar, which grows very quickly, and must repeatedly throw off its integuments during its continuance in the larva state; it accordingly consumes a vast quantity of food compared with the size of its body; and hence we find it provided with a digestive apparatus of considerable size.

laws; if you would conquer nature, you must obey her. But since no general rule is without its exceptions, so it may be observed, that there are cases of disease in which the stomach is unable to bear any considerable quantity of aliment at one time, whence it becomes indispensable to repeat it at short intervals, in order to afford a sufficient proportion of nutriment; but as the patient acquires strength, such a system should be gradually abandoned.

134. Although the advantage of regular meals at stated periods is generally admitted, it has been much disputed how many should be allowed in the day: some physicians have considered one, others two, three, or even five necessary. It is, perhaps, impossible to lay down a general rule that shall apply to every particular case. In some persons the food rarely remains longer than three hours in the stomach; in others, four, five, or even six hours. It is evident, then, that the repetition of the meals ought to be regulated by this circumstance, always avoiding the extremes of long fasting and repletion. Some nations have been satisfied with one meal a day; but the stomach would thus be oppressed with too large a quantity, and in the interval would suffer from the want of some nourishment in it. Such a plan, therefore, is neither calculated for persons of robust health, and who are engaged in much bodily exertion, and consequently require large supplies, nor for those of a weak habit, who are not able either to *take* or to *digest* such a quantity of aliment in a single meal as will be sufficient to supply the waste of the body during twenty-four hours. Celsus recommends the healthy to take food rather twice in the day than once; and Sanctorius says, "that the body becomes more heavy and uneasy after six pounds taken at one meal, than after eight taken at three; and that he who makes but one meal in the day, let him eat much or little, is pursuing a system that must ultimately injure him." When Plato returned that memorable answer to the philosophers, who inquired whether he had seen anything remarkable in Trinacria? "*Vadi monstrum in natura, hominem bis saturatum in die,*" he referred rather to the quantity, than to the *repetition* of the meals of Dionysius. In my own opinion, an invalid may safely take three frugal meals; or, on some occasions, even four, provided a certain quantity of exercise be insisted upon. It is reported, that when Alexander the Great turned away his cooks, on proceeding upon a march, he observed that he had no further occasion for such assistants, as he carried with him superior cooks; a long morning's journey to create an appetite for his dinner, and a frugal dinner to give a relish to his supper.

135. I shall now consider the nature of the different meals, and the periods at which they can be taken with the greatest advantage; repeating, however, that all general rules must be modified in their application according to particular circumstances.

136. *Breakfast.* This is, perhaps, the most natural, and not the least important of our meals; for, since many hours must have intervened since the last meal, the stomach ought to be in a condi-



tion to receive a fresh supply of aliment. As all the food in the body has, during the night, been digested, we might presume, that a person in the morning ought to feel an appetite on rising. This, however, is not always the fact; the gastric juice may not be secreted in any quantity during sleep, while the muscular energies of the stomach, although invigorated by repose, are not immediately called into action: it is therefore advisable to allow an interval to pass before we commence the meal of breakfast. We seem to depart more from the custom of our hardy ancestors, with regard to breakfast, than any other meal. A maid of honour in the court of Elizabeth breakfasted upon beef, and drank ale after it; while the sportsman, and even the day-labourer of the present day, frequently breakfast upon tea. The periods of their meals, however, were so generally different from those of modern times, that we cannot establish any useful comparison between them, without taking into consideration the collateral circumstances which must have influenced their operation. The solidity of our breakfast should be regulated by the labour and exercise to be taken, and to the time of dining. Where the dinner hour is late, we should recommend a more nutritious meal, or what the French call *un déjeuner à la fourchette*, in order to supersede the necessity of *luncheon*. At the same time it must be remembered, that dyspeptic invalids are frequently incommoded by such a repast, if it be copious. Heartburn is a common effect of a heavy breakfast, especially if it be accompanied with much diluting liquid; and a question has consequently arisen as to the propriety of taking much fluid on these occasions. Some have recommended a *dry breakfast*, as peculiarly wholesome: and we have been told, that Marcus Antoninus made it a rule to eat a hard biscuit the moment he got up. I think, however, it will not be difficult to show the reasons why liquids are essentially necessary at this meal. To say nothing of the instinctive desire which we all feel for them, it is evident that there is a certain acrimony and rankness in all our secretions at that time; the breath has frequently a peculiar taint in the morning, which is not perceptible at subsequent periods of the day. This may be explained by the loss which the fluids of the body have sustained by perspiration, as well as by the quality of newly-elaborated matter introduced into the circulation during sleep. The experiments of Sanctorius have fully demonstrated the superior power of sleep in promoting the perspiration; insomuch, that a person sleeping healthily, and without any unnatural means to promote it, will, in a given space of time, perspire insensibly twice as much as when awake. This fact is sufficient to prove the necessity of a liquid breakfast. Nor must we overlook the highly active state of the absorbent system at this period of the day, arising, no doubt, from the expenditure of fluids to which we allude. This is shown by the facility with which invalids are enabled to dispose of large draughts of mineral water before breakfast, which at any other period of the day would be followed by the most painful oppression. It also explains the nutritive and

restorative influence of milk, when taken in the early morning. Every physician, in the course of his practice, must have been consulted upon the propriety of taking meat, tea, or coffee, at breakfast. I shall, therefore, offer to the profession the results of my experience upon this subject; and I am encouraged in this duty by a conviction of the advantages which have arisen from my view of the question. A person who has not strong powers of digestion is frequently distressed by the usual association of tea with bread and butter, or, what is more injurious, with hot buttered toast or muffin; the oily part of which is separated by the heat of the liquid, and remains in the stomach, exciting, on its cardiac orifice, an irritation which produces the sensation of heartburn. On such occasions I always recommend dry toast, without any addition. New bread, or spongy rolls, should be carefully avoided. Tea, to many persons, is a beverage which contains too little nutriment: I have therefore found barley-water, or a thin gruel, a very useful substitute. A gentleman some time since applied to me, in consequence of an acidity which constantly tormented him during the interval between breakfast and dinner, but at no other period of the day: he had tried the effects of milk, tea, coffee, and cocoa, but uniformly without success. I advised him to eat toasted bread, with a slice of the lean part of cold mutton, and to drink a large cup of warm barley-water, for the purpose of dilution. Since the adoption of this plan he has entirely lost his complaint, and continues to enjoy his morning diversions without molestation. Hard eggs, although they require a long period for their digestion, are not generally offensive to the stomach; they may therefore be taken with propriety, whenever, from necessity or choice, the dinner is appointed at a late season.

137. In the course of my own practice I have not unfrequently been called upon to advise a patient under the following circumstances. He rises in the morning without much inclination for breakfast; but such are his occupations that he is compelled to "*force down*" a substantial repast, in order to protect himself against the inanition which would otherwise take place during the day, his dinner being unavoidably postponed to six or seven o'clock. Should he take but a moderate breakfast, he is compelled to eat a luncheon at three o'clock, by which his dinner is rendered indigestible. I will tell the reader the plan which I have usually directed with success under such circumstances. If, at your usual breakfast hour, the stomach should not yet be in the humour for food, take a cup of tea, or thin gruel, and a piece of dry toast, or a biscuit; and, after the lapse of two or three hours, eat some cold mutton, a chop, or any other easily digestible meat. You will thus gain all the advantages of a substantial breakfast without its evils, and derive the profit of a luncheon without the chance of unfitting your stomach for the duties imposed upon it at dinner. The following passage is extracted from a letter which I lately received from a gentleman resident in the vicinity of London, whose mercantile engagements required his attendance in town every morning. "I never was

more obliged to any man than I am to you ; you may remember I some time ago applied for your assistance under circumstances that rendered my life most uncomfortable ; by following your advice the evil has been completely removed : and I absolutely feel ten years younger than I did eight months back. I hope that, in the next edition of your work, you will take some notice of my case, for the sake of those poor d—ls, who may be suffering in a similar manner. I have been attentively perusing all you have said about breakfast, but I cannot find any allusion to the plan you recommended to me. You may, perhaps, not recollect the particulars of my case, and the difficulties in which this strange stomach of mine placed me. I told you that whenever I ate a hearty breakfast, I suffered for it the rest of the day ; and, if I took a scanty one, I became so faint as to be obliged, in my own defence, to spoil my dinner by a luncheon. I now break my fast by a small basin full of barley water with milk, and a biscuit ; two hours after which I find myself in trim for a chop, which carries me on comfortably till six o'clock, when I assure you I can make a most respectable dinner. The consequence of all this is, that I do not know I have a stomach, except, indeed, when it civilly reminds me that it is twelve and six o'clock. You perceive I can now look the enemy in the face, and laugh at the terrors which formerly frightened me almost to death. Is not this a good sign ?"—Indeed it is, the very best and least equivocal sign of convalescence. If any of my medical readers should question the intimate connection between body and mind, between, as Sterne says, the outside and inside of a jacket which, ruffle but the one, and you will be sure to ruffle the other, all I can say is, that they must have very superficially observed the phenomena of disease.

138. *Dinner.* Among the Romans this was rather considered as a refreshment to prevent faintness, than as a meal to convey nourishment. It consisted principally of some light repast, without animal food or wine ; but in modern times it is considered the principal meal, at which every species of luxurious gratification is indulged in. With regard to the proper period at which invalids should dine, physicians entertain but one opinion : it should be in the middle of the day, or at about two or three o'clock. Sir A. Carlisle has justly observed, that it is thus best adapted to the decline of animal vigour, because it affords a timely replenishment before the evening waning of the vital powers, and which naturally precedes the hour of rest ; besides which, the custom tends to prevent intemperance ; while late hours and a consequent state of exhaustion demand, or seem to justify, an excessive indulgence in strong drinks, and in variety of food. The exact period, however, of dinner must be directed by the physician with reference to the necessary habits of his patient, the nature and time of his breakfast, and, above all, to the rapidity or slowness of his digestion. I will illustrate the importance of this precept by the relation of a case which lately fell under my own immediate notice and care. A

gentleman, resident in a distant part of the country, applied for my advice under the following circumstances. His health was generally good, but he had lost all appetite for his dinner, and constantly experienced a sensation of weight and uneasiness after that meal: I prescribed some laxative and bitter medicines, and after a fortnight had elapsed I again saw him. He then told me that he had not experienced the sensations of which he had complained for some time; but that the circumstance afforded him but little encouragement, as he had uniformly found the same beneficial change whenever he resided in London, which he was at a loss to explain, as he took the same exercise in the country. I then inquired whether the hour at which he dined was the same in both situations? when it appeared, that in the country he dined at three, and in London at about six. I immediately suspected the origin of the complaint, and fortunately touched the spring which unfolded the whole secret: his digestion was remarkably slow, and the dinner in the country was served up before the breakfast had been duly digested. By my advice this evil was remedied; and he has never since had any reason to complain of want of appetite, or of the weight and oppression which had so long distressed him.

139. *Tea.* I have already stated my reasons for considering this repast as salutary; and where it is practicable, exercise should follow it.

140. *Supper.* In the time of Elizabeth, the nobility and gentry were accustomed to dine at eleven, to sup between five and six, and to go to bed at ten. It is therefore evident, that any argument in favour of this meal, founded upon the healthy condition of our ancestors, must be fallacious. By supper, in modern times, we understand a late meal just before bed time. But as sleep is not favourable to every stage of digestion, it is very questionable whether retiring to rest with a full stomach can, under any circumstances, be salutary.<sup>1</sup> During the first part of the process, or that of chymification, a person so situated may perhaps sleep quietly, unless indeed the morbid distention of the stomach should impede respiration, and occasion distress; but when the food has passed out of the stomach, and the processes of chylification and sanguification have been established, the natural propensity of the body is for activity, and the invalid awakes at this period, and remains in a feverish state for some hours. Upon this general principle, then, suppers are to be avoided; that is to say, *hearty* suppers, which require the active powers of the stomach for their digestion. The same objection cannot be urged against a light repast, which is generally useful to dyspeptics; and it has been truly and facetiously observed, that "some invalids need not put on their night caps, if they do not first bribe their stomachs to good behaviour."

<sup>1</sup> "Ex magna cœna stomacho fit maxima pœna,  
Ut sis nocte levis, sit tibi cœna brevis."

An egg lightly boiled, or a piece of dry toast, with a small quantity of white wine negus, will often secure a tranquil night, which would otherwise be passed with restlessness. Amongst the intellectual part of the community, there has ever existed a strong predilection in favour of suppers: the labour of the day has been performed; the hour is sacred to conviviality, and the period is one which is not likely to be interrupted by the calls of business. To those in health, such indulgences may be occasionally allowed; but the physician should be cautious how he gives his sanction to their wholesomeness. The hilarity<sup>1</sup> which is felt at this period of the day must not be received as a signal for repairing to the banquet, but as an indication of the sanguification of the previous meal (123).

#### ON THE QUANTITY OF FOOD THAT OUGHT TO BE TAKEN AT DIFFERENT MEALS.

141. There is no circumstance connected with diet, which popular writers have raised into greater importance; and some medical practitioners have even deemed it necessary to direct that the quantity of food, appropriated to each meal, should be accurately estimated by the balance. Mr. Abernethy says, that "it would be well if the public would follow the advice of Mr. Addison, given in the Spectator, of reading the writings of L. Cornaro; who, having naturally a weak constitution, which he seemed to have ruined by intemperance, so that he was expected to die at the age of thirty-five, did at that period adopt a strict regimen, allowing himself only *twelve ounces* of food daily." When I see the habits of Cornaro so incessantly introduced as an example for imitation, and as the standard of dietetic perfection, I am really inclined to ask with Feyjoo—did God create Lewis Cornaro to be a rule for all mankind in what they were to eat and drink? Nothing can be more absurd than to establish a rule of weight and measure upon such occasions. Individuals differ from each other so widely in their capacities for food, that to attempt the construction of a universal standard, is little less absurd than the practice of the philosophical tailors of Laputa, who wrought by mathematical calculation, and entertained a supreme contempt for those humble and illiterate fashioners who went to work by measuring the person of their customer; but Gulliver tells us, that the worst clothes he ever wore were constructed on abstract principles. How then, it may be asked, shall we be able to direct the proportion of food which it may be proper for an invalid to take? I shall answer this question in the words of Dr. Philip, whose opinion so exactly coincides with my own experience, that it would be difficult to discover a more

<sup>1</sup> Breakfast has been considered the meal of *friendship*; dinner that of *etiquette*; and supper the *feast of wit*.

appropriate manner of expressing it. "The dyspeptic should carefully attend to the first feeling of satiety. There is a moment when the relish given by the appetite ceases; a single mouthful taken after this oppresses a weak stomach. If he eats slowly, and carefully attends to this feeling, he will never overload the stomach." But that such an indication may not deceive him, let him remember to *eat slowly*. This is an important condition; for when we eat too fast, we introduce a greater quantity of food into the stomach than the gastric juice can at once combine with; the consequence of which is, that hunger may continue for some time, after the stomach has received more than would be sufficient, under other circumstances, to induce satiety. The advantage of such a rule, over every artificial method by weight and measure, must be obvious; for it will equally apply to every person, under whatever condition or circumstances he may be placed. If he be of sedentary habits, the feeling of satiety will be sooner induced; and if a concurrence of circumstances should have invigorated his digestive powers, he will find no difficulty in apportioning the increase of his food, so as to meet the exigencies of the occasion.

142. Although it must be admitted, that we all take more solid food than may be necessary for supporting the body in its healthy state: yet it is important to know, that too great a degree of abstinence will also tend to weaken and distress both mind and body. Men who in the earlier ages, from a mistaken notion of religion, confined their diet to a few figs, or a crust of bread and water, were so many visionary enthusiasts; and the excessive abstinence to which some religious orders are subjected, has proved one of the greatest sources of modern superstition. The effects of feeding below the healthy standard, are also obvious in the diseases of the poor and ill-fed classes in many parts of England and Ireland; and these are still more striking in those districts where the food is chiefly or entirely vegetable, and therefore less nutritious. It is also well known, that the obstinate fasting of maniacs often occasions a disease resembling the sea scurvy.

143. Those who are induced from their situation in life constantly to exceed the proper standard of diet, will preserve their health by occasionally abstaining from food, or rather, by reducing the usual quantity, and living low, or *maigre*, as the French call it.<sup>1</sup> A poached egg, or a basin of broth, may on such occasions be substituted for the grosser solids. The advantage of such a practice has not only been sanctioned by experience, but demonstrated by experiment. The history of the art of "*training*" will furnish us with some curious facts upon this subject. It is well known that race-horses and fighting-cocks, as well as men, cannot be preserved at their *athletic weight*, or at the "top of their condition," for any length of time; and that every attempt to force its continuance

<sup>1</sup> Baglivi tells us that in Italy a large proportion of invalids recovered their strength during the period of Lent.

is followed by disease.<sup>1</sup> A person, therefore, in robust health, should diminish the proportion of his food, in order that he may not attempt to force it beyond the athletic standard. I am particularly anxious to impress this important precept upon the mind of the junior practitioner, as I have, in the course of my professional experience, seen much mischief arise from the neglect of it. A person, after an attack of acute disease, when his appetite returns, is in the condition of a pugilist who is about to enter upon a system of *training*; with this difference, that he is more obnoxious to those evils which are likely to accrue from over-feeding. In a state of debility and emaciation, without any disease, with a voracious appetite, he is prompted to eat largely and frequently; and he is exhorted by those not initiated in the mysteries of the medical art, to neglect no opportunity to "*get up his strength.*" The plan succeeds for a certain time, his strength increases daily, and all goes on well; but, suddenly, his appetite fails, he becomes again unwell, and fever or some other mischief assails him. To the medical practitioner the cause of the relapse is obvious: he has attempted to force his strength too suddenly and violently beyond that athletic standard which corresponds with the vital condition of his constitution. This remark will forcibly apply to the treatment of cases of debility after inordinate fluxes and hemorrhages.

144. Any sudden transition from established habits, both with regard to the quantity and quality of food, is injudicious. This precept is the more important, as persons who have too freely indulged, and begin to feel the bad effects of their excesses, are disposed to alter their habits without the preliminary preparations. They leap at once from the situation which gives them pain or fills them with alarm, instead of quietly descending by the steps which would secure the safety of their retreat.

145. It has been already stated that, after long fasting, we ought to be careful how far we indulge. Persons who have been inclosed in coal mines for several days without food, in consequence of the accidental falling in of the surrounding strata, have not unfrequently lost their lives from the too assiduous administration of food after their extrication. During the period of my studentship at Cambridge, Elizabeth Woodcock was buried under the snow for the space of eight days: on her being found, she was visited by those to whom so extraordinary an adventure presented any interest; and I can state, from my personal knowledge of the fact, that she died in consequence of the large quantity of sustenance with which she was supplied. In the first volume of the Memoirs of the Philosophical Society of Manchester, the case of a miner is recorded, who after remaining for eight days without food, was killed by being placed in a warm bed, and fed with chicken broth.

146. The advantages which are produced by rendering food

<sup>1</sup> When a sheep becomes fat, the butcher knows it must be killed, or it will soon decline.

grateful to invalids are so striking, that the most digestible aliment, if it excite aversion, is more injurious than that which, though in other respects objectionable, gratifies the palate. If feelings of disgust or aversion are excited, the stomach will never act with healthy energy on the ingesta; and in cases of extreme dislike, they are either returned, or they pass through the alimentary canal almost unchanged. On the other hand, the gratification which attends a favourite meal is, in itself, a specific stimulus to the organs of digestion, especially in weak and debilitated habits. In the eighth edition of my Pharmacologia, I published a case which was related to me by Dr. Merriman, highly illustrative of the powerful influence of the mind upon these organs. A lady of rank, labouring under a severe menorrhagia, suffered with that irritable and unrelenting state of stomach which so commonly attends uterine affections, and to such a degree, that every kind of aliment and medicine was alike rejected. After the total failure of the usual expedients to procure relief, and the exhaustion of the resources of the regular practitioner, she applied to the celebrated Miss Prescott, and was *magnetised* by the mysterious spells of this modern Circe. She immediately, to the astonishment of all her friends, ate a beefsteak, with a plentiful accompaniment of strong ale; and she continued to repeat the meal every day, for six weeks, without the least inconvenience! But the disease itself, notwithstanding this treacherous amnesty of the stomach, continued with unabated violence, and shortly afterwards terminated her life. On the other hand, I could cite several cases to show, that the most nutritive and digestible aliment may be rejected by the stomach, if any impression against its salubrity be produced. I remember a case, in which, from some groundless suspicion, the idea of the food having been poisoned by copper was introduced, the persons at table became sick, one or two absolutely vomited, and the remainder complained of distress in the stomach and bowels. The following is another striking instance of the powers of the imagination. A Cambridge student called upon a friend, and observed a glass of sherry on his table, which he immediately swallowed; the gentleman, in whose apartment this occurred, determined to play off a hoax upon his visiter, and turning towards him the label of a half-pint bottle of antimonial wine, declared that he had swallowed a portion of its contents. The student left the room, and instantly vomited. These facts show in a striking manner to what an extent the digestive organs are influenced by the nervous system, and were it not otherwise obvious, they would point out the vast importance of serenity and cheerfulness during the discharge of their functions:

“Unquiet meals make ill digestion.”



## ON THE QUANTITY OR VOLUME OF LIQUORS THAT SHOULD BE TAKEN AT MEALS.

147. As the introduction of solid aliment into the stomach is for the purpose of furnishing materials for the repair of the different textures of the body, so is a supply of liquid matter, essentially necessary to replace those various fluids which are constantly ejected from the body, during the exercise of its different functions. The necessity of this supply, as well as its quantity are both indicated by a certain feeling known by the name of *thirst*. In this point of view, therefore, drinks ought to be considered as real aliments; and, indeed, it is a question whether they may not also undergo certain decompositions in the body, and be made to surrender elements for the formation of solid parts.<sup>1</sup> The chyme and chyle may also require the assistance of some liquid medium to favour the absorption of its finer and more nutritive parts, which, by increasing the fluidity of the mass, will expedite the numerous combinations it is destined to undergo. In every point of view, therefore, dilution is an essential operation; and an animal will not only endure the sensation of hunger with more tranquillity than that of thirst, but he will survive longer under the privation of solid than of liquid aliment.<sup>2</sup> Unfortunately, however, those instincts which nature implanted in us for our guidance have been eradicated by the habits of artificial life: thirst is so rarely experienced, that the very sensation is associated with the idea of disease. The consequence is, that we have been abandoned to the control of our caprice in the selection and use of these agents—a circumstance which has given origin to numerous disorders. The quantity of diluents which each person may require will depend upon individual peculiarity, climate, nature of the solid aliment, &c.

148. In appreciating the effects of liquids upon the human body, there are several circumstances independent of the quality of the fluid which deserve some notice; such as temperature, volume, and the period of potation. Although fluids of the usual temperature of the air are grateful and congenial to a healthy stomach, persons disposed to dyspepsia frequently require them to be raised to the temperature of the body; for the stomach, not having sufficient vital energy to establish the reaction which the sudden impression of cold produces in a healthy condition, falls into a state of

<sup>1</sup> Fish, especially the cetaceous tribe, decompose water, and live upon its hydrogen.

<sup>2</sup> Redi (*Osservaz. intorno agli Anim. viventi, &c. No. 34.*) instituted a series of experiments, with the sole view of ascertaining how long animals can live without food. Of a number of capons which he kept without either solid or liquid aliment, not one survived the ninth day; but one to which he allowed water, drank it with avidity, and did not perish until the twentieth day. See our work on Medical Jurisprudence, Art. "*Death by Starvation*," vol. ii. p. 67.

collapse, and is consequently unable to proceed in the performance of its requisite duties.<sup>1</sup> It deserves notice, however, that fluids heated much above the temperature of the body are equally injurious: it is true that they will frequently, from their stimulus, afford present relief; but it will always be at the expense of future suffering, and be compensated by subsequent debility. Iced fluids should not be taken, under any circumstances, by those who have delicate stomachs, especially after a meal, the digestion of which is thus retarded, or wholly prevented.

149. It is a popular idea that hot liquids injure the teeth. I entertain great doubts upon the subject. Ribe, in a paper published in the *Amœnitates Academicæ*, observes, that "Man is the only animal accustomed to hot food, and almost the only one affected with carious teeth." This is far from being true; the term of life in all the graminivorous classes appears to be principally limited by the decay of the teeth, and forms an insuperable obstacle to the prolongation of their existence much beyond the term when they have attained to the perfection of their kind.<sup>2</sup>

150. The quantity or volume of liquid taken at once into the stomach is a circumstance of material consequence. The reader must refer to that part of the work in which the digestion of drinks is explained (97), in order to understand the importance of the considerations which this question embraces. It is evident that if the stomach be distended with fluid, the digestion of its solid contents must meet with considerable impediment; its bulk will stimulate the muscular fibres to contract too rapidly, and thus to expel the food before it has undergone the necessary changes; while, at the same time, it is said that the gastric juice becomes too dilute to fulfil the objects of its secretion. Upon this latter point I entertain some doubt: the secretions of the stomach are not very soluble in water; and it has been already stated with what extreme difficulty the coagulating quality of the gastric membrane is removed by washing. Be this, however, as it may, it is evident, that if the solid matter be diffused through a large quantity of liquid, it cannot be so easily acted upon by the gastric juice; nor can it be converted into that pultaceous mass which appears to be a preliminary step to its digestion. On the other hand, if the food be too hard or dry, its necessary change by the *churning* of the stomach cannot be accomplished, and the progress of digestion will be impeded. It

<sup>1</sup> This remark applies particularly to the residents of hot climates, whose stomachs are always more or less enfeebled. It appears that the Romans were in the habit of drinking tepid potations at their meals. See Juvenal, Sat. V., v. 63.

<sup>2</sup> In the elephant, who rivals, or perhaps exceeds, man in duration of life, a peculiar provision is found to exist for the purpose of renewing the teeth. The grinding teeth, or *molars*, of the elephant, which consist each of a single piece of bone, intermingled with enamel, are so constructed as to continue growing from behind, in proportion as they are worn away in front by the process of mastication; so that their duration is coeval with that of the animal.

therefore follows, that different aliments will require different quantities of liquid to assist their chymification. Animal food demands, of course, a greater quantity of drink than vegetable food ; roasted, than boiled meat ; and baked still more than roasted. The next question to be considered is, as to the most suitable period for taking liquids ; and this is, in some measure, answered by the preceding observations. By drinking *before* a meal, we place the stomach in a very unfit condition for the duties it has to perform. By drinking *during* a meal, we shall assist digestion, if the solid matter be of a nature to require it ; and impede it, if the quantity taken renders the mass too liquid. Those physicians, therefore, who have insisted upon the necessity of a total abstinence of liquid during a meal, appear to have forgotten that every general rule must be regulated by circumstances. The best test of its necessity is afforded by the sensations of the individual, which ought not to be disregarded merely because they appear in opposition to some preconceived theory. The valetudinarian who, without the feeling of thirst, drinks during a meal because he has heard that it assists digestion ; and he who abstains from liquid, in opposition to this feeling, in consequence of the clamour which the partisans of a popular lecturer have raised against the custom, will equally err, and contribute to the increase of the evil they so anxiously seek to obviate. Dr. W. Philip has stated a fact, the truth of which my own experience justifies, that "eating too fast causes thirst: for the food being swallowed without a due admixture of saliva, the mass formed in the stomach is too dry." The same habit is also a common cause of costiveness. I may conclude these remarks by observing, that as hunger and thirst are, to a certain extent, incompatible sensations, it is probable nature intended that the appetite for food should first be satisfied, before a supply of drink becomes necessary ; and if our food possess that degree of succulence which characterises digestible aliment, there will seldom be any occasion for it. But, under any circumstances, the quantity taken should be small: it is during the intervals of our solid meals that the liquid necessary for the repair of our fluids should be taken ; and both theory and experience appear in this respect to conform, and to demonstrate the advantage which attends a liquid repast about four or five hours after the solid meal. At about this period the chyle has entered its proper vessels, and is flowing into the blood, in order to undergo its final changes. Then it is that the stomach, having disposed of its charge receives the wholesome draught with the greatest advantage : then it is that the blood, impregnated with new materials, requires the assistance of a diluent to complete their sanguification, and to carry off the superfluous matter ; and it is then that the kidneys and the skin will require the aid of additional water, to assist the performance of their functions. The common beverage of tea, or some analogous repast, originally suggested no doubt by an instinctive desire for liquid at this period, is thus sanctioned by theory, while its advantages are established by experience.

So, again, after the repose of the night, we feel an instinctive desire for liquids, as already stated (136) in consequence of the loss of fluids sustained by the body during sleep.

#### CONDUCT TO BE PURSUED PREVIOUS AND SUBSEQUENT TO MEALS.

151. As dietetic regulations are intended for the use of those who are either suffering under disease, or are compelled, from the precarious state of their health, to attend to every circumstance which may be likely to preserve it, it is scarcely necessary, in a professional work, to apologise for the introduction of advice, which, to the robust and healthy, may appear frivolous and unnecessary. It is admitted, that nature never contemplated the necessity of confining men to a certain routine of habits; nor did she contemplate, as far as we can learn, the existence of those diseases which may render such discipline necessary. We have in this place only to inquire into the habits which are most favourable or hostile to the process of digestion, and then to form a code for the direction of those who stand in need of such artificial assistance.

152. Exercise in the open air is essential to the well-being of every person; but its degree must be regulated by the circumstances under which the individual is placed. The interval between breakfast and dinner is the period for active exertion; and the enjoyment of it, when not attended with severe fatigue, will strengthen and invigorate all the functions of the body. This, too, is the period when the mind may direct its energies with the greatest chance of success; but it is important to remark, that *the valetudinarian and dyspeptic ought never to take his principal meal in a state of fatigue*; and yet I would ask, whether there is a habit more generally pursued, or more tenaciously defended? Aye, and defended too upon *principle*;—the invalid merchant, the banker, the attorney, the government clerk, are all impressed with the same belief, that after the sedentary occupations of the day, to walk several miles to their villas, or to fatigue themselves with exercise before their dinner, or rather early supper, will sharpen their tardy stomachs, and invigorate their feeble organs of digestion; as if bodily fatigue were an antidote to mental exhaustion. The consequence is obvious: instead of curing, such a practice is calculated to perpetuate, and even aggravate the malady under which they may suffer, by calling upon the powers of digestion at a period when the body is in a state of exhaustion from fatigue. Often have I, in the course of my practice in this town, cured the dyspeptic invalid, by merely pointing out the error of this prevailing opinion, and inducing him to abandon the mischievous habit which has been founded upon it. Do not let me be understood as decrying the use of moderate exercise before dinner; it is the *abuse* of it that I am anxious to prevent. No person should sit down to a full meal, unless he has had the opportunity of previously inhaling the open

air, and taken a quantity of exercise, proportionate to his power of sustaining it without fatigue. Upon this point I agree with Mr. Abernethy, who says, "I do not allow the state of the weather to be urged as an objection to the prosecution of measures so essential to health, since it is in the power of every one to protect himself from cold by clothing: and the exercise may be taken in a chamber with the windows thrown open, by walking actively backwards and forwards, as sailors do on shipboard." Horse exercise is undoubtedly salutary, but it should not supersede the necessity of walking; where the two modes can be conveniently combined, the greatest advantage will arise. I have heard that a physician of eminence has declared, that "equitation is more beneficial to the horse than to his rider;" my own experience on this subject will not allow me to concede to such a proposition; nor to that which maintains, that "riding is the best exercise for regaining health, and walking for retaining it." It must be admitted, that the shaking which attends horse exercise is salutary to the stomach and intestines; it is also less fatiguing to the inferior limbs; so that persons in a weak state can use it with less pain or difficulty; they can, moreover, better regulate the quantity of exercise, and bring their excursions to a close without fatigue, as soon as they discover the propriety of so doing, which is not so easy in the case of walking. There is also another circumstance connected with this subject, upon which I am inclined to think that sufficient stress has not been laid, the rapidity with which we change the air. I am not aware that any theory has been proposed to explain the fact; but I am perfectly well satisfied, that rapid motion through the air is highly beneficial. As this is a gymnastic age, I may be allowed to offer some further observations upon the importance of exercising the body. The occupation of *digging* is more beneficial than is usually supposed; and to dyspeptic persons it proves useful, by the agitation thus occasioned in the abdominal region. Patients who have suffered from visceral congestion have experienced the greatest benefit from it. I am induced to believe, that the general discontinuance of those manly exercises, which were so commonly resorted to by our ancestors in the metropolis, has contributed to multiply our catalogue of dyspeptic diseases; and I cannot but express my satisfaction at the prospect of the establishment of a society for their reintroduction. Stow, in his Survey of London, laments the retrenchments of the grounds appropriated for pastimes, which had begun to take place even in his day: what would he say, could he now revisit the metropolis? It has been truly observed, that had it not been for the effect of bodily exercise, Cicero<sup>1</sup> would never have triumphed at the bar, nor Julius Cæsar in the field.

153. One of the great evils arising from too sedentary habits, is constipation of the bowels. This, however, may to a certain degree be remedied, by standing for a certain period; and I have repeatedly

<sup>1</sup> See Plutarch's Life of Cicero.

known the greatest benefit to arise from the student or clerk introducing a high desk into his office, by which he is enabled to pursue his occupation in an erect posture.

154. In speaking of inordinate exercise before meals, I have alluded principally to *bodily* exercise; but let me here observe, that the undue exertion of the mind is equally hostile to the due performance of the digestive functions; and when we consider the vast importance of nervous influence in carrying on their operations, we cannot feel surprised should a person, after he has been jaded by mental anxiety, or exhausted by intellectual exercise, be incapable of digesting an accustomed meal. These observations suggest many important questions for the deliberations of those who are placed in superintendence of public and private seminaries; the school-cry of "duty before pleasure," has scattered the seeds of disease even amongst the most robust of our species.

155. I have already explained the necessity of exercise at that period of the digestive process, when the chyle enters the circulation (123); and it is, perhaps, not the least of the evils which attend the modern fashion of late dinners, that it should preclude the possibility of such a regulation. The utility of dancing may certainly be deduced from these views, and its propriety sanctioned on just principles; but the lateness<sup>1</sup> of the hour at which these recreations commence, and, what is worse, the excessive heat and ill-ventilation of the apartments in which they are usually carried on, must counteract any benefit which might otherwise attend an indulgence in them. If exercise be useful during the period of sanguification, pure air is no less so; and I shall take this opportunity of entering my protest against the introduction of *gas* into the interior of our houses. *Carburetted hydrogen* is a deadly poison; and even in a state of great dilution, it is capable of exerting a very baneful effect upon the nervous system. I have been consulted on several occasions for pains in the head, nausea, and distressing languor, which evidently had been produced by the persons inhaling the unburnt *gas* in the boxes of our theatres. In order to afford additional support to the objections which I have urged upon this occasion, I shall quote an account of the effects produced upon Sir Humphrey Davy by the inspiration of *carburetted hydrogen gas*. He introduced into a silk bag four quarts of this gas nearly pure, which had been carefully produced, from the decomposition of water by charcoal, an hour before the experiment, and which had a very strong and disagreeable smell. "After a forced exhaustion of my lungs," says he, "the nose being accurately closed, I made three inspirations and expirations of the gas. The first inspiration produced a sort of numbness and loss of feeling in the chest and about the pectoral muscles. After the second inspiration, I lost all power of perceiving external things, and had no distinct sensation, except a terrible

<sup>1</sup>In former times the ball commenced at six, and terminated at eleven; but now it begins at eleven and ends at six.

oppression on the chest. During the third expiration this feeling disappeared, I seemed sinking into annihilation, and had just power enough to drop the mouthpiece from my unclosed lips. A short interval must have elapsed, during which I respired common air, before the objects about me were distinguishable. On recollecting myself, I faintly articulated, "I do not think I shall die." Putting my finger on the wrist I found my pulse threadlike, and beating with excessive quickness. In less than a minute I was able to walk; and the painful oppression on the chest directed me to the open air. After making a few steps, which carried me to the garden, my head became giddy, my knees trembled, and I had just sufficient voluntary power to throw myself on the grass. Here the painful feeling of the chest increased with such violence as to threaten suffocation. At this moment I asked for some nitrous oxide.<sup>1</sup> Mr. Dwyer brought me a mixture of oxygen and nitrous oxide, which I breathed for a minute, and *believed* myself relieved. In five minutes the painful feelings began gradually to diminish. In an hour they had nearly disappeared, and I felt only excessive weakness and a slight swimming of the head. My voice was very feeble and indistinct: this was at two o'clock in the afternoon. I afterwards walked slowly for about half an hour, and on my return was so much stronger and better, as to believe that the effects of the gas had disappeared, though my pulse was 120, and very feeble. I continued without pain for nearly three quarters of an hour, when the giddiness returned with such violence as to oblige me to lie on the bed; it was accompanied with nausea, loss of memory, and deficient sensation. In about an hour and a half the giddiness went off, and was succeeded by an excruciating pain in the forehead, and between the eyes, with transient pains in the chest and extremities. Towards night these affections gradually diminished; at ten, no disagreeable feeling except weakness remained. I slept sound; and awoke in the morning very feeble and very hungry. I have," adds Sir H. Davy, "been minute in the account of this experiment; because it proves that carburetted hydrogen acts as a *sedative*, *i. e.* that it produces diminution of vital action, and debility without previously exciting. There is every reason to believe, that if I had taken four or five inspirations, instead of three, they would have destroyed life immediately, without producing any painful sensation."<sup>2</sup> After this proof of the poisonous nature of carburetted hydrogen,—after the cases of sickness and headache which have occurred, in consequence of its inhalation at the theatre, am I not borne out in my opinion, that *its introduction into our apartments is objectionable?*<sup>3</sup>

<sup>1</sup> Sir H. Davy had previously inspired this gas, and found it capable of producing an excitement resembling that of incipient intoxication.

<sup>2</sup> "Researches, Chemical and Philosophical, chiefly concerning nitrous oxide, and its respiration, by Humphrey Davy."

<sup>3</sup> This objection of course points to the escape of unburnt gas; if the combustion is perfect, watery vapour and carbonic acid are the only products, with,

156. We may, in this place, very properly take into consideration the evil effects produced by the inspiration of impure air. It may be stated, as a general proposition, that all living bodies when crowded together generate a matter which would seem to be highly destructive. No species of animal can congregate in ill ventilated apartments with impunity. Under such circumstances, the horse becomes infected with *glanders*, fowls with the *pip* or *pep*, and sheep with a disease peculiar to them, if they be too closely folded.<sup>1</sup> Our chemical tests for the detection of animal impurities in the atmosphere, have hitherto been inadequate, and we have therefore been erroneously led to question the presence and extent of such contamination; and the palpable unhealthiness of crowded assemblies has been referred rather to temperature, or to the diminished proportion of oxygen in the air, than to the true source of the evil. We may, I think, look forward with some confidence to an improved system of eudiometry; and when this shall have been established, I will venture to predict that many important facts connected with the public health, and with the origin and propagation of epidemic diseases, will be disclosed. It has been lately discovered that certain substances, in the state of minute division, have the power of absorbing animal matter from the atmosphere, and of rendering its presence sensible by yielding ammonia,<sup>2</sup> on exposure to heat; such

perhaps, a small proportion of sulphurous acid. The heat generated by the combustion of gas when compared with that produced by oil lamps is as 3 to 2.

<sup>1</sup> It is worthy of remark that these diseases, evidently engendered by congregation, become subsequently contagious. In the expedition to Quiberon in 1795, several transports, crowded with horses, had their hatches shut for a considerable time in a storm, by which some of them were suffocated, and amongst the surviving horses the contagious disease called *glanders* was propagated. At another period it was proposed to send live stock from England across the Atlantic, but the animals all died of a febrile disease in a few weeks, in consequence of being too much crowded.

<sup>2</sup> This fact may be illustrated by the following simple experiments. Heat some common sand red hot, in order to expel from it every trace of animal matter; when cool, introduce a portion into a small glass tube, in which a piece of test-paper has been placed.—Heat the sand by means of a spirit lamp, and the test-paper will not be found to indicate the presence of any ammonia. Repeat this experiment, with another portion of sand which has been touched by the hand, and the test-paper will now show the development of the alkali. In like manner, quick-lime, or gypsum, after exposure to an atmosphere impregnated with animal matter, will betray the contamination by a similar indication. It is, perhaps, worthy of notice, that oxide of iron possesses the same imbibing property; and the discovery of the fact is connected, in a very interesting manner, with a trial for murder which lately occurred in Paris. A dagger had been found, with spots of rust, in the apartment of a suspected person. The chemist was called upon to ascertain, if possible, whether these spots had been occasioned by blood. He accordingly examined them by the aid of heat, and finding that ammonia had been given off during the process, he concluded that they must have originated from animal matter, and delivered his opinion accordingly; but Vauquelin, one of the most celebrated and acute chemists in France, submitted to a similar examination a sword that had contracted rust in the ordinary manner,



are pure sand, lime, gypsum, &c.; to this absorbing faculty may, perhaps, be attributed the advantages derived from whitewashing infected apartments, and from strewing the floors with fresh sand.

157. The observations which have been offered upon the congregation of animal bodies will equally apply to the vegetable kingdom; indeed nature would seem to have established the law, in order that the extent of her productions might be limited to those bounds which are essential to the well-being of the whole—but let us return from this digression.

158. Sleeping after dinner is a practice of very questionable propriety; it is true, that the inhabitants of many southern climates indulge it with impunity: but it does not appear essential in our country, where animal food is used in such considerable quantities. Its effect is to hurry on the latter stages of digestion, and hence the fever and state of excitement in which the person not unfrequently awakes. In states of disease it may occasionally be useful, and the recumbent posture may expedite the passage of the aliment out of the stomach into the intestines; but the person who lies down for the accomplishment of such an object should be careful to remove all ligatures from his body.

and he was surprised to obtain the same production of ammonia. The fact, although at the time incapable of explanation, disarmed the evidence of its force, and the prisoner was acquitted.

## PART III.

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### OF THE MATERIA ALIMENTARIA.

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Whether nitrogen be an essential element of food—M. Majendie's experiments—Classification of aliments—Digestible and nutritive not synonymous—Texture of food—Cookery—Boiling—Roasting—Baking, &c.—Condiments—Importance of salt, vinegar, oil, &c.

159. Those bodies which have possessed life can alone be strictly considered capable of affording aliment to animals; yet there exist a certain number of inorganic substances, such as water, common salt, lime, &c. which, although incapable by themselves of nourishing, appear, when administered in conjunction with the former, to contribute essentially to nutrition. The consideration, therefore, of the *materia alimentaria*, necessarily embraces not only the SUBSTANTIVE agents above stated, but those which, from their *modus operandi*, are entitled to the distinctive appellation of alimentary ADJECTIVES. Under the former division will be arranged all the varieties of animal and vegetable food; under the latter, the class of condiments will merit our attention.<sup>1</sup>

160. The science of chemistry had no sooner demonstrated that all the different tissues of the body contained azote (nitrogen,) than it became an important physiological question, whether that element were derived from the food introduced into the stomach, or from the atmospheric air inhaled by the lungs. To the practical physician this subject may not perhaps appear to present any points of professional interest; but the experiments which have been lately instituted by M. Majendie, in support of the former opinions, have furnished results which, in my judgment, are susceptible of some useful applications to practice. M. Majendie observes, that the partisans of the theory he proposes to subvert insist particularly upon the example of the herbivorous animals, which are supported exclusively upon *non-azotised* matter; upon the history of certain

<sup>1</sup> Dr. Bostock has observed that condiments differ from aliments in one essential circumstance, viz. that whereas the latter are always resolved into their ultimate elements before they can contribute to nutrition, the former act in their entire state, and, if decomposed, would probably cease to produce their specific effects.

people that live entirely upon rice and maize; upon that of negroes, who can live a long time without eating anything but sugar; and, lastly, upon what is related of *caravans*, which, in traversing the deserts, have for a long time had only gum in place of every sort of food. Were it, says he, indeed proved by these facts that men can live a long time without *azotised* food, it would be necessary to acknowledge that azote has an origin different from the food; but the facts cited by no means sustain this proposition, for almost all the vegetables upon which man and animals feed contain more or less azote; for example, the impure sugar that the negroes eat presents a considerable proportion of it; and with regard to the people, as they say, who feed upon rice or maize, it is well known that they eat milk or cheese; now *casein* is the most azotised of all the nutritive proximate principles. In order to acquire some more exact notions on this subject, M. Majendie submitted several animals, during a necessary period, to the use of food of which the chemical composition was accurately ascertained. I shall present the reader with an account of these experiments, and then explain the different, but not less important conclusions, which I deduce from their results. He took a small dog of three years old, fat, and in good health, and put it to feed upon sugar alone, and gave it distilled water to drink: it had as much as it chose of both. It appeared very well in this way of living for seven or eight days; it was brisk, active, ate eagerly, and drank in its usual manner. It began to get thin in the second week, although its appetite continued good, and it took about six or eight ounces of sugar in twenty-four hours. Its alvine excretions were neither frequent nor copious; that of the urine was very abundant. In the third week its leanness increased, its strength diminished, the animal lost its liveliness, and its appetite declined. At this period there was developed upon one eye, and then on the other, a small ulceration on the centre of the transparent cornea; it increased very quickly, and in a few days it was more than a line in diameter; its depth increased in the same proportion; the cornea was very soon entirely perforated, and the humours of the eye ran out. This singular phenomenon was accompanied with an abundant secretion of the glands of the eyelids. It, however, became weaker and weaker, and lost its strength; and, though the animal ate from three to four ounces of sugar per day, it became so weak that it could neither chew nor swallow; for the same reason every other motion was impossible. It expired the thirty-second day of the experiment. M. Majendie opened the animal with every suitable precaution. He found a total want of fat; the muscles were reduced to more than five-sixths of their ordinary size; the stomach and intestines were also much diminished in volume, and strongly contracted. The gall and urinary bladders were distended by their proper fluids, which M. Chevreul was called upon to examine. That distinguished chemist found in them nearly all the characters which belong to the urine and bile of *herbivorous* animals; that is, that the urine, instead of being acid,

as it is in *carnivorous* animals, was sensibly alkaline, and did not present any trace of uric acid, nor of phosphate. The bile contained a considerable portion of *picromel*; a character considered as peculiar to the bile of an ox, and, in general, to that of herbivorous animals. The excrements were also examined by M. Chevreul, and were found to contain very little azote, whereas they usually furnish a considerable quantity.

161. M. Majendie considered that such results required to be verified by new experiments: he accordingly repeated them on other dogs, but always with the same conclusions. He therefore considered it proved, that sugar by itself, is incapable of supporting dogs. This want of the nutritive quality, however, might possibly be peculiar to sugar: he therefore proceeded to inquire whether other substances, *non-azotised*, but generally considered as nutritive, would be attended with the same consequences. He fed two dogs with olive oil and distilled water, upon which they appeared to live well for about fifteen days; but they afterwards underwent the same series of accidents, and died on the thirty-sixth day of the experiment. In these cases, however, the ulceration of the cornea did not occur.

162. Gum is another substance that does not contain azote, but which is considered as nutritive. To ascertain whether it acted like sugar and oil, he fed several dogs with this substance, and the phenomena which he observed did not differ sensibly from those above described.

163. The same distinguished physiologist lately repeated the experiment, by feeding a dog with butter, an animal substance free from azote. Like the other animals, it was supported by this food very well at first; but, in about fifteen days, it began to lose flesh and to become weak: it died the thirty-sixth day, although, on the thirty-fourth day, he gave it as much flesh as it would eat, a considerable quantity of which it took for two days. The right eye of this animal presented the ulceration of the cornea that he noticed in those which were fed on sugar. The opening of the body presented the same modifications of the bile and urine. In order to make the evidence furnished by these experiments complete, after having given to dogs separately, oil, gum, or sugar, he opened them, and ascertained that these substances were each reduced to a particular chyme in the stomach, and that they afterwards furnished an abundant chyle; whence he argues, that if these different substances are not nourishing, it cannot be attributed to want of digestion.

164. Now, giving all due credit to the accuracy and good faith with which these experiments were performed, what do their results show? That the azote of the organs is produced by the food, says M. Majendie; and, consequently, that no substance which does not contain this principle can support life. By no means: they merely prove that an animal cannot be supported by highly concentrated aliment. In contradiction to the theory of Majendie,

we know that sugar is highly nutritive, provided it be properly mixed with a quantity of substantial viands; it is certain that, in the process of making hay, if well performed, it will be found that the nutritive matter is greatly increased by the partial conversion of the cruder mucilaginous sap into a substance analogous to sugar; as we find that animals thrive faster with this food, and prefer it to that which is left on the ground, and found in a state of self-made hay. Horses fed on concentrated aliment are invariably liable to various diseases, originating from diseased action in the stomach, and hence arise broken wind, as it is termed, staggers, blindness, &c. The intolerable fetid odour of sulphuretted hydrogen gas, perceptible when post horses are fed with oats and beans only, cannot have escaped observation; and it affords sufficient proof of the mischief which arises from a too concentrated diet. The same remark applies to men; and I shall have occasion to show hereafter, that the use of chocolate, butter, cream, sugar, and rich sauces, without a due admixture of bread, potatoes, and other less nutritive aliments, is invariably attended with disordered digestion. Unless the taste be vitiated by habit, there exists an instinctive aversion to such food.

—————"The prudent taste  
Rejects, like bane, such loathsome lusciousness."

The Kamtschatdales are frequently compelled to live on fish-oil, but they judiciously form it into a paste with saw dust, or the rasped fibres of indigenous plants.<sup>1</sup>

165. M. Raspail, in alluding to the experiments of Majendie, observes that, as digestion is a complex operation, we should not seek to study it by isolating its elements. If such a mode of experimenting entitle us to erase sugar, oil, and gum, from the list of nutritive substances, we must also erase pure gluten, and even pure albumen; for if an animal be fed on them alone, it will die just as certainly as if it be fed exclusively on sugar.

#### OF THE CLASSIFICATION OF ALIMENTS.

166. The arrangements which different authors have proposed will be found to vary according to the particular theory by which each may have been influenced. The chemist investigates the composition of an aliment, and arranges it according to the proximate principles which predominate in its composition. The naturalist, on the other hand, merely considers to what division in his system each article of diet belongs, and assigns to it a corresponding place in his arrangement: while the empirical practitioner distributes the various kinds of food in an order which answers to his

<sup>1</sup> Norwegian unleavened bread consists of three parts of oatmeal, and one part of the sawdust of fir, and is said to be very wholesome.

notions of their relative nutritive value, or to the supposed facility with which they are digested in the stomach. If there be any truth in our dietetic researches, or any natural affinity between the objects of our classification, the theory of the arrangement will be unimportant; for, however greatly the roads of our pursuit may vary, we must ultimately arrive at the same goal.

167. Chemistry has satisfactorily demonstrated the nature of those proximate principles of organic matter, upon the presence of which the nutritive qualities depend, viz. *fibrin, albumen, gelatin, oil and fat, gluten, fecula, or starch, mucilage, sugar, acids, &c.* Although a combination of two or more of these principles appears essential, yet assuming that the variety, observable in the nutritive value of different substances, arises from the predominance of some one of them, we may conveniently distribute the nutrientia into the following nine classes:—

Cl. I. *Fibrinous aliments.* Comprehending the flesh and blood of various animals, especially such as have arrived at puberty: venison, beef, mutton, hare.

Cl. II. *Albuminous.* Eggs; certain animal matter.

Cl. III. *Gelatinous Aliments.* The flesh of young animals: veal, chickens, calf's foot, certain fishes.

Cl. IV. *Fatty and oily aliments.* Animal fats, oils, and butter; cocoa, &c.; ducks, pork, geese, eels, &c.

Cl. V. *Caseous aliments.* The different kinds of milk, cheese, &c.

Cl. VI. *Farinaceous Aliments.* Wheat, barley, oats, rice, rye, potato; sago, arrow-root, &c.

Cl. VII. *Mucilaginous aliments.* Carrots, turnips, asparagus, cabbage, &c.

Cl. VIII. *Sweet aliments.* The different kinds of sugar, figs, dates, &c.; carrots.

Cl. IX. *Acidulous aliments.* Oranges, apples, and other acescent fruits.

To these we may add condiments; such as salt, the varieties of pepper, mustard, horse radish, vinegar, &c.

168. In classing the different species of potatoes, we may, in like manner, be governed by the chemical composition which distinguishes them. They may be arranged under four divisions, viz.

Cl. I. *Water.* Spring, river, well water, &c.

Cl. II. *The juices and infusions of vegetables and animals.* Whey, tea, coffee, &c.

Cl. III. *Fermented liquors.* Wine, beer, &c.

Cl. IV. *The alcoholic liquors, or spirits.* Alcohol, brandy, rum, &c.

169. Before we attempt to appreciate the value of the different substances arranged under the foregoing classes, it will be necessary to caution the reader against the popular error of regarding the terms digestible and nutritive as synonymous and convertible. A substance may be highly nutritive, and yet be digested with difficulty; that is to say, it may require all the powers of the digestive

organs to convert it into chyle, and yet, when so converted, it may afford a principle of highly restorative energy: this is the case with some of the fatty and oily aliments.<sup>1</sup> On the contrary, there are substances which apparently pass out of the stomach with sufficient readiness, but afford but little comparative support to the body.

170. Writers on dietetics have descanted very learnedly upon what they please to term the *perspirability* and *alkalescency* of certain aliments. To the former I am quite unable to attach any precise meaning; with respect to the latter, I apprehend that it is intended to express a highly nutritive quality, with a certain degree of indigestibility. *Heavy* and *light*, as applied to food, are terms equally vague and indefinite, and ought never to be introduced into writings which aspire to the character of philosophical precision. The observation may be extended to the epithet *bilious*.

171. It is only necessary to reflect upon the chemical and mechanical processes by which chymification is performed in the stomach to perceive, that the digestibility of a substance may depend upon other circumstances than that of its chemical composition. Its mechanical state, with regard to texture and consistence, is of the highest importance;<sup>2</sup> and if we attempt to deduce any law upon this subject, from the known solubility of a substance out of the body, we shall fall into several fatal errors. It will be necessary to investigate this question with some attention; for it not only explains the relative digestibility of aliments, but furnishes the only true basis for a system of skilful cookery.

172. The healthy stomach disposes most readily and effectually of solid food, of a certain specific degree of density, which may be termed its *digestive texture*; if it exceed this, it will require a greater length of time, and more active powers, to complete its chymification; and if it approaches too nearly to a gelatinous condition, the stomach will be equally impeded in its operations. It is, perhaps, not possible to appreciate or express the exact degree of firmness which will confer the highest order of digestibility upon food;<sup>3</sup> indeed, this point may vary in different individuals; but we are taught by experience, that no meat is so digestible as tender mutton: when well conditioned, it appears to possess that degree of consistence which is most congenial to the stomach; and in this country it is perhaps more universally used than any other animal

<sup>1</sup> It has been calculated, that an ounce of fat affords nutriment equal to four ounces of lean.

<sup>2</sup> Some physiologists have gone so far as to believe that the mechanical condition of food is even more important than its composition; that the gastric juice is alike capable of acting upon all, provided the aliment be sufficiently comminuted; and that all the anatomical varieties in the structure of the stomach in different animals may be resolved into their mechanical effects upon the aliment.

<sup>3</sup> Some experiments were instituted for this purpose by Gosse, of Geneva; but the conclusions deduced from them are by no means satisfactory. He confounds solubility with digestibility, which in itself is sufficient to vitiate his reasoning.

food. Wedder mutton or the flesh of the castrated animal, is in perfection at five years, and is by far the sweetest and most digestible. Ewe mutton is best at two years old. Beef appears to be not so easy of digestion; its texture is firmer, but it is equally nutritive—much, however, will depend upon the period which has elapsed since the death of the animal, and more upon the method of cookery; in short, it would be worse than useless to attempt the construction of any scale to represent the nutritive and digestive qualities of the different species of food: the observations here introduced are merely noticed for the sake of illustrating those general principles whose application can alone afford us any rational theory of diet.

173. It will not be difficult to understand why a certain texture and coherence of the aliment should confer upon it digestibility, or otherwise. Its conversion into chyme is effected by the solvent power of the gastric juice, aided by the *churning* which it undergoes by the motions of the stomach; and unless the substance introduced possesses a suitable degree of firmness, it will not yield to such motions: this is the case with soups, and other liquid aliments; in such cases, therefore, nature removes the watery part before digestion can be carried forward. It is on this account that oils are digested with so much difficulty; and it is probable that jellies, and other glutinous matters, although containing the elements of nourishment in the highest state of concentration, are not digested without considerable difficulty; in the first place, on account of their evading the grappling powers of the stomach, and, in the next, in consequence of their tenacity opposing the absorption of their more fluid parts. For these reasons I maintain, that the addition of isinglass, and other glutinous matter, to animal broths, with a view to render them more nutritive to invalids, is a questionable custom.

174. The texture of animal food is greatly influenced by the age, sex, habits, condition, diet, and description of death of the animal which furnishes it. In proportion, generally, to the age, its flesh is coarser and more firm in texture, as every one must have noticed in eating birds. If the flesh of mutton and lamb, beef and veal, are compared, they will be found of a different texture; the two young meats are of a more stringy, indivisible nature than the others, which makes them harder of digestion. It has been also justly observed, that young animals differ from old ones in the distribution of the fat, which in the latter is chiefly collected in masses or layers, external to the muscles; whereas, in the former, it is more interspersed among the muscular fibres, giving the flesh a marbled appearance, which is always a desirable property of butchers' meat. The texture of food will also vary according to the wild or domesticated state of the animal; that of the former is more dense, although highly nutritive. The sex also modifies the quality of the flesh, that of the female being always more delicate and finer grained than that of the entire male, whose fibres are denser: the



influence of the genital organs upon this occasion is very extraordinary; it is generally believed, that the flavour of the female is even improved by removing the ovaries, or *spaying* them, as it is called. Every day the testes are permitted to remain, even though totally inactive with regard to their proper functions, injures the delicacy of the veal of the bull-calf; and an animal which is not castrated until after puberty always retains much of the coarseness of the entire male. The mode of killing an animal has been considered, from the remotest ages, as capable of affecting the quality of its meat. The flesh of hunted animals is characterised by peculiar tenderness; the same effect is produced by any lingering death. This fact probably explains the policy of those old municipal laws, which ordained that no butcher should offer or expose any bull-beef for sale, unless it had previously been baited; and it is upon the same principle only, that the quality of pigs' flesh could be improved by the horrid cruelty of whipping them to death, as said to be practised by the Germans. The action of vinegar, administered to an animal some hours before killing it, is also known to be capable of rendering its flesh less tough. It is a common practice in the country to give a spoonful of this acid to poultry, when they are intended for the immediate service of the table.

175. Nothing, however, tends more effectually to ameliorate the rigidity of the animal fibre, than incipient putrefaction. The length of time that meat ought to be kept after it is killed will necessarily depend upon its tendency to undergo the putrid fermentation, and the prevalence of those circumstances which are inclined to favour it.

176. The circumstances which have been just enumerated, as being capable of influencing the texture of our food, and consequently its degree of digestibility are, however, unimportant when compared with the modifying powers of cookery, which I shall now proceed to examine.

177. By cookery, alimentary substances undergo a twofold change; their principles are *chemically* modified, and their textures *mechanically* changed. The extent and nature, however, of these changes will greatly depend upon the manner in which heat has been applied to them; and if we inquire into the culinary history of different countries, we shall trace its connection with the fuel most accessible to them.<sup>1</sup> This fact readily explains the prevalence of the peculiar species of cookery which distinguishes the French table, and which has no reference, as some have imagined, to the dietetic theory, or superior refinement, of the inhabitants.

178. *Boiling*. By this operation, the principles not properly soluble are rendered softer, more pulpy, and, consequently, easier of

<sup>1</sup> Furze constitutes the principal fuel of the Cornish peasant, whence in that country, from the convenience thus offered for baking, the use of pies is so general as to have become proverbial: "*The devil will not come into Cornwall, for fear of being put into a pie.*"

digestion ; but the meat, at the same time, is deprived of some of its nutritive properties by the removal of a portion of its soluble constituents : the albumen and gelatin are also acted upon ; the former being solidified, and the latter converted into a gelatinous substance. If, therefore, our meat be boiled too long or too fast, we shall obtain, where the albumen predominates, as in beef, a hard and indigestible mass, like an overboiled egg ; or, where the gelatin predominates, as in young meats, such as veal, a gelatinous substance equally injurious to the digestive organs. Young and viscid food, therefore, as veal, chickens, &c. are more wholesome when roasted than when boiled, and are easier digested. Dr. Prout has very justly remarked, that the boiling temperature is too high for a great many of the processes of cooking, and that a lower temperature and a greater time, or a *species of infusion*, are better adapted for most of them. This is notorious with substances intended to be *stewed*, which, even in cookery books, are directed to be *boiled slowly* (that is, not at all), and for a considerable time. The ignorance and prejudice existing on these points is very great, and combated with difficulty ; yet, when we take into account their importance, and how intimately they are connected with health, they will be found to deserve no small share of our attention.<sup>1</sup> The loss occasioned by boiling partly depends upon the melting of the fat, but chiefly from the solution of the gelatine and osmazone : mutton generally loses about one fifth, and beef about one fourth, of its original weight. Boiling is particularly applicable to vegetables, rendering them more soluble in the stomach, and depriving them of a considerable quantity of *air*, so injurious to weak stomachs. But, even in this case, the operation may be carried to an injurious extent ; thus, potatoes are frequently boiled to the state of a dry, insipid powder, instead of being preserved in that state in which the parts of which they are composed are rendered soft and gelatinous, so as to retain their shape, and yet be very easily separated. On the other hand, the cabbage tribe, and carrots, are frequently not boiled long enough, in which state they are highly indigestible. In conducting this process, it is necessary to pay some attention to the quality of the water employed : thus, mutton boiled in hard water is more tender and juicy than when soft water is used ; while vegetables, on the contrary, are rendered harder and less digestible when boiled in hard water.

179. *Roasting*. By this process the fibrine is corrugated, the albumen coagulated, the fat liquefied, and the water evaporated. As the operation proceeds, the surface becomes first brown, and then scorched ; and the tendinous parts are rendered softer and gluey. Care should always be taken that the meat should not be *over done*, nor ought it to be *under dressed* ; for although in this latter state it may contain more nutriment, yet it will be less

<sup>1</sup> Hence it is, that beef tea and mutton tea are much more calculated for invalids than the broths of these meats.

digestible, on account of the density of its texture. This fact has been satisfactorily proved by the experiments of Spallanzani;<sup>1</sup> and Mr. Hunter,<sup>2</sup> observes, that "*boiled, and roasted, and even putrid* meat is easier of digestion than that which is raw." Animal matter loses more by roasting than by boiling; it has been stated above, that by this latter process mutton loses one fifth, and beef one fourth; but by roasting, these meats lose about one third of their weight. In roasting, the loss arises from the melting out of the fat, and the evaporation of the water; but the nutritious matter remains condensed in the cooked solid; whereas, in boiling, the gelatine is partly abstracted. Roast are, therefore, more nutritive than boiled meats.<sup>3</sup>

180. *Frying*. This process is, perhaps, the most objectionable of all the culinary operations. The heat is applied through the medium of boiling oil, or fat, which is thus rendered empyreumatic, and therefore extremely liable to disagree with the stomach.

181. *Broiling*. By this operation, the sudden browning or hardening of the surface prevents the evaporation of the juices of the meat, which imparts a peculiar tenderness to it. It is the form selected, as the most eligible, by those who seek to invigorate themselves by the art of *training*.

182. *Baking*. The peculiarity of this process depends upon the substance being heated in a confined space, which does not permit the escape of the fumes arising from it; the meat is, therefore, from the retention of its juices, rendered more sapid and tender. But baked meats are not so easily digested, on account of the greater retention of their oils, which are, moreover, in an empyreumatic state. Such dishes accordingly require the stimulus of various condiments to increase the digestive powers of the stomach.

#### OF CONDIMENTS.

183. These may be defined substances which are, in themselves, incapable of nourishing, but which, in concert with our food, promote its digestion, or correct some of its deleterious properties. The existence and necessity of such agents are far more universal and important than has been generally supposed.<sup>4</sup> The bitter principle

<sup>1</sup> Spallanzani on Digestion, vol. i. p. 277.

<sup>2</sup> Hunter on the Animal Economy, p. 220.

<sup>3</sup> It has been computed that, from the dissipation of the nutritive juices by boiling, one pound of roasted contains as much nourishment as two of boiled meat.

<sup>4</sup> Pharmacologia, edition 8th, p. 111. Dr. Bostock observes that it is a curious fact, strikingly exemplified in the history of condiments, that such articles as are, in the first instance, disagreeable to the palate, are those for which we afterwards acquire the strongest partiality, and which even become necessary for our comfort; whereas the frequent repetition of flavours that are originally grateful is very apt to produce a sense of satiety, or even of

which exists in the composition of grasses and other plants appears to be essential to the digestion of herbivorous animals; it acts as a natural stimulant; for it has been shown, by a variety of experiments, that it passes through the body without suffering any diminution in its quantity, or change in its nature. No cattle will thrive upon grasses which do not contain a portion of this vegetable principle: this fact has been most satisfactorily proved by the researches of Mr. Sinclair, gardener to the Duke of Bedford, which are recorded in that magnificent work, the "*Hortus Gramineus Woburnensis*." They show, that if sheep are fed on yellow turnips, which contain little or no bitter principle, they instinctively seek for, and greedily devour, any provender which may contain it; and that if they cannot so obtain it, they become diseased, and die. We are ourselves conscious of the invigorating effects of slight bitters upon our stomach; and their presence in malt liquors not only tends to diminish the noxious effects of such potations, by counteracting the indirect debility which they are liable to occasion, but even to render them, when taken in moderation, promoters of digestion. The custom of infusing bitter herbs in vinous drinks is very ancient and universal. The *poculum absinthiatum* was regarded in remote ages as a wholesome beverage, and the wormwood was, moreover, supposed to act as an antidote against intoxication. Civilisation has, in a great measure, destroyed our natural taste for bitters; while, by improving our food, it has probably rendered its stimulus less necessary. The Swiss peasant cheers himself amid the frigid solitude of his glaciers with a spirit distilled from *gentian*, the extreme bitterness of which is relished with a glee that is quite unintelligible to a more cultivated taste. It may be safely affirmed, that the utility of this condiment is in an inverse ratio with the nutritive, or rather digestible power of a vegetable substance; and we accordingly find, in conformity with that universal scheme of self-adjustment and compensation, so visible in all the operations of nature, that cultivation, which exalts and extends the nutritive powers of vegetable bodies, generally diminishes their bitterness in the same proportion. The natural history of the potato, already alluded to (5,) offers a good illustration of this fact.

184. From the different nature of condiment, it has been usually divided into three classes, viz. the *saline*, the *spicy*, or *aromatic*, and the *oily*.

185. *Salt* appears to be a necessary and universal stimulus to animated beings; and its effects upon the vegetable as well as animal kingdom have furnished objects of the most interesting inquiry to the physiologist, the chemist, the physician, and the agriculturist. It appears to be a natural stimulant to the digestive organs of all warm-blooded animals, and that they are instinctively

disgust. The examples of tobacco, garlic, and even assafœtida, on the one hand, and of such substances as possess simple sweetness, on the other, may be adduced in proof of this position.

led to immense distances in pursuit of it. This is strikingly exemplified in the avidity with which animals in a wild state seek the salt-pans of Africa and America, and in the difficulties they will encounter to reach them: this cannot arise from accident or caprice, but from a powerful instinct, which, beyond control, compels them to seek, at all risks, that which is salubrious. To those who are anxious to gain further information upon this curious subject, I would recommend the perusal of a work entitled "Thoughts on the Laws relating to Salt, by Samuel Parkes, Esq." and a small volume by my late lamented friend, Sir Thomas Bernard, on the "Case of the Salt Duties, with Proofs and Illustrations." We are all sensible of the effect of salt on the human body; we know how unpalatable fresh meat and most vegetables are without it. During the course of my professional practice, I have had frequent opportunities of witnessing the evils which have attended an abstinence from salt. In my examination before a committee of the house of commons in 1818, appointed for the purpose of inquiring into the laws respecting the salt duties, I stated, from my own experience, the bad effects of a diet of unsalted fish, and the injury which the poorer classes, in many districts, sustained in their health from an inability to procure this essential condiment. I had some years ago a gentleman of rank and fortune under my care, for a deranged state of the digestive organs, accompanied with extreme emaciation. I found that, from some cause which he could not explain, he had never eaten any salt with his meals: I enforced the necessity of his taking it in moderate quantities, and the recovery of his digestive powers was soon evinced in the increase of his strength and condition. One of the ill effects produced by an unsalted diet is the generation of worms. Mr. Marshall has published the case of a lady who had a natural antipathy to salt, and was in consequence most dreadfully infested with worms during the whole of her life.—(*London Medical and Physical Journal*, vol. xxix. No. 231.) In Ireland, where, from the bad quality of the food, the lower classes are greatly infested with worms, a draught of salt and water is a popular and efficacious anthelmintic. Lord Somerville, in his address to the board of agriculture, gave an interesting account of the effects of a punishment which formerly existed in Holland. "The ancient laws of the country ordained men to be kept on bread alone, UNMIXED WITH SALT, as the severest punishment that could be inflicted upon them in their moist climate. The effect was horrible; these wretched criminals are said to have been devoured by worms engendered in their own stomachs." The wholesomeness and digestibility of our bread are undoubtedly much promoted by the addition of the salt which it so universally receives.<sup>1</sup>

186. If the utility of salt be thus established, it may be asked,

<sup>1</sup> A pound of salt is generally added to each bushel of flour. Hence it may be presumed, that every adult consumes two ounces of salt per week, or six pounds and a half per annum, in bread only.

how it can happen that salted provisions should ever produce those diseases which experience has shown to arise from their use? It is true that a certain proportion of this condiment is not only useful but indispensable: but an excess of it is as injurious as its moderate application is salutary. This observation applies with as much force to the vegetable as to the animal kingdom; a small proportion, applied as a manure, promotes vegetation in a very remarkable manner; whereas a larger quantity actually destroys it. The experiments of Sir John Pringle have also shown, that a little salt will accelerate putrefaction, and a large quantity prevent it. In explaining the operation of *salting* meat, and in appreciating the effects of such meat as food, it will be necessary to advert to a chemical fact, which has not hitherto attracted the attention which its importance merits. The salt thus combined with the animal fibre ought no longer to be considered as the condiment upon which so much has been said; a chemical combination has taken place; and, although it is difficult to explain the nature of the affinities which have been brought into action, or that of the compound to which they have given origin, it is sufficiently evident that the texture of the fibre is so changed as to be less nutritive, as well as less digestible. If we are called upon to produce any chemical evidence, in support of such an assertion, we need only relate the experiment of M. Eller, who found, that if salt and water be boiled in a copper vessel, the solution will contain a notable quantity of that metal; whereas, if, instead of heating a simple solution, the salt be previously mixed with beef, bacon, or fish, the fluid resulting from it will not contain an atom of copper. Does not this prove that the process of salting meat is something more than the mere saturation of the animal fibre with muriate of soda?

187. The beneficial operation of salt as a condiment is proved by ample experience: theory has had no share in establishing the fact; and, in the present state of our physiological knowledge, it will be, perhaps, difficult to offer a theory for its explanation. It may probably only operate as a stimulant upon the alimentary passages, although, to those who are disposed to place any confidence in the views already stated (109,) an hypothesis will necessarily suggest itself, which, on the present occasion, it is not my intention either to support or to invalidate.

188. *Vinegar*. This acid, in small quantities, is a grateful and wholesome stimulant; it will often check the chemical fermentation of certain substances in the stomach, and prevent vegetable matter in its raw state from inducing flatulence; but its use requires caution, and in some morbid states of the system it is obviously improper. Fatty and gelatinous substances frequently appear to be rendered more digestible in the stomach by the addition of vinegar, although it is difficult to offer either a chemical or physiological explanation of the fact. The native vegetable acids may also be occasionally substituted; the addition of lemon-juice to rich and glutinous soups renders them less liable to disagree with the

stomach ; and the custom of eating apple-sauce with pork is, undoubtedly, indebted for its origin to the same cause. I shall take this opportunity to observe, that vinegar, if taken in considerable quantities, as is not unfrequently the case with young persons, to prevent the accumulation of fat, is highly injurious to the digestive organs ; and, if the habit be long continued, will produce fatal marasmus.

189. *The aromatic condiments* comprise the foreign spices, as pepper, cayenne pepper, cinnamon, nutmeg, cloves, ginger ; and the indigenous herbs and roots, such as parsley, thyme, sage, garlic, leek, onion, horse-radish, mustard, &c. The former of these were not intended by nature for the inhabitants of temperate climes : they are heating, and highly stimulant.<sup>1</sup> I am, however, not anxious to give more weight to this objection than it deserves. Man is no longer the child of nature, nor the passive inhabitant of any particular region : he ranges over every part of the globe, and elicits nourishment from the productions of every climate. It may be therefore necessary that he should accompany the ingestion of foreign aliment with foreign condiment.<sup>2</sup> If we go to the east for tea, there is no reason why we should not go to the west for sugar. The dyspeptic invalid, however, should be cautious in their use ; they may afford temporary benefit at the expense of permanent comfort. It has been well said, that the best quality of spices is to stimulate the appetite, and their worst to destroy, by insensible degrees, the tone of the stomach. The intrinsic goodness of meats should always be suspected, when they require spicy seasoning to compensate for their natural want of sapidity. But, mischievous as the abuse of aromatic condiments may be, it is innocent in comparison with the custom of swallowing a quantity of brandy to prevent the upbraiding of our stomachs, or an increased libation of wine to counteract the distress which supervenes a too copious meal—as if drunkenness were an antidote to gluttony.

190. *Oil.* This, with butter, constitutes what is called the oleaginous condiments. Melted butter is, perhaps, the most injurious of all the inventions of cookery : oil, when used in extremely small quantities, as a seasoning to salads, appears to prevent their running into fermentation, and consequently obviates flatulency.

<sup>1</sup> Nature is very kind in favouring the growth of those productions which are most likely to answer our local wants. Those situations, for instance, which engender endemic diseases, are in general congenial to the growth of the plants that operate as antidotes to them.—*Pharmacologia*, p. 113.

<sup>2</sup> Swift observes, that such is the extent of modern epicurism, that “the world must be encompassed before a washerwoman can sit down to breakfast.”

AN ESTIMATE OF THE NUTRITIVE AND DIGESTIBLE QUALITIES OF SEVERAL SPECIES OF ALIMENT, AS DERIVED FROM THE APPLICATION OF THE PHYSIOLOGICAL AND CHEMICAL PRINCIPLES ESTABLISHED IN THE PRECEDING PAGES.

Milk, although fluid, is, in fact, a mixture of solid and liquid aliment—its chemical composition—Cream, curd, cheese—Eggs—Fish—Birds—Farinaceous aliments ; bread, &c.—Potatoes—Rice—Pulses—Fruits—Plurality of food.

191. Were I to follow the steps of all preceding writers on dietetics, I should present a catalogue of the nutrientia, and introduce, under each article, a history of its composition and virtues ; but the utility of general principles is to abbreviate labour, and to class under a few heads those remarks which were previously scattered and unconnected.

192. We have seen that the nutritive qualities of a substance depend upon its composition ; but that its digestibility may be influenced by various mechanical causes. It is by such tests that we have now to examine the several classes of aliment, and to assign to the individual bodies which they comprehend their relative value as articles of diet.

193. *Milk.* This is the only nutritive fluid with which nature has presented us ; but if we examine its chemical composition, we shall soon discover that it possesses an ingredient which is instantly coagulated in the stomach ; so that, in fact, it must be regarded as a mixture of solid and liquid aliment ; the latter, however, considerably exceeding the former in quantity, and thereby demonstrating the necessity of a greater portion of fluid than of solid matter, for the reparation of that habitual waste, upon which the necessity of alimentary supplies is founded.

194. Although recent milk appears as a homogeneous liquid, it may be resolved, partly by standing, and partly by agents that do not essentially alter the nature of its components, into three proximate ingredients, the *cream*, *curd*, and *whey*.

1. The *cream* rises to the surface of the milk, after it has stood for some hours, and may be skimmed off, and thus separated from it. It appears to possess many of the properties of oil ; is smooth and unctuous to the touch, and stains cloth in the same manner as other unctuous substances. By standing for some days it becomes gradually thicker, and at length forms a soft solid, in which the flavour of cream is no longer perceived, and that of cheese is substituted in its place. According to the experiments of Berzelius, cream is a compound body, consisting of butter, 4.5 ; cheese, 3.5 ; and whey, 92 parts : but since the whey holds certain salts in solution, we may consider the whole of the solid matter contained in



cream as amounting to 12.5 per cent. When cream is agitated, as is done by the common process of churning, it is separated into two parts; a thick animal oil, well known by the name of butter, and a fluid which possesses exactly the same properties as milk that has been deprived of its cream. This change has been supposed to be owing to the combination of the cream with the oxygen of the atmosphere; but it takes place, though perhaps not equally well, in vessels from which the air has been excluded.

2. *Curd.* When milk, either deprived or not of its cream, is mixed with certain substances, or allowed to stand till it becomes sour, it undergoes a change which is called coagulation, consisting in its separation into a solid substance termed curd, and a fluid called *whey*. This change may be effected by several agents, such as alcohol, gelatine, and all astringent vegetables; by acids, and many neutral salts; by gum, sugar, and more particularly by the *gastric juice*. The effect is supposed to arise from the affinity of the coagulating substance for water, the curd being principally albumen, having very little affinity for the same; but this theory can hardly explain the operation of the gastric juice: the infusion of a piece of calf's stomach, not larger than a half-crown, will coagulate a quantity of milk sufficient for making a cheese of sixty pounds weight, although the quantity of coagulating matter cannot in this case exceed a few grains.

3. *Whey*, or the liquid which remains after the separation of the curd, is a thin and almost transparent fluid, of a yellowish-green colour, and a pleasant sweetish taste. It still contains, generally, a portion both of curd and of butter; the former of which may be separated by a boiling heat, in the form of coagulum. The buttery matter also separates by heat, especially if the whey be previously allowed to become sour. Whey contains, indeed, in its recent state, some acetic acid. When whey, which has been deprived as much as possible of the butter and curd, is slowly evaporated, it yields the peculiar substance termed "sugar of milk," which may be obtained, by clarification with whites of eggs, in the form of crystals. The presence of this saccharine matter held in solution in whey enables that fluid to undergo the vinous fermentation; and it is accordingly employed by the Tartars for making a sort of wine, which is called *koumiss*. For this purpose mare's milk is selected, as containing a larger portion of sugar than that of the cow. Whey also contains several saline bodies, viz. *muriate of potass*, *phosphates of lime and of iron*, and *sulphate of potass*; and a peculiar *animal matter*; which gives a precipitate with infusion of galls, and affords carbonate of ammonia by distillation.

From these investigations, the constituents of skimmed milk from the cow appear to be as follow:—

Water . . . . .	926.75
Curd, with a little cream . . . . .	28.
Sugar of milk . . . . .	35.
Muriate of potass . . . . .	1.70
Phosphate of potass . . . . .	0.25
Lactic acid, acetate of potass with a trace of lactate of iron . . . . .	6.
Earthy phosphates . . . . .	0.30
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	1000

195. Although nature has presented us with this compound fluid for the purposes of nourishment, and although it is evident that its several ingredients are wholesome, and designed for the various objects of aliment, yet, when separated by art, they are frequently unwelcome to the stomach; that viscus would appear to dislike the interference of the cook, in the performance of an analysis which its own powers are so well calculated to perform. We are well assured, that the first process which takes place in the stomach for the chymification of milk, is its separation into curd and whey; and yet the former of these substances, when obtained by art, frequently proves highly oppressive to the stomach, and sometimes occasions obstructions in the bowels. *Cheese*, again, which is nothing more than the coagulum of milk, pressed, salted, and partly dried, with a portion of butter, which, having been enveloped in the curd, is not afterwards separable, is one of the least digestible of our aliments, and is only adapted to strong stomachs, and to such persons as use great and constant exercise. When *toasted*, it is still more injurious, from acquiring a tenacity of texture highly hostile to the digestive function of the stomach. *Butter*, from its oily nature, is apt to disagree with delicate stomachs, and when rendered empyreumatic by heat, produces heartburn, and other distressing symptoms: the use of hot buttered toast or muffins should, therefore, never be allowed to dyspeptic invalids. Whey differs considerably in its dietetic value, according to the method employed for its separation. When this is effected by *rennet*, it always holds a portion of cream and curd suspended in it, besides its quantity of sugar. It is, therefore, considerably nutritive; but it is, at the same time, more acescent than milk, and hence it is liable to produce flatulence in those whose stomachs are disposed to encourage fermentation. Whey that has been produced by spontaneous coagulation always contains less nutritive matter, is more acid, and consequently more objectionable, unless, perhaps, as a drink in certain states of fever.

196. From this account of the composition of milk, several properties of the entire fluid may be understood. By boiling it, its albuminous part is not coagulated into a mass like the white of an egg, on account of the large quantity of water through which it is diffused; but a thin pellicle forms on the surface, which, if removed,

is immediately replaced by another; and thus the whole of the albumen may be separated in successive portions. The effect of this process is therefore to diminish the nutritive quality of the milk; but it may at the same time render it more easily digestible. I have known many invalids who could take boiled milk, but were unable to bear that fluid in its natural state.

197. Milk, in its dietetic relations, may be considered as intermediate between animal and vegetable food; it is easily assimilated, and therefore affords a quick supply of aliment to the system, while it does not excite that degree of vascular action which is produced by other animal matters. Its nutritive powers may be increased by various additions, which have also, on some occasions, the effect of correcting its natural tendency to acidity, and on others, that of obviating the costiveness which it is liable to occasion; such objects are sometimes fulfilled by adding oatmeal gruel to it. In certain states of organic disease, I have found that milk, impregnated with the fatty matter of mutton suet, is a valuable article of diet: such a repast is best prepared by inserting the suet in a muslin bag, and then simmering it with the milk. In common cases of dyspepsia it would prove injurious, for the reasons so often alluded to in the course of this work; but where it is an object to introduce much nutritive matter in a small space, I am not acquainted with a better form of aliment. With some practitioners it is a custom to recommend an admixture of lime-water with milk, to prevent the acidity which it is apt to create in feeble stomachs. I have occasionally experienced the benefit of such a practice, especially in cases of *tabes mesenterica*.

198. Before quitting this subject, it is necessary to observe, that there exists some difference in the composition of the milk of different animals. That of the human subject is much thinner than cow's milk; is of a bluer colour, and contains much more saccharine matter. It also yields a larger proportion of cream, but from which the butter cannot be separated by agitation. It deposits a part of its curd by mere repose. Asses' milk bears a stronger resemblance to human milk than to any other; it contains more sugar than that of the cow, and the proportion of curd is so considerable as even to separate on standing, before the milk becomes sour. Goats' milk yields a remarkably thick and unctuous cream, and abounds also in curd.

199. Eggs, in point of nutriment and digestibility, may be classed next to milk; but their qualities will greatly depend upon the manner in which they have been cooked. When raw, they are certainly not so easily digested as when lightly boiled, so as slightly to coagulate their albuminous principle: but if this process be carried too far, they are converted into a hard mass, which requires a long period for their digestion: but this is much accelerated by the use of vinegar as a condiment. They are distinguished by the peculiar quality of singularly affecting some stomachs, even in the smallest quantity; while they do not produce any uneasy

impressions on others. I am acquainted with a person who constantly finds an egg to produce uneasiness when his stomach is in the least deranged, but who can eat them with impunity at all other times. It is a notorious fact, that eggs, when raw, are laxative, and when cooked are apt to produce costiveness.

#### FISH.

200. Fish have been generally considered as holding a middle rank between the flesh of warm blood animals and vegetable food. It is certain that they are less nutritive than mutton or beef; but the health and vigour of the inhabitants of fishing towns evidently prove that they are sufficiently nourishing for all the purposes of active life: but in order to satisfy the appetite, a large quantity is requisite; and the appetite returns at shorter intervals than those which occur during a diet of meat. Nor does this species of food produce the same stimulus to the body; the pulse is not strengthened as after a repast of flesh; and that febrile excitement which attends the digestion of the more nutritive viands is not experienced. Hence fish afford a most valuable article of diet to invalids labouring under particular disorders; for it furnishes a chyle moderately nutritive, but, at the same time, not highly stimulant. From the nature of their texture, they do not require a laborious operation of the stomach; although sufficiently solid to rescue them from those objections which have been urged against liquid or gelatinous food. From the observations just offered upon the nutritive powers of fish, it must follow, that such a diet is not calculated to restore power to habits debilitated by disease, and should never be directed under such circumstances, but from the conviction that the digestive powers are unable to convert stronger aliment into chyle. The jockeys who *waste themselves* at Newmarket, in order to reduce their weight, are never allowed meat, when fish can be obtained. On account of the low stimulant power of fish, they require the assistance of condiment; and on this account salt appears to be an essential accompaniment.

201. Fish have been arranged under three divisions; viz. *fresh water fish, salt water fish, and shell fish*. But, since the value of these animals as articles of food has an intimate relation to the colour and texture of their muscles, and to their gelatinous or oily qualities, it will be expedient to consider their several varieties, with reference to such conditions. Turbot, cod, whiting, haddock, flounder, and sole, are the least heating of the more nutritive species; and the flakiness of the fish, and its opaque appearance after being cooked, may be considered as true indications of its goodness; for when the muscles remain semi-transparent and bluish, after sufficient boiling, we may reject it as inferior in value, or not in season. When the fish is in high perfection, there is also a layer of white curdy matter, resembling coagulated albumen, interposed

between its flakes. The whiting ("the chicken of the sea") is well adapted for weak stomachs, on account of the little viscosity which it possesses; it is, at the same time, tender, white, and delicate, and conveys sufficient nutriment, with but little stimulus, to the system. The haddock much resembles it, but is firmer in texture. Cod has a more dense fibre than the two former, and contains also more glutinous matter: it is an excellent aliment, but, upon the whole, is not quite so digestible as whiting or haddock. It is generally preferred when large; but such fish are frequently coarse. The haddock is certainly better when it does not exceed a middling size. A process called *crimping* is sometimes adopted, for the purpose of improving cod and some other fish. Sir Anthony Carlisle has investigated the change thus produced; and we are indebted to him for some curious observations upon the subject. Whenever the rigid contractions of death have not taken place, the process may be practised with success. The sea fish, destined for *crimping*, are usually struck on the head when caught, which, it is said, protracts the term of this capability; and the muscles which retain this property longest are those about the head. Many transverse sections of the muscles being made, and the fish immersed in cold water, the contractions called *crimping* take place in about five minutes; but if the mass be large, it often requires thirty minutes to complete the process. It has been found that the muscles subjected to this process have both their absolute weight and specific gravity increased; whence it appears, that the water is absorbed, and condensation produced. It was also observed, that the effect was always greater in proportion to the voraciousness of the fish. The object, therefore, of *crimping*, is to retard the natural stiffening of the muscles, and then, by the sudden application of cold water, to excite it in the greatest possible degree; by which means the fish acquires its natural firmness, and keeps longer. The operation certainly improves the flavour, as well as the digestibility of the fish. Turbot is an excellent article of food; but it is usually rendered difficult of digestion by the quantity of lobster sauce with which it is eaten. Sole is tender, and yet sufficiently firm; it is, therefore, easy of digestion, and affords proper nutriment to delicate stomachs. It is necessary to state, that every part of the same fish is not equally digestible; and it unfortunately happens, that those which are considered the most delicious are, at the same time, the most exceptionable: the pulpy, gelatinous skin of the turbot, and the glutinous parts about the head of the cod, are very apt to disagree with invalids. Salmon may, perhaps, be considered the most nutritive of our fish; but it is heating and oily, and not very digestible: and persons, even with strong stomachs, are frequently under the necessity of taking some stimulant to assist its digestion. The addition of lobster sauce renders it still more unwholesome: the best condiment that can be used is vinegar. As connected with the time of spawning, the season of the year has the most decided influence upon the quality of salmon. It is in the highest perfec-

tion, or *in season*, as it is termed, some time previous to its spawning; the flesh is then firm and delicious: whereas, after this event, it is for some time unfit for food. This circumstance, however, is not sufficient to prevent those who have an opportunity, from catching and eating the fish in that state; and the legislature has accordingly found it necessary to fix the periods at which salmon fishing is lawful. In Ireland, where there is great freedom used in killing salmon, during and after the spawning season, the eating of the fish at such times has been often found to be productive of disease; and Dr. Walker has related a circumstance of the same kind as having occurred in Scotland. Salmon trout is not so rich and oily as the salmon; although, therefore, it is less nutritive, it is, at the same time, less heating and more digestible. Eels are extremely objectionable, on account of the large proportion of oil which they contain. I have witnessed several cases of indigestion and alimentary disturbance from their use. When eaten, they should always be qualified with vinegar. From these observations, the value of fish may be appreciated, and the qualities which entitle them to election easily understood. Firmness of texture, whiteness of muscle, and the absence of oiliness and viscosity, are the circumstances which render them acceptable to weak stomachs.

202. *Shell fish* have been greatly extolled by some physicians, as nutritive and easily digestible articles of food. It will be necessary to examine this question, by the application of those principles which I have endeavoured to establish. Oysters, in my opinion, enjoy a reputation which they do not deserve: when eaten cold, they are frequently distressing to weak stomachs, and require the aid of pepper as a stimulant; and since they are usually swallowed without mastication, the stomach has an additional labour to perform, in order to reduce them into chyme. When cooked, they are still less digestible, on account of the change produced upon their albuminous principle. It is, however, certain, that they are nourishing, and contain a considerable quantity of nutritive matter in a small compass; but this latter circumstance affords another objection to their use. Certain it is, that oysters have occasionally produced injurious effects, which have been attributed to their having lain on coppery beds: but this idea is entirely unfounded, and arose merely from the green colour which they often acquire, the cause of which is now generally understood; it is sometimes an operation of nature, but it is more generally produced by art, by placing them in a situation where there is a great deposit from the sea, consisting of the vegetable germs of marine *confervæ* and *fuci*, and which impart their colour to the oyster. For this object, the Dutch formerly carried oysters from our coasts, and deposited them on their own. Native oysters, transported into the Colchester beds, soon assume a green colour. Where this food has produced a fit of indigestion, it has evidently arisen from the indigestible nature of the oyster, and the state of the individual's stomach at the time; and had such a person indulged to the same amount, in

any equally indigestible aliment, there can be no doubt but that he would have experienced similar effects. Dr. Clarke has related<sup>1</sup> some striking cases of convulsion, which occurred to women after child-birth, in consequence of eating oysters: the same effects might have supervened the ingestion of any food that is not easily digestible; for the stomach of a woman at such a period, in consequence of the irritable state of the nervous system, is easily disturbed in its functions. The oyster casts its spawn, which the dredgers call the *spat*, in the month of May, after which they are sick and unfit for food; but in June and July they begin to mend, and in August they are perfectly well. We therefore see the cause of their going out of season, and discover the origin of the old maxim, that an oyster is never good except when there is an *R* in the month. Lobsters are certainly nutritive; but they are exposed to the same objection, on the ground of indigestibility; and such has been their effect upon certain stomachs, as to have excited a suspicion of their containing some poisonous principle: they have been known to occasion pain in the throat, and, besides eruptions upon the skin, to extend their morbid influence to the production of pain in the stomach, and affection of the joints. As found in the London market, they are generally underboiled, with a view to their better keeping; and in that case they are highly indigestible. The same observations apply to the crab. Shrimps are a species of sea crab, which vary in their colour and size, and are considered easier of digestion than the preceding articles. The muscle is a species of bivalve which is more solid, and equally as indigestible as any animal of the same tribe. The common people consider them as poisonous, and, in eating them, take out a part in which they suppose the poison principally to reside. This is a dark part, which is the heart, and is quite innocuous: the fact, however, is sufficient to prove, that this species of bivalve has been known to kill; but probably not more frequently than any other indigestible substance. Our annals abound with instances of the deleterious properties of melons, cucumbers, &c. and yet no one will contend that any poison, properly so called, resides in such vegetables. The peculiar cutaneous efflorescence which is produced by the imperfect digestion of shell-fish, has been observed to occur more frequently in cases where the fish has been stale or tainted;<sup>2</sup> although it also happens where no such error can be suspected.

<sup>1</sup> Medical Transactions of the College of Physicians, vol. v.

<sup>2</sup> I am inclined to think that, under such circumstances, an *absolute* poison may be occasionally generated. Without this concession, it will be impossible to explain many of the phenomena of fish poison. Dr. Burrows has published a very striking case, in which two youths of the ages of nine and fourteen died, in consequence of eating about a dozen of small muscles, which they had picked from the side of a fishing smack at Gravesend. The muscles were found to have been in a putrid state. In the *Gazette de Santé*, and in the works of Fodere and Behren, similar cases are recorded. Vancouver, in his voyage to the coast of America, relates, that several of his

203. In eating some species of fish, as the pike, it is essential that the small bones should be carefully extracted; the swallowing of them is likely to irritate the alimentary membrane, and instances are recorded in which fistula has been thus produced.

men were ill from eating some muscles which they had collected and roasted for breakfast; in an hour after which, they complained of numbness of the face and extremities, sickness and giddiness. Three were more affected than the others, and one of them died. A question has long since arisen, how far the ingestion of animal matter in a state of putrefaction is liable to affect the health. I am strongly inclined to believe that the muscular fibre does not become poisonous under such circumstances, but I would not extend this remark to the brain and viscera. In *Crantz's History of Greenland*, we read an account of the death of thirty-two persons, at a missionary station, called *Kangek*, shortly after a repast upon the putrid brains of a walrus. Some highly interesting observations have lately been published by Dr. Kerner, of Wurtemberg, respecting the probable existence of a species of animal poison hitherto unknown. He informs us that the smoked sausages, which constitute so favourite a repast in his country, often cause fatal poisoning. The effects of the poison occasionally manifest themselves in the spring, generally in the month of April, in a degree more or less alarming. He states that out of *seventy-six* persons, who became sick from eating such sausages, *thirty-seven* died in a short time, and that several others remained ill for years. Upon these occasions it has been observed that the most virulent sausages were made of liver. M. Cadet, of Paris, analysed all the meat, examined all the vessels in which they had been prepared, and inspected the matters vomited, or found in the stomach after death, without being able to trace the vestige of any known poison; nor was there the slightest evidence, in these cases, of malevolence or negligence. Similar accidents have occurred at different periods in Paris; upon which occasions, the police officers visited the pig dealers, and were perfectly assured that the animals had never been fed with unwholesome food; the use of poison for rats, with which these places abound, was interdicted, and every precaution taken. What, then, asks *M. Cadet*, is this poison found in sausages—is it Prussic acid—is it a new matter? It is evidently not the effect of putrefaction, since it exists in meat perfectly well preserved. To the above queries of M. Cadet, I beg to add one more—may not the skin enclosing the meat have been the part in which the poison resided? It is well known that the bodies of animals who die diseased are capable of communicating fatal diseases to the human species; and experience has shown that such animal poison is particularly energetic in those parts that are commonly called the *offals*, in which term are included the *intestines*. In the history of *fish poison* above alluded to, we have numerous instances of dogs, cats, hogs, and birds, dying from eating these parts, while persons who have partaken of the fish to which those *offals* belonged, remained uninjured. Moreover, to account for the deleterious change of which those parts appear to be occasionally susceptible, it is not in the least necessary to suppose that the animal died in a state of disease. Captain Scoresby, in his account of the "Arctic Regions," states that, although the flesh of the bear is both agreeable and wholesome, the *liver* of that animal is poisonous: sailors who had inadvertently eaten it, were almost always sick after it, and some actually died; while in others, the cuticle has peeled off their bodies. The ancients appear to have entertained a fear with regard to the wholesomeness of the *viscera* of certain animals, and of the fluids which they secrete. Pliny says that the gall of a horse was accounted poison; and therefore at the sacrifices of horses at Rome, it was unlawful for the *Flamen* (Priest) to touch it. Sir B. Brodie lately communicated a fact to me, which, in my opinion, goes far to support the idea I have just stated as to the possible



204. It has been usual to attribute all the cutaneous affections which follow the liberal use of fish as depending upon the sympathy of the skin with the stomach. This, I believe, is, in general, the true explanation, since the effect is merely temporary; and when the process of digestion is finished, it departs. Its departure may even be hastened by the operation of an emetic removing the noxious aliment. At the same time, the fact must not be overlooked, that the oily principle, upon which depends the odour of certain fish, is absorbed from the alimentary canal, and carried into the blood; this is evident from the peculiar flavour of the flesh of certain birds who live upon fish: from the ready access which the hogs in Cornwall have to pilchards, the pork of that county is very commonly deteriorated by a fishy savour. It is also well known, that persons confined for any length of time to a diet of fish, secrete a sweat of a rancid smell. It is not, therefore, improbable, that certain cutaneous diseases may be produced, or at least aggravated, by such diet; and in hot climates this effect may be less questionable. The priests of Egypt may therefore have been prohibited from eating fish upon just principles, in order that the leprosy might be averted; and the great legislator of the Jews was, no doubt, influenced by some such belief, when he framed his celebrated prohibition.<sup>1</sup>

205. It is usual to add various condiments to fish, and many of them are doubtless thus rendered more digestible, by affording a necessary stimulus to the stomach; but rich sauces are ever to be avoided by the valetudinarian. Vinegar and salt, perhaps, form the best additions.

206. The mode of cooking fish is another circumstance of some importance; frying them in lard or oil, is an objectionable process. In general, the process of boiling is best adapted to render them wholesome. Stewed fish, with all the usual additions of glutinous and stimulant materials, are extremely injurious to dyspeptics. The objections which were urged against salted meats apply to salted fish; they are, however, rendered less injurious by a plentiful admixture of potatoes: indeed, this esculent root, with perhaps the exception of parsnip, is the only vegetable that should accompany a meal of any species of fish; and it will be well for the invalid to abstain, upon such occasions, from fruit. Cullen says, that, by way of experiment, he has taken apples after fish; but he always found that his digestion was disturbed by them. Milk may

source of poison in sausages. He says that he has, on several occasions, met with evidence of the acrid and poisonous nature of "*dog's meat*," as sold in the streets of London; which manifested itself by producing ulcerations, of a peculiar and distinct character, on the hands, accompanied with swellings in the axillæ, of the venders. This fact is well worthy of further inquiry, and might even lead to some new and important conclusions respecting the origin of hydrophobia.

<sup>1</sup> Leviticus, xi. 9-12.

be considered as another incompatible aliment ; the most serious diarrhœa has followed such a mixture.

#### BIRDS.

207. There exists a great variety in the qualities of the food which is furnished by this class of animals, with regard to nourishment, stimulus, and digestibility: the whiter meat of domesticated birds, as the wings and breasts of chickens, contains less nutriment, and is less digestible, than that which is furnished by wild birds, as the partridge, &c. ; but the former is, at the same time, less stimulant and heating than the latter. These are the circumstances which are to direct the medical practitioner in his opinion. No general rule for the choice of either species can be established: it must be determined by the particular condition of the patient, and the effect which the aliment is intended to produce. The same observation will apply to the flesh of quadrupeds ; that which is dark coloured and contains a large proportion of fibrin, as venison, &c. is easily disposed of by the stomach, and a large quantity of highly stimulating chyle is produced from it. The whiter meats are, on the contrary, detained longer in the stomach, and furnish a less stimulant chyle. The former, therefore, will be more easily digested by weak persons, while the latter will frequently run into a state of acetous fermentation ; but they may, nevertheless, be preferable on many occasions, inasmuch as they impart less stimulus to the general system. We see, therefore, the folly into which many popular writers have fallen, of stating such or such an article as being wholesome or otherwise ; *the wholesomeness of an aliment must depend upon its fitness to produce the particular effect which the case in question may require.* Van Swieten has justly said, that "to assert a thing to be wholesome, without a knowledge of the condition of the person for whom it is intended, is like a sailor pronouncing the wind to be fair, without knowing to what port the vessel is bound."

#### FARINACEOUS ALIMENTS.

208. We are principally indebted to the industry of man for this valuable addition to our *materia alimentaria*. The vegetables which yield it may be said to owe their nutritive qualities to cultivation. The art of feeding mankind on so small a grain as wheat, says Dr. Darwin, seems to have been discovered in Egypt, by the immortal name of Ceres ; but it is probable, that it has risen to its present advanced state progressively, and is indebted to the labour of many generations for its perfection. The flour of wheat contains three distinct substances ; a *mucilaginous saccharine matter*, *starch*, and a peculiar substance, possessing many of the properties

of animal matter, termed *gluten*. It is to the quantity of this latter ingredient that wheat flour possesses so decided a superiority over that of barley, rye, or oats, for from these latter grains much less gluten can be extracted. It furnishes by far the best ingredient for making that important article of diet, *bread*; although it may also be made of all the various sorts of grain, as well as of chestnuts, of several roots, and of the potato. I shall first describe the nature of wheaten bread, and then compare it with that produced from other substances. The first process for rendering farinaceous seeds esculent, is to grind them into powder, between mill-stones, which Dr. Darwin aptly terms the "artificial teeth of society." The *meal* thus produced is purified from the husk of the seed, or *bran*, by the operation of sifting or *bolting*; and it is then denominated *flour*. This, when mixed with water or milk, undoubtedly possesses the power of nourishing the body; but it will evidently follow, from the observations which have been so frequently made in the progress of this work, that in this raw state it would not be sufficiently digestible: it would clog the stomach, and oppose those actions which are essential to chymification. The application, however, of heat renders the compound more easy to masticate as well as to digest; whence we find, in the earliest history, a reference to some process instituted for the purpose of producing this change, although the discovery of the manufacture of bread, simple as it may appear to us, was probably the work of ages. It has been just stated, that wheaten flour is the best adapted for making bread, that is to say, *loaf* bread; this depends upon the superior quantity of gluten which it contains, and which operates in a manner to be presently explained. The first stage of this process of panification consists in mixing the flour with water, in order to form a paste, the average proportion of which is two parts of the latter to three of the former; but this will necessarily vary with the age and quality of the flour: in general, the older and the better the flour, the greater will be the quantity of water required. This paste may be regarded as merely a viscid and elastic tissue of gluten, the interstices of which are filled with starch, albumen, and sugar. If, then, it be allowed to remain for some time, its ingredients gradually react upon each other, the gluten probably performing an important part; by its action on the sweet principle, a *fermentation* is established, and alcohol, carbonic acid, and lastly, acetic acid, are evolved. If the paste be now baked, it forms a loaf full of *eyes* like our bread, but of a taste so sour and unpleasant that it cannot be eaten. If a portion of this old paste, or *leaven*, as it is called, be mixed with new made paste, the fermentation commences more immediately, a quantity of carbonic acid is given off, but the gluten resists its disengagement, expands like a membrane, and forms a multitude of little cavities, which give lightness and sponginess to the mass. We easily, therefore, perceive why flour, deficient in the tenacity which gluten imparts to it, is incapable of making raised bread, notwithstanding the greatest activity may be given to the ferment-

ative process by artificial additions. Where, however, *leaven* has been employed, the bread will be apt to be sour, in consequence of the great difficulty of so adjusting its proportion, that it shall not, by its excess, impart an unpleasant flavour, nor, by its deficiency, render the bread too compact and heavy. It is for such reasons, that, in this country, we employ *barm*; a ferment which collects on the surface of fermenting beer. It appears that we are indebted to the ancient Gauls for this practice. In Paris it was introduced about the end of the seventeenth century; the faculty of medicine, however, declared it to be prejudicial to health, and it was long before the bakers could convince the public that bread baked with *barm* was superior to that of *leaven*. A great question arose among chemists, as to the nature of this *barm* that could produce such effects, and elaborate analysis were made, and theories deduced from their results; but all these ingenious speculations fell to the ground, when it was found that *barm* dried, and made into balls, would answer every purpose: the bakers imported it in such a form from Picardy and Flanders, and when again moistened, it fermented bread as well as the recent substance. The presence, therefore, of carbonic acid, water, acetic acid, and alcohol, could not be essential, for these ingredients were separated by the process of its preparation. At length it was discovered, that gluten, mixed with a vegetable acid, produced all the desired effects; and such is the nature of *leaven*, and such is the compound to which *barm* is indebted for its value as a panary ferment. After the dough has sufficiently fermented, and is properly raised, it is put into the oven previously heated, and allowed to remain till it is baked. The mean heat, as ascertained by Mr. Tillet, is 448°. When the bread is removed, it will be found to have lost about one fifth of its weight, owing to the evaporation of water; but this proportion will be varied by the occurrence of numerous circumstances, which it is not easy to appreciate. Newly baked bread has a peculiar odour as well as taste, which are lost by keeping: this shows, that some peculiar substance must have been formed during the operation, the nature of which is not understood. Bread differs very completely from the flour of which it is made, for none of the ingredients of the latter can be discovered in it; it is much more miscible with water than dough; and on this circumstance its good qualities, most probably, in a great measure depend. It is not easy to explain the chemical changes which have taken place. It appears certain, that a quantity of water, or its elements, is consolidated and combined with the flour; the gluten, too, would seem to form a union with the starch and water, and thus to give rise to a compound, upon which the nutritive qualities of bread depend.<sup>1</sup>

<sup>1</sup> The late novel researches of M. Raspail, with regard to the true nature of *fecula*, have thrown a new light upon this subject. The proximate principle, *fecula*, has been generally described as composed of small grains of a white crystalline appearance, insoluble in cold, but combining easily with boiling water, forming a *hydrate* which is known by the name of *starch*.

209. *Unleavened* bread consists of a mixture of meal and water, formed into a firm and tough cake, made as thin as possible, to favour its drying, and sometimes with the addition of butter, to render it more soluble, friable, and porous; but it renders it sourer, and more apt to produce acidity on the stomach. Of the unleavened sorts of bread, biscuit is by far the best; and in all cases where leavened or fermented bread does not agree, its use cannot be too strongly advocated. I shall have occasion, hereafter, to relate cases in which the use of common bread did not agree, and in which acidity of the stomach was cured by the substitution of biscuit.

210. The different sorts of bread to be met with in this country may be considered under three classes: viz. *white*, *wheaten*, and *household*. In the first, all the *bran* is separated; in the second, only the coarser; in the third, none at all: so that *fine bread* is made only of flour, *wheaten* bread of flour and a mixture of the finer bran, and *household* of the whole substance of the grain, without taking out either the coarse bran or fine flour. It is necessary for the medical practitioner to understand these distinctions; for it will be proved that an important dietetic fact is connected with them. The tendency of starch upon the bowels is astringent. Bread, therefore, which is made of the whitest flour, is apt to render them costive; but this is counteracted by the presence of *bran*, the scales of which appear to exert a mechanical action upon the intestines, and thus to excite them into action. I have already stated, in the Pharmacologia, that there are many bodies which have the power of thus acting upon the inner coats of the intestinal canal, and of increasing its peristaltic motion; and it is not improbable, that the harsh and coarse texture which certain grasses assume in moist situations may be a wise provision in nature to furnish an increased stimulus to the intestines of the animals who are destined to feed upon them, at a time when their diminished nutritive qualities may render such an effect salutary. The practical application of such views is obvious; and experience has sanctioned the propriety of the practice that may be founded upon them. By changing the

M. Raspail, however, by a microscopic examination of these grains, and by numerous experiments conducted with great care, has very satisfactorily shown that these grains are "*organic vesicles*," consisting of an investing membrane filled with gummy matter. When put into water, heated to 122°, this membrane, which is impervious to cold water, expands; in boiling water it bursts, and then its contents dissolve in the water. So that fecula is not actually nutritive to man until it has been boiled, for the heat of the stomach is not sufficient to burst all the grains of the feculent mass which is subjected to the rapid action of this organ. *Panification*, therefore, must be regarded as a process, the object of which is to burst all the grains of fecula. The finest and best baked bread is that which is made of farina abounding in gluten; for this latter body, rising in large blisters by the dilatation of the gases imprisoned within it, allows each feculent grain to participate in the communication of the heat, and to burst as it would by boiling. Hence, after panification, if the paste has been well kneaded, we do not find a single grain of fecula entire.—*Raspail's Organic Chemistry*, by W. Henderson, M. D.

quality of the bread, I have frequently succeeded in regulating the alvine discharges.

211. The French have many varieties of bread, in which eggs, milk, and butter, enter as ingredients. They are also in the habit of adding ammonia to the dough; which, during its evaporation in the oven, raises it, and thus adds to its sponginess.

212. *Barley bread* has a sweetish but not unpleasant taste; it is, however, rather viscid, and is less nutritive, as well as less digestible, than wheaten bread. It is common to mix peas-meal with the barley, which certainly improves the bread. *Rye bread* is of a dark-brown colour, and is apt to lie heavy on the stomach; it is also liable to create acescency and purging: but it appears to be highly nutritive. In some of the interior counties of England, where their bread is often manufactured from oatmeal, there is a mode of preparing the meal by making it sour; the bread, instead of being hard, is thus rendered of a soft texture, and from its moderate acidity is wholesome to strong persons: but invalids should, if possible, avoid it. In bread, however, this grain is more usually in an unfermented state, or it is made into flat, thin cakes, which are baked or roasted. The *bannock*, *clap-bread*, *bitchiness-bread*, and *riddle-cakes*, are the names which such productions have received. The *jannock* is oaten bread made into loaves. It is evident, from the health and vigour of the people who use this grain as a principal article of diet, that it must be very nutritive; but the stomach will require some discipline before it can digest it. In those unaccustomed to such food, it produces heartburn; and it is said to occasion, even in those with whom it agrees, cutaneous affections. In times of scarcity, potatoes have been made into bread; but they contain too much mucilage in proportion to their starch to afford a good article: the bread thus produced is heavy, and apt to crumble into powder; but such effects are obviated by mixing a certain quantity of wheat-flour with the potatoes. Rice will also serve the purpose of making very good bread: but, like the potato, it requires the addition of some flour. It is said by some, that bread, made of different kinds of grain, is more wholesome than that made of only one sort, as their qualities serve to correct one another. This is certainly the case with that which is commonly called *brown bread*, and which is made of a mixture of wheat and rye flour; the former, being of a more starchy nature, is apt to produce costiveness, while the latter often proves too laxative: a due proportion of each, therefore, must furnish a desirable compound.

213. The importance of bread, as an article of diet, will be easily deduced from the principles upon which the digestion of food in the stomach has been already explained. In addition to its nutritive qualities, it performs a mechanical duty of some importance. It serves to divide the food, and to impart a suitable bulk and consistence to it; it is therefore more necessary to conjoin it with articles containing much aliment in a small space, than where the food is both bulky and nutritive. The concentrated cookery of the French

is rendered much more wholesome from the large quantity of bread which that people use at their meals. I know from personal experience how greatly this habit can correct the evil which arises from rich soups and ragouts. If I eat a rich soup, without a considerable quantity of stale bread, I inevitably suffer from heartburn; but it never offends my stomach when taken with such precaution. Bread should never be eaten new; in such a state it swells, like a sponge, in the stomach, and proves very indigestible. Care should also be taken to obtain bread that has been duly baked. Unless all its parts are intimately mixed, and the fixed air expelled, it will be apt, in very small quantities, to produce acescency and indigestion. After stating the advantages of bread, it is necessary to make a few observations upon the evils which it may occasionally produce: in certain diseases it evidently produces a tendency to acidity; we have daily instances of this fact in children, in whom acidity and much alimentary disturbance follow its use. In early life it is scarcely admissible, on account of the flatulence and costiveness which it produces; and even at a more advanced period it gives children a pale countenance, and breeds worms. Shebbeare goes so far as to say, that the rickets are so common in France only because the quantity of bread given to children is excessive; which, by its acidity, destroys the calcareous substance of the bones, and reduces them to a state of cartilage. This is mere idle speculation, which is in direct variance with the received opinions upon the subject. Where acidity occurs, the bread should be toasted, or well-prepared biscuit substituted. I shall have occasion to state, in a subsequent part of this work, that striking changes in the urinary deposits may be produced by suspending the use of bread, and giving biscuit in its place.

214. Bread has also been charged with producing evil consequences, from the presence of noxious principles, either naturally or artificially introduced into it. It will be necessary to direct some attention to these points. The presence of a peculiar poisonous principle, termed *ergot*, or *spurred rye*, has frequently proved a source of extensive disease: but as this subject has been ably treated in the various works on Toxicology, it will not be necessary to enter into its history on this occasion. Much has been said and written upon the subject of the adulteration of bread; but I am inclined to believe, that the evils arising from such a practice have been greatly exaggerated. It is certain, that the inferior kinds of flour will not make bread of sufficient whiteness to please the eye of the fastidious citizen, without the addition of a proportion of alum. It has been also found, that unless this salt be introduced into the flour, the loaves stick together in the oven, and will not afterwards separate from each other with that smooth surface which distinguishes the loaf of the baker. This circumstance is probably owing to the action of the alum upon the mucilage of the flour, which it coagulates. It has been said, that the smallest quantity that can be employed for these purposes is from three to four ounces to two hun-

dred and forty pounds of flour. It cannot be denied, that the introduction of a portion of alum into the human stomach, however small, may be prejudicial to the exercise of its functions, and particularly to dyspeptic invalids. It was found by Mr. E. Davy, of Cork, that bad flour may be made into tolerable bread by adding, to each pound, from twenty to forty grains of the common carbonate of magnesia. The operation of this substance in rendering the bread lighter has not been satisfactorily explained; but from my own experience of its effects, I apprehend that it neutralises an acid which is produced during the fermentation of inferior flour, and, becoming itself decomposed by the same action, gives out carbonic acid, and thus contributes to the sponginess of the loaf. The addition of salt greatly improves the digestibility of the bread, for reasons which have been already considered.

215. Besides bread, several other preparations are made by the solidification of flour, such as pudding, pancake, &c. The most digestible pudding is that made with bread, or biscuit and boiled flour: *batter* pudding is not so easily digested; and *suet* pudding is to be considered as the most mischievous to invalids in the whole catalogue. *Pancake* is objectionable, on account of the process of frying imparting a greasiness to which the dyspeptic stomach is not often reconciled. All pastry is an abomination: I verily believe, that one half, at least, of the cases of indigestion which occur after dinner-parties may be traced to this cause.

216. Many persons entertain a strange prejudice in favour of *pudding*, and appear as if they considered it to possess a balsamic virtue, or some property by which the digestion of other aliment is expedited. If ever such a diet has served the valetudinarian, it must have been by excluding less stimulant food, and not by any virtue inherent in the *pudding* itself. This opinion is well illustrated by the case of the Billericay Miller, whose history must be well known to many of my readers: 'this person, by reducing the quantity of his daily food, until at length he took nothing more than a pudding made of sea biscuit, was, to use his own expression, "metamorphosed from a monster to a person of a moderate size; from the condition of an unhealthy, decrepit, old man, to perfect health, and to the vigour and activity of youth." Mr. Wadd, in his work on corpulence, has introduced a very pleasant story, which will serve to complete the illustration of our subject. A gentleman, says he, who was fond of good living, and found himself becoming too corpulent, having heard of the salutary effects of the miller's regimen, ordered his cook to prepare the "miller's pudding," which he ate with great regularity every day, *after his usual dinner*. From the above anecdote the sagacious reader will deduce far more than is expressed. Plutarch, in his life of Lyncurgus, tells us that one of the kings of Pontus having heard great praises of the *black broth of Sparta*, hired a cook from that city. But when he came to



taste this celebrated dish, he called immediately for his cook, and warmly reproached him for the imposition. "Sir," replied the cook, "to make this broth relish well, a man must bathe himself in the river Eurotas."<sup>1</sup>—But to return from this digression.

217. Amongst the farinaceous aliments, the *potato* holds a distinguished rank; but its digestibility greatly depends upon its kind, and the nature of the cookery to which it is subjected. That species which is known by the name of *waxy* potato should be shunned by the dyspeptic, for it is so indigestible as to pass through the intestines in an unaltered state. The same objection applies to the young, or new potato. The mealy kind more readily yields to the powers of the stomach, and affords a healthy nutriment; in some respects it supplies the place of bread, and should therefore be eaten with freedom whenever our food is concentrated. To the dyspeptic, however, I have generally found this vegetable to be injurious; if ever allowed to such patients, it is worthy of remark that *roasting* is preferable to every other form of cookery. The process of *mashing* certainly does not contribute to their digestibility: by such an operation they escape being so intimately mixed with the saliva; and when they are impregnated with the fat of roast meat, they should be studiously avoided. If boiled, care should be taken that they are not over-done; for in such a case, they are deprived of their nutritious qualities. Under any circumstances, they are apt to accumulate in the colon, and to form indigestible masses in that part of the canal.

218. *Rice* is the general aliment of the people of the east, with whom it answers the same purposes as bread does with us. As it is not much disposed either to acescency or fermentation in the stomach, it furnishes a wholesome aliment when mixed with other food; but, if taken in large quantities by itself, from its low degree of stimulant properties, it is apt to remain for a length of time in the stomach: this effect is greatly increased by protracted boiling. Where the stomach is in a state of relaxation and debility, it ought not to be taken without condiment: it is, for this reason, found necessary in the warmer climates to conjoin it with a considerable quantity of warm spices. There formerly existed a prejudice against its use, from a belief that it had a tendency to produce blindness. It is scarcely necessary to state, that such an idea has no foundation in truth. It is generally considered as astringent, and is, therefore, a popular remedy for diarrhœa; no astringent principle, however, has yet been discovered in its composition, and it is probable that it owes its virtues, on such occasions, to the mild and bland mucilage with which it abounds, shielding the intestines from acrimonious humours.

219. There are various other aliments in domestic use, which owe their qualities to starch, such as *sago*, *tapioca*, *arrow root*, &c.

<sup>1</sup> A river of Laconia, running by SPARTA, so that "to bathe in Eurotas," signified to imitate the discipline and temperance of the Lacedæmonians.

From the mucilaginous form in which they are usually administered to invalids, they are not so digestible as is generally supposed ; but where the stomach rejects more substantial viands, they are useful in themselves, as well as proper vehicles for the administration of vinous stimulants.

220. The leguminous productions, or *pulses*, may be considered as constituting the second division of farinaceous aliment. They differ little from grains, except in affording a more unctuous flour, which forms a milky solution with water, owing to the presence of an oily matter. Although they are highly nutritive, they are certainly more indigestible than seeds, and the bread they afford is apt to occasion flatulence, and to lie heavy on the stomach. The use, therefore, of this species of food is more circumscribed than that of the farinaceous seeds ; it is principally confined to the lower classes, and to those possessing strong powers of digestion. In dyspeptic habits they ought on no account to be allowed ; the symptoms of uneasiness which they produce in such persons is often alarming : flatulence and colic are the common consequences of their action. It has been said with some truth, that nature herself would seem to point out the necessity of mixing such food with other grains, for the soil becomes exhausted, unless it is alternately sown with grains and pulses ; whereas, by such an alteration, the ground is preserved in a condition to afford a constant supply of nutriment. Pulses are employed in two very different states : in an early stage of their growth, when they are succulent : and when all their parts have reached maturity : in the former condition they are frequently acceptable to the stomach ; but in the latter, they are only calculated for those who have strong digestive powers.

221. *Peas* form a wholesome and light food, when green and young, but when full grown and dry, they are very indigestible : in this latter state they contribute, in a remarkable degree, to the generation of gas in the intestines. In the form of pudding they are, if possible, still more objectionable ; for, in addition to the bad qualities which depend upon their composition, are thus added those which arise from tenacity of texture. *Beans*, like peas, are comparatively wholesome in their immature state. The *kidney-bean*, being eaten with its cod, is not so flatulent as other pulse : when well boiled, it is easy of digestion, but not very nutritive.

222. *Nuts* are generally supposed to have constituted the earliest food of mankind ; and they still furnish, in some countries, a considerable source of food. In this country they are principally known as an article of the dessert, although on some occasions they are eaten with our food ; they constitute a favourite accompaniment with turkey ; and I allude to this circumstance in order to guard dyspeptics against their use. I was lately desired to see a person who, after such a repast, was seized with violent pain in the region of the duodenum, accompanied with distressing retching ; I instantly suspected the cause, and the appearance of the stools which were produced confirmed my supposition. The chestnuts had swelled in

the intestines, and produced an obstruction, probably at that part of the duodenum where it makes its exit through the ring of the mesentery; or they might have lodged in the stomach, and produced an irritation upon the pylorus. With regard to composition, the chestnut may perhaps be considered as more nearly allied to the pulse than to the nut tribe, since it affords no oil by expression, and from its farinaceous qualities it may even be made into bread, although it is heavy and indigestible. Its nutritive power must be considerable, since it forms the chief food of the lower orders in the plains of Lombardy; and it has been conjectured, that it was the *acorn* so frequently mentioned in ancient history and tradition. When eaten after dinner, an indulgence which can only be conceded to the most robust, it ought to be previously roasted; its digestibility is also increased by being kept for some time after it has been gathered. It is at the same time thus rendered more palatable, by the greater evolution of its saccharine principle.

223. The evils which may arise from the use of the chestnut are still more likely to occur after the ingestion of nuts, for they are more oily, as well as more viscid and glutinous: when eaten, they should always be accompanied with salt; but it would be wise to banish them entirely from our tables. It is much easier, as Dr. Johnson has said, to be abstinent than temperate; an aphorism which applies with peculiar force on this occasion: for there is a fascination in nuts which will lead most persons, who once begin to eat them, to take a quantity which the best-disposed stomach cannot bear with impunity. Hoffman observes, that dysenteric complaints are always more common in those years in which the harvest of nuts is plentiful; and there is not a physician in any practice who will be inclined to doubt his statement.

#### ESCULENT ROOTS.

224. These are of two kinds; those used as food, and those which principally answer the purposes of condiment or seasoning. Under the first division may be classed *turnips, carrots, parsnips, Jerusalem artichokes, radishes, &c.*; many of which, it will be seen, are seldom used solely for aliment, but are rather brought to our tables to qualify our animal food. Under the second division may be arranged *onions, garlic, horse-radish, &c.* It will be necessary to offer a few observations upon the qualities of these several roots.

225. The *carrot*, from the quantity of saccharine matter which it contains, is very nutritive, and slightly laxative; but it also possesses a large proportion of fibrous matter, which in some stomachs prevents the digestion of the root, and it passes through the bowels with but little change: to obviate this effect, it ought to be very thoroughly boiled, and it should be eaten when young. It appears to have been introduced by the Flemings, in the reign of Elizabeth.

The *turnip* is a very excellent vegetable, and, although it has the character of being flatulent, is less liable to disagree with the stomach than the carrot; it ought, however, to be well boiled, and the watery part separated by pressure. Lord Townshend, secretary to Charles I., was the person who introduced its use into England; but it appears that the ancient Romans, in the best period of their republic, lived much upon this root. The *parsnip* is nutritive and digestible, although many persons dislike it on account of its sweet flavour. The *Jerusalem artichoke*<sup>1</sup> is agreeable, but watery and flatulent; it ought, therefore, never to be eaten without a proper accompaniment of salt and pepper. *Radishes*. All the varieties of which have a pungent and acrid taste, in consequence of a peculiar stimulating matter, which resides in the cortical part of the root. They may be said to contain little else than water, woody fibre, and acrid matter, and cannot, therefore, be very nutritive; they may act as a stimulant and thus prove useful, but they ought never to be eaten when old, as the quantity of inert matter in such a condition is apt to disagree with the stomach. From the consideration of radishes we pass, by an easy transition, to that of onions, &c., for they appear to form the connecting link between alimentary roots and those used principally as condiment. The *onion*, however, although classed under this latter division, and must be considered as valuable on account of its stimulating matter, certainly contains a considerable proportion of nourishment. This appears evident in its boiled state, by which process its acrimony is exhaled, and a sweet mucilage separated. Sir John Sinclair says, that it is a well-known fact, that a Highlander, with a few raw onions in his pocket, and a crust of bread, or some oat-cake, can travel almost to an incredible extent, for two or three days together, without any other sort of food. The French are fully aware of the quantity of nourishment this plant affords; hence the soup à l'oignon is considered by them as the best of all restoratives. As a stimulant to the stomach and bowels, the onion, in a raw state, is certainly of value, and this is much enhanced by its diuretic qualities. The leek, garlick, shallot, are of the same species, and possess qualities of the same nature. *Horse-radish*<sup>2</sup> is a warm and pungent root, and is highly valuable to the dyspeptic as a stimulant; it is, perhaps, the best of all condiments for the prevention of flatulence.

<sup>1</sup> The reader is aware, that this root of a species of sun-flower has no botanical relation with the artichoke properly so called; its name is a curious specimen of verbal corruption. The word *Jerusalem* is a corruption of *Gira-sole*, Turn-sun, or Heliotrope. It acquires the title of artichoke from its supposed resemblance in flavour to that vegetable.

<sup>2</sup> The epithet *horse* is a Grecism: ἵππος and βου, i. e. horse and bull, when prefixed to any word, were used to express its comparative greatness. We have thus, *horse-radish*, or the *greater radish*; *horse-mint*; *bull-rush*, &c. The great dock is called *hippo-lapathum*, and the horse of Alexander, from the size of its head, *Bucephalus*.

## ESCULENT HERBS.

226. In this class are arranged the leaves and stalks of such vegetables as are eaten at table in the form of "greens and salads." Some ancient nations, we are told, were accustomed to range over fields and woods in search of food, devouring, like animals, any wild herb they could find likely to satisfy their hunger :

"Quæ sol atque imbres dederant, quod terra creârat  
Sponte suâ, satis id placabat pectora donum."

*Lucret. lib. v.*

Some herbs are still eaten in a raw state ; but they are far less digestible than when cooked. During the heats of summer they are refreshing, and are well calculated to assuage that febrile state which full meals of animal food are known to occasion. Of all these herbs, the *water-cress* is the most beneficial ; for, by operating in some degree as an aromatic, it promotes digestion, and corrects that tendency to flatulency which other raw vegetables are apt to produce. According to Xenophon, the ancient Persians lived upon water-cresses, which they considered the most wholesome of vegetable productions.<sup>1</sup> The *lettuce* is generally eaten with other herbs, in the form of a salad, dressed with oil and vinegar. Some difference of opinion has arisen with respect to the propriety of such additions. Gosse, of Geneva, found that vinegar retarded its solution in the stomach ; and oil has been stated by others to render it less digestible. I have generally found such condiments useful, and that dressed lettuce is less likely to ferment in the stomach than that which is eaten without them. Oil is known to have such an effect in checking fermentation, and the vinegar is not found to promote it. The lettuce contains a narcotic principle ;<sup>2</sup> and the effect of this is, in a great measure, obviated by a vegetable acid. Those persons, therefore, who eat lettuce with a view to obtain such effects, ought to take it without vinegar. Whatever difference of opinion may exist with regard to lettuce, there is none with regard to celery, the digestibility of which is greatly increased by maceration in vinegar. *Cucumbers* are by far the most unwholesome of all raw vegetables, and should be avoided as poison by dyspeptics.

227. The vegetables which require to be boiled are the different species and varieties of *colewort* ; the value of which does not depend so much upon their nutritive quality as the tenderness of their texture. On this account, the cauliflower and brocoli are the

<sup>1</sup> The island of St. Helena abounds with them, and I am informed that crews arriving there when suffering with scurvy, almost immediately experience relief from their use.

<sup>2</sup> We are told that Galen, in the decline of life, suffered much from morbid vigilance, until he had recourse to eating a lettuce every evening, which cured him.

species to be preferred, particularly the younger sprigs of the former. Of the kinds where the leaves only are employed, the Savoy is of a sweeter and more tender texture than the others, particularly its central and upper leaves. The cabbage tribe appear to contain a peculiar essential oil, whence the unpleasant odour of cabbage water; this matter is liable to produce offensive effects on the stomach. The vegetable should therefore be boiled in two successive waters, in order to free it entirely from the noxious ingredient, and at the same time to render its texture soft and digestible. *Asparagus* is quickly dissolved in the stomach, and, when sufficiently boiled, is not disposed to create flatulence or acidity: along with its mucilage it frequently contains some sweetness, which affords a proof of its nutritive quality. From the peculiar odour which it imparts to the urine of those who eat it, it appears to possess some active matter distinct from its mucilage; and it is generally considered diuretic. I have, however, prepared a strong infusion, as well as extract, from it, in order to ascertain this point, and I have not been able to discover any diuretic effects from its administration in large doses. *Asparagus* is only wholesome when in an intermediate state, between root and plant. When older than this, it is remarkably acrid.

#### FRUITS.

228. These are generally regarded as articles rather of luxury than of food; and were we to form our opinion of their value from their abuse, we should certainly be rather disposed to class them under the head of poisons than of aliments. Nothing can be more mischievous to the invalid than large quantities of apples, pears, and plums, in the form of dessert, after the stomach has been already loaded, and its good-nature taxed to the utmost by its epicurean master. But, when taken under other circumstances, they contribute to health, and appear to be providentially sent at a season when the body requires that cooling and antiseptic aliment which they are so well calculated to afford. It is not my intention to enter into a minute history of the several kinds; but it will be useful to take a general view of the qualities which distinguish each division, and to state the circumstances which render them useful or objectionable.

229. Fruits may be arranged under the following heads: stone fruits, the apple species, small-seeded fruits, small berries, and farinaceous fruits.

230. The stone fruits have been denounced as the least digestible species by popular acclamation, and I am inclined to acquiesce in the truth of the assertion as a general proposition; but much of the mischief that has been attributed to their use has arisen from the unripe state in which they were eaten. They are, however, certainly less digestible than other species, and more liable to undergo

fermentation in the stomach. The hard pulp of certain plums remains also in the alimentary canal for a long time, and is frequently passed without having been materially changed. The ripe peach is the most delicious, as well as one of the most digestible of the stone fruits: the apricot is equally wholesome; but the nectarine is liable to disagree with some stomachs. Cherries are far less digestible: their pulpy texture and skins are not easily disposed of by the stomach; and as the sweetest species contain a considerable excess of acid, they may be objectionable in some cases, and desirable in others. The apple species is not so dilute and watery as the foregoing fruits, and is less apt to pass into a state of noxious fermentation; but its texture is firmer, and on that account it is retained longer in the stomach, and often proves indigestible. The same observations apply to pears, except that, their texture being in general less firm, they are less objectionable. The orange, when perfectly ripe, may be allowed to the most fastidious dyspeptic: but the white, or inner skin, should be scrupulously rejected, for it is not more digestible than leather. The small-seeded fruits are, by far, the most wholesome. Of these, the ripe strawberry and raspberry deserve the first rank. The grape is also cooling and antiseptic, but the husks and seeds should be rejected. The gooseberry is less wholesome, on account of the indigestibility of the skin, which is too frequently swallowed. The fruits to be classed under the head of small berries, are the cranberry, the bilberry, and the red whortleberry. These are seldom eaten, except when baked, and in that state their acescency seldom proves injurious. The farinaceous fruits are universally unwholesome. The melon, which is the principal one, is very apt to disagree with weak stomachs, and should never be eaten after dinner, even by persons in health, without a plentiful supply of salt and pepper.

231. The most proper periods for indulgence in fruit appear to be the morning and evening. On some occasions it may be taken with advantage at breakfast, or three hours before dinner, and it affords a light and agreeable repast if taken an hour before bed-time; but these regulations are to be influenced by circumstances which no general rule can possibly embrace.

232. By cookery, fruit, otherwise unwholesome, may be converted into a safe and useful aliment. Apples, when baked, afford a pleasant repast; and from their laxative properties are well adapted to certain cases of dyspepsia. Fruit pies, if the pastry be entirely rejected, may be considered valuable articles of diet. Dried fruits are by no means so useful or safe as is generally imagined; the quantity of sugar which enters into their composition disposes them to fermentation.

233. Having offered some general rules with respect to the circumstances which render food salutary or noxious, and illustrated these principles by an examination of the several classes and species of aliments, it remains for me to say a few words upon the subject of their intermixture. I have already, in the introduction of this

work (6,) alluded to the mischief which arises from the too-prevailing fashion of introducing at our meals an almost indefinite succession of incompatible dishes. The stomach being distended with soup, the digestion of which, from the very nature of the operations which are necessary for its completion (84,) would in itself be a sufficient labour for that organ, is next tempted with fish, rendered indigestible from its sauces; then with flesh and fowl; the vegetable world, as an intelligent reviewer<sup>1</sup> has observed, is ransacked from the *cryptogamia* upwards; and to this miscellaneous aggregate are added the pernicious pasticcios of the pastry-cook, and the complex combinations of the confectioner. All these evils, and many more, have those who move in the ordinary society of the present day to contend with. It is not to one or two good dishes, even abundantly indulged in, but to the overloading the stomach, that such strong objections are to be urged; nine persons in ten eat as much soup and fish as would amply suffice for a meal, and, as far as soup and fish are concerned, would rise from the table, not only satisfied, but saturated. A new stimulus appears in the form of stewed beef, or *côtelettes à la suprême*: then comes a Bayonne or Westphalia ham, or a pickled tongue, or some analogous salted, but proportionately indigestible, dish, and of each of these enough for a single meal. But this is not all; game follows; and to this again succeed the sweets, and a quantity of cheese. The whole is crowned with a variety of flatulent fruits and indigestible knick-nacks, included under the name of dessert, in which we must not forget to notice a mountain of sponge cake.<sup>2</sup> Thus, then, it is, that the stomach is made to receive, not one full meal, but a succession of meals rapidly following each other, and vying in their miscellaneous and pernicious nature with the ingredients of Macbeth's cauldron. Need the philosopher, then, any longer wonder at the increasing number and severity of dyspeptic complaints, with their long train of maladies, amongst the higher classes of society? "*Innumerabiles morbos non miraberis, coquos numera.*" But it may be said, that this is a mere tirade against quantity; against over distention of the stomach; that it argues nothing against variety of food, provided the sum of all the dishes does not exceed that which might be taken of any single one. Without availing myself of the argument so usually applied against plurality of food, that "it induces us to eat too much," I will meet the question upon

<sup>1</sup> See the review of my Pharmacologia, in the Journal of Science and the Arts, No. xxvii.

<sup>2</sup> The custom of introducing cake after a rich entertainment is very ancient; but the cakes or "*mustacea*" of the Romans were very different compositions. They consisted of meal, aniseed, cummin, and several other aromatics: their object was to remove or prevent the indigestion which might occur after a feast. A cake was, therefore, constantly introduced, for such a purpose, after a marriage entertainment; and hence the origin of the "Bride Cake," which in modern times is an excellent invention for *producing*, instead of *curing*, indigestion.



fair grounds. It is evident that the different varieties of food require very different exertions of the stomach for their digestion ; it may be that the gastric juice varies in composition, according to the specific nature of the stimulus which excites the vessels to secrete it ; but of this we are uncertain, nor is it essential to the argument : it is sufficient to know, that one species of food is passed into the duodenum in a chymified state in half the time which is required to effect the same change in another. Where, then, the stomach is charged with contents which do not harmonise with each other in this respect, we shall have the several parts of the mixed mass at the same time in different stages of digestion : one part will therefore be retained beyond the period destined for its expulsion, while another will be hurried forward before its change has been sufficiently completed. It is, then, highly expedient, particularly for those with weak stomachs, *to eat but one species of food*, so that it may be all digested and expelled at nearly the same period of time ; that when the duodenal digestion has been fully established, the operation of the stomach shall have ceased.

## OF DRINKS.

234. *Water* is unquestionably the natural beverage of man ; but any objection to the use of other beverages, founded on their artificial origin, I should at once repel by the same argument which has been adduced in defence of cookery, that we are to consider man as he is, not as he might have been, had he never forsaken the rude path of nature. I am willing to confess, that "the more simply life is supported, and the less stimulus we use, the better ; and that he is happy who considers water the best drink, and salt the best sauce : " but how rarely does a physician find a patient who has regulated his life by such a maxim : He is generally called upon to reform stomachs, already vitiated by bad habits, and which cannot, without much discipline, be reconciled to simple and healthy aliment. Under such circumstances, nothing can be more injudicious than abruptly to withdraw the accustomed stimuli, unless it can be shown that they are absolutely injurious—a question which it will be my duty to investigate hereafter.

235. The qualities of water differ essentially, according to the source from which it has been obtained ; and those accustomed to this beverage are sensible of differences which wholly escape the observation of less experienced judges. How far the existence of foreign matter injures its salubrity, has been a subject of much controversy : the truth, perhaps, lies between the extremes ; those who insist upon the necessity of distillation for its purification, and those who consider every description of water as alike salubrious, are, in my opinion, equally remote from truth. That the presence of very minute quantities of earthy matter can become a source of disease, appears absurd ; while it would be highly dangerous to deny the

morbid tendency of water that holds putrescent animal or vegetable matter in solution, or which abounds in mineral impregnation.

236. The usual varieties of common water were classed and defined by Celsus, and modern chemists have not found any reason to reject the arrangement—" *Aqua levissima pluvialis est; dein fontana, tum ex flumine, tum ex puteo; posthæc ex nive aut glacie, gravior his ex lacu; gravissima ex palude.*"

1. *Rain water*, when collected in the open fields, is certainly the purest natural water, being produced, as it were, by a natural distillation. When, however, it is collected near large towns, it derives some impregnation from the smoky and contaminated atmosphere through which it falls: and, if allowed to come in contact with the houses, will be found to contain calcareous matter; in which case it ought never to be used without being previously boiled and strained. Hippocrates gave this advice; and M. Margraaf, of Berlin, has shown the wisdom of the precaution, by a satisfactory series of experiments.

2. *Spring water*, in addition to the substances detected in rain water, generally contains a small portion of muriate of soda, and frequently other salts: but the larger springs are purer than the smaller ones; and those which occur in primitive countries, and in siliceous rocks, or beds of gravel, necessarily contain the least impregnation. An important practical distinction has been founded upon the fact, that the water of some springs dissolves soap, while that of others decomposes and curdles it: the former has been termed *soft*, the latter *hard*, water. Soft water is a more powerful solvent of all vegetable matters, and is consequently to be preferred for domestic as well as medicinal purposes. The brewer knows well, from experience, how much more readily and copiously *soft* water will dissolve the extractive matter of his malt; and the housewife does not require to be told, that *hard* water is incapable of making good tea. Sulphate of lime is the salt which generally imparts the quality of hardness to water; and it has been said that its presence will sometimes occasion an uneasy sense of weight in a weak stomach. The quantity of this salt varies considerably; but, in general, it appears that the proportion of five grains in a pint of water will constitute *hardness*, unfit for washing with soap, and for many other purposes of domestic use. Animals appear to be more sensible of the impurities of water than man. Horses, by an instinctive sagacity, always prefer soft water; and when, by necessity or inattention, they are confined to the use of that which is *hard*, their coats become rough and ill-conditioned, and they are frequently attacked with the gripes. Pigeons are also known to refuse hard, after they have been accustomed to soft water.<sup>1</sup>

<sup>1</sup> Hard water has certainly a tendency to produce disease in the spleen of certain animals, especially in sheep. This is the case on the eastern side of the island of Minorca, as we are informed by Cleghorn.

3. *River water.* This, being derived from the conflux of numerous springs with rain water, unless in the immediate vicinity of a large town, generally possesses considerable purity; that the proportion of its saline contents should be small, is easily explained by the precipitation which must necessarily take place from the union of different solutions: it is, however, liable to hold in suspension particles of earthy matter, which impair its transparency, and sometimes its salubrity; it may also, in the neighbourhood of a city, hold dissolved, as well as suspended, a considerable proportion of animal and vegetable matter: this is unquestionably the case in the water supplied from the Thames by the Grand Junction Water Company; the discovery of the polluted source from whence this water flows into our houses, has lately filled the inhabitants with just alarm.<sup>1</sup> There exists a popular belief, that the water of the Thames is peculiarly adapted for the brewery of porter; it is only necessary to observe, that such water *is never* used in the London breweries. The vapid taste of river, when compared with spring water, depends upon the loss of carbonic acid, from its long exposure. It is well known that Thames water, by rest, undergoes a species of fermentation, and becomes free from organic matter, but Dr. Bostock has shown that by the same process the saline contents are increased fourfold: the greatest proportionate increase being in the *murates*, which are nearly twelve times more in the purified than in the ordinary state of the Thames water; the *carbonate of lime* is between two or three times as abundant as before, and the *sulphate of lime* between five and six times. So that the process of spontaneous depuration actually converts a *soft* into a *hard* water. The source of these saline matters would appear to be the animal substances so copiously deposited in the Thames.

4. *Well water* is essentially the same as spring water, being derived from the same source; it is, however, more liable to impurity from its stagnation, or slow infiltration:<sup>2</sup> hence our old wells furnish much purer water than those which are more recent, as the soluble particles are gradually washed away. Mr. Dalton observes, that the more any spring is drawn from, the softer the water will become.

5. *Snow water* has been supposed to be unwholesome, and in particular to produce bronchocele, from the prevalence of that disease in the Alps; but it does not appear upon what principle its insalubrity can depend. The same strumous affection occurs at Sumatra, where ice and snow are never seen; while, on the contrary, the disease is quite unknown in Chili and Thibet, although

<sup>1</sup> See a pamphlet entitled "The Dolphin, or Grand Junction Nuisance, proving that seven thousand families in Westminster, and its suburbs, are supplied with water in a state offensive to the sight, disgusting to the imagination, and destructive to health."

<sup>2</sup> Dr. Percival observes, that bricks harden the softest water, and give it an aluminous impregnation; the common practice of lining wells with them is therefore very improper, unless they be covered with cement.

the rivers of those countries are supplied by the melting of the snow with which the mountains are covered. The same observations will apply to *ice water*. The trials of Captain Cook, in his voyage round the world, prove its wholesomeness beyond a doubt: in the high southern latitudes, he found a salutary supply of fresh water in the ice of the sea. "This melted ice," says Sir John Pringle, "was not only sweet but soft, and so wholesome as to show the fallacy of human reasoning, unsupported by experiments." When immediately melted, snow water contains no air, as it is expelled during the act of freezing, consequently it is remarkably vapid; but it soon recovers the air it had lost, by exposure to the atmosphere.

6. *Lake water* is a collection of rain, spring, and river waters, contaminated with various animal and vegetable matter, which from its stagnant nature have undergone putrefaction in it. This objection may be urged with greater force against the use of water collected in ponds and ditches, and which the inhabitants of some districts are often under the necessity of drinking. I have known an endemic diarrhœa to arise from such a circumstance.

7. *Marsh water*, being the most stagnant, is the most impure of all water, and is generally loaded with decomposing vegetable matter. There can be no doubt that numerous diseases have sprung up from its use.

237. It is, however, in vain that pure water is discovered, if proper means be not adopted to convey it for the use of the inhabitants. In ancient times this was done by means of aqueducts of extraordinary magnificence; and the materials of which they were composed were even then acknowledged to be capable of affecting the water which flowed through them. Palladius testifies his aversion to the use of lead, as apt to become covered with ceruse, and thereby rendered poisonous; and Vitruvius and Columella recommend pipes of earthenware, as not only cheaper, but *more wholesome* than those of lead. Dr. Lambe, to whom we are indebted for an important work<sup>1</sup> upon this subject, states, that there is a great diversity in the corrosive powers of different waters; in some places the use of leaden pumps has been discontinued, from the expense entailed upon the proprietors by the perpetual want of repair. Dr. Lambe states an instance where the proprietor of a well ordered his plumber to make the lead of a pump of double the thickness of the metal usually employed on such occasions, to save the charge of repairs; because he had observed that *the water was so hard*, as he called it, *that it corroded the lead very soon*. If any acidity be communicated to the water, from the accidental intrusion of decayed leaves or other vegetable matter, its power of dissolving this metal will be increased to a very dangerous extent. The noted colic of Amsterdam is said by Tronchin, who has written a history of the epidemic, to have been occasioned by leaves falling and putrefying in leaden

<sup>1</sup> *Researches into the Properties of Spring Water, with Medical Cautions against the Use of Lead.*

cisterns filled with rain water. Van Swieten has also related an instance of a whole family who were afflicted with colic from a similar cause;<sup>1</sup> and Dr. Lambe entertains no doubt, but that the very striking case recorded in the Medical Commentaries<sup>2</sup> proceeded more from some foulness in the cistern, than from the solvent power of the water. In this instance, the officers of a packet vessel used water out of a leaden cistern; the men also drank the same water, except that the latter had been kept in wood: the consequence was, that all the officers were seized with colic, while the men remained healthy. Sir George Baker has furnished the following striking illustration of this subject:—"The most remarkable case that now occurs to my memory," says he, "is that of Lord Ashburnham's family in Sussex; to which spring water was supplied from a considerable distance in leaden pipes. In consequence, his lordship's servants were every year tormented with colic, and some of them died. An eminent physician of Battle, who corresponded with me on the subject, sent up some gallons of that water, which were analysed by Dr. Higgins, who reported that the water had contained more than the common proportion of carbonic acid; and that he found in it lead in solution, which he attributed to the action of the carbonic acid. In consequence of this representation, Lord Ashburnham substituted wooden for leaden pipes; and from that time his family have experienced no particular complaints in their bowels." As timber pipes are liable to decay, and to impart a bad taste to the water, those made of cast-iron are to be greatly preferred. Before quitting this subject, I ought to state that I have found the presence of iron, as for instance a pump, in contact with lead to accelerate the solution of the latter metal; by forming a simple voltaic circuit, and thus effecting the decomposition of the saline ingredients, and transferring the alkaline element to the lead, by which it is dissolved. (Pharmacologia, edit. 8th, p. 394.)

238. For the purification and preservation of water, numerous methods have been adopted. The mechanical impurities may be removed by filtration, a process which is suggested by nature herself; for all springs arising through sand, gravel, &c. must undergo this process. Hence it occurred, that if waters of a putrid, marshy, or unwholesome nature, were filtered through a factitious bed of sand, or a vessel made of porous stone,<sup>3</sup> they might be deprived of their bad qualities. As that peculiar property of water which constitutes what is termed *hardness*, generally depends upon the presence of *sulphate of lime* in solution, it cannot be removed by simple filtration; but the addition of an alkaline carbonate,<sup>4</sup> twenty-four hours before it is used, will be found to restore it; or, if it

<sup>1</sup> Van Swieten and Boerhaav. Aphor. 1060, Comment.

<sup>2</sup> Duncan. Med. Comment. Dec. 2, 1794.

<sup>3</sup> Various machines have been constructed for this purpose; but the most modern are those known by the name of "Bennet's Patent Filtering Machine," and Robins's Royal Filter.

<sup>4</sup> In the proportion of from ten to fifteen grains to every pint.

should depend upon *super-carbonate of lime*, long ebullition, without any addition, will be found sufficient for its cure. Another mode of improving water, and one that has been most recently discovered, is by means of charcoal, a substance which enjoys, in an eminent degree, the property of preserving water from corruption, and of purifying it after it has been corrupted: hence the filtration of water through alternate layers of sand and charcoal offers a ready and effectual mode of abstracting its impurities, especially when they consist of animal or vegetable matter. Where we have reason, however, to suspect much injurious contamination, the process of boiling should never be omitted; after which it may be strained and filtered, and lastly agitated in contact with the atmosphere, in order to restore to it its natural proportion of air. In China, water is never drunk until it has been boiled. The mischievous effects of impure water, where it cannot be corrected by any chemical process, are said to be best counteracted by some bitter vegetable. Virey supposes that this circumstance first induced the Chinese to infuse the leaves of the tea plant. The brown tinge so generally seen in ponds and slow streams, depends upon a minute quantity of extractive matter, from the decomposition of fallen leaves and other vegetable bodies, and will be retained by the water in solution, after it has undergone the process of depuration; nor can it be removed by boiling, but alum and certain metallic salts, as *sulphate of iron*, especially if heated with it, throw down a precipitate, and leave the water colourless.

239. The juices and infusions of vegetable and animal matter constitute the second division of drinks.

240. *Toast water*. By impregnating water with the soluble parts of toasted bread, it will frequently agree with those stomachs which rebel against the use of the pure fluid. It is thus rendered slightly nutritive, holding a certain portion of gum and starch in solution. Sir A. Carlisle recommends that it should be prepared with hard biscuit, reduced by fire to a coffee colour. This drink, says he, being free from yeast, is a most agreeable beverage. Much depends upon the water being at a boiling temperature, and it ought to be drunk as soon as it has cooled sufficiently; for, by keeping, it acquires an unpleasant flavour. Infusions of other kinds of bread, in particular of toasted oat-cakes, also dried or toasted oatmeal, have been recommended; but the taste of such infusions would not be palatable to any one who has not been accustomed to oat-bread.

241. *Barley water*. The decoction of barley is a very ancient beverage: it is recommended by Hippocrates, and preferred by him to every other aliment in acute diseases. Barley has the advantage over other grains, in affording less viscid potations. The invention of *pearl barley* has greatly increased the value of this grain; it is prepared by the removal of its husk or cuticle, and afterwards by being rounded and polished in a mill. These well known granules consist chiefly of fecula, with portions of mucilage, gluten, and

sugar, which water extracts by decoction; but the solution soon passes into the acetous fermentation. The bran of barley contains an acrid resin, and it is to get rid of such an ingredient that it is deprived of its cuticle. The addition of lemon juice and sugar-candy greatly improve the flavour of this drink.

242. *Gruel.* Oats, when freed from their cuticle, are called *groats*; in which state, as well as when ground into meal, they yield to water, by coction, the fecula they contain, and form a nutritious gruel, which has also the property of being slightly aperient. It should never be kept longer than forty-eight hours, as it becomes acescent after that period. Gruel may be made of a different degree of consistence, according to the object of its potation. If it be used as a demulcent drink, it should be thin; and may be made, as Dr. Kitchener, our culinary censor, informs us, by mixing well together, by degrees, in a pint basin, *one* tablespoonful of oatmeal with three of cold water, and then adding carefully a pint of boiling water, which is to be boiled for five minutes, stirring it all the time, to prevent the oatmeal from burning at the bottom of the stewpan; then strain through a hair sieve, to separate the undissolved parts of the meal from the gruel. If a more substantial repast is required, double the above quantity of oatmeal must be treated in a similar manner. To increase the nutritive quality of this aliment, broth or milk may be substituted for water. Some persons are in the habit of introducing a piece of butter into gruel; but the propriety of this practice is questionable, where the stomach is disposed to generate acidity.

243. *Sage tea.* The virtues of sage have been so extravagantly praised, that, like many of our remedies,<sup>1</sup> the plant has fallen into disuse from the disgust which its panegyriste have excited. I am convinced, however, that in the form of infusion it possesses some power in allaying the irritability of the stomach,<sup>2</sup> and that, on many occasions, it will furnish a salutary beverage. The same observation will apply to the infusions of *balm* and *rosemary*. A drink extremely agreeable to the stomach of invalids may also be made by infusing lemon peel in boiling water, and adding a small quantity of sugar.

244. *Tea.* There is no subject that has occasioned a greater controversy amongst dietetic writers than the subject of tea. By one party it is decried as a poison; by another it is extolled as a medicine, and a valuable addition to our food; while some refer all its beneficial effects to the water thus introduced into the system, and its evil consequences to the high temperature at which it is drunk. In order to understand the value of the different arguments which have been adduced in support, or to the disparagement, of this beverage, it will be necessary to inquire into its composition. Two kinds of tea are imported into this country, distinguished by

<sup>1</sup> Pharmacologia, see Introduction.

<sup>2</sup> It is frequently used by the Chinese as a tonic for debility of the stomach.

the epithets *black* and *green*. Both contain astringent and narcotic principles, but in very different proportions; the latter producing by far the most powerful influence upon the nervous system. As the primary operation of every narcotic is stimulant, tea is found to exhilarate and refresh us, although there exist individuals who are so morbidly sensible to the action of certain bodies of this class, that feelings of depression, accompanied with various nervous sensations and an unnatural vigilance, follow the potation of a single cup of strong tea; while others experience, from the same cause, symptoms indicative of derangement of the digestive organs: but these are exceptions<sup>1</sup> from which no general rule ought to be deduced. The salubrity of the infusion to the general mass of the community is established by sufficient testimony to outweigh any argument founded on individual cases. It must, however, be admitted, that if this beverage be taken too soon after dinner, the digestion of the meal may be disturbed by the distention it will occasion, as well as by its influence as a diluent; the narcotic and astringent principles may also operate in arresting chymification; but when a physician gives it his sanction, it is with the understanding that it shall be taken in moderate quantities, and at appointed seasons. When drunk four hours after the principal meal, it will assist the ulterior stages of digestion, as already explained (146,) and promote the insensible perspiration: while it will afford to the stomach a grateful stimulus after its labours. With regard to the objection urged against its use, on the ground of temperature, it will be only necessary to refer to the observations which have been already offered upon this subject (147). In enumerating, however, the advantages of tea, it must not be forgotten that it has introduced and cherished a spirit of sobriety; and it must have been remarked by every physician of general practice, that those persons who dislike tea, frequently supply its place by spirit and water. The addition of milk certainly diminishes the astringency of tea; that of sugar may please the palate, but cannot modify the virtues of the infusion.

245. *Coffee*. The hostility which has been manifested against the use of tea has been extended, with equal rancour, against that of coffee; and, probably with equal injustice. The principle upon which its qualities depend is more stimulant than that of tea, and

<sup>1</sup> While correcting this sheet for the press, I have, for the first time, seen a pamphlet entitled "Observations on the Medicinal and Dietetic Properties of Green Tea," by W. Newnham, Esq. There is a great deal of sound sense in this little production. The author refers the different effects produced by green tea to the different states of the system in which it is taken. He maintains that in a state of what he calls *sthenic excitement* of the brain and nervous system, as that produced by alcoholic stimulants, or by intense and long continued application of the mind to any particular object of literary research, green tea will act as a salutary remedy; whereas, on the contrary, in states of diminished excitement, morbid vigilance and nervous disturbance will follow its potation.



certainly exerts a different species of action upon the nervous system, although it is very difficult to define the nature of this difference. If taken immediately after a meal, it is not found to create that disturbance in its digestion which has been noticed as the occasional consequence of tea; on the contrary, it accelerates the operations of the stomach, and will frequently enable the dyspeptic to digest substances, such as fat and oily aliment, which would otherwise occasion much disturbance. The custom of taking coffee immediately after dinner, so universally practised by the French, no doubt must counteract the evil effects which the peculiar form of their diet is calculated to produce. Coffee, like tea, has certainly an antisoporific effect on many individuals; it imparts an activity to the mind which is incompatible with sleep: but this will rarely occur if the beverage be taken several hours before our accustomed period of repose. It seems to be generally admitted, that it possesses the power of counteracting the effects of narcotics; and hence it is used by the Turks with much advantage, in abating the influence of the inordinate quantities of opium they are accustomed to swallow. When our object is to administer it as a promoter of digestion, it should be carefully made by infusion; decoction dissipates its aroma. The addition of milk is one of questionable propriety; that of sugar, or rather sugar candy, may be allowed.<sup>1</sup> I have known some persons who have never taken this beverage without suffering from acidity in the stomach: where this happens, the practice must be abandoned.

246. *Chocolate*. In consequence of the large quantity of nutritive matter which this liquid contains, it should be regarded rather as food than drink. It is prepared by reducing the cocoa-nut into paste, with sugar, milk, or eggs: it is also frequently mixed with different aromatics, the most common of which is the *vanilla*, a substance very liable to disagree with the stomach, and to produce a train of nervous symptoms. As a common beverage, chocolate is highly objectionable; it contains an oil which is difficult of assimilation; it therefore oppresses the stomach: this effect is of course increased by the application of too much heat in its preparation. Another objection against its use is to be found in the observations which I have already offered upon the subject of too great concentration. (164.)

247. *Cocoa* is usually considered as a substitute for chocolate.

<sup>1</sup> Coffee has been often imitated by the torrefaction of various grains. In the "Fourth Century of Observations," in the "Miscellanea Curiosa," we find a critical dissertation on the coffee of the Arabians, and on European coffee, or such as may be prepared from grain or pulse. Dillenius gives an account of his own preparations made with peas, beans, and kidney beans; but says, that made of rye comes nearest to true coffee, and was with difficulty distinguished from it. This fact is curious, inasmuch as a spurious coffee has been lately vended, which is nothing more than roasted rye. The article is well known, under the name of "Hunt's Economical Breakfast Powder."

As it contains less nutritive matter, it is not so objectionable ; and, as the oily matter exists only in small quantities, it is less likely to disagree with the stomach.

248. *Whey* is a delightful beverage ; but as its nature and operation cannot be well understood until the composition of milk is investigated, the observations which I have to offer upon its use will be deferred until the history of that fluid has been examined.

249. The nature of weak broths, and the manner in which they are decomposed in the digestive organs, have been already considered (97) ; and I shall have occasion to revert to the subject in a future part of the work.

250. There are certain saline solutions which are frequently employed as drinks, and deserve some attention in this place : such are *imperial* and *soda water*.

251. *Imperial*. This is a solution of cream of tartar flavoured with lemon pœel. It ought never to be used except as a medicine. If employed as an ordinary drink, it is apt to retard digestion. If ever useful as an article of diet, it will be under circumstances of robust health, and where a large quantity of animal food has been taken.

252. *Soda water*. The modern custom of drinking this inviting beverage during, or immediately after dinner, has been a pregnant source of dyspepsia. By inflating the stomach at such a period, we inevitably counteract those muscular contractions which are essential to chymification. The quantity of soda thus introduced scarcely deserves notice : with the exception of the *carbonic acid gas*,<sup>1</sup> it may be regarded as water, more mischievous only in consequence of the exhilarating quality inducing us to take it at a period at which we should not require the more simple fluid.

#### FERMENTED LIQUORS.

253. Volumes have been written to prove that spirit, in every form, is not only unnecessary to those who are in health, but that it has been the prolific source of the most painful and fatal diseases to which man is subject ; in short, that Epimetheus himself did not, by opening the box of Pandora, commit a greater act of hostility against our nature than the discoverer of fermented liquors. Every apartment, it is said, devoted to the circulation of the glass, may be regarded as a temple set apart for the performance of human sacrifices ; and that they ought to be fitted up, like the ancient temples of Egypt, in a manner to show the real atrocity of the superstition that is carried on within their walls. This is mere rant and nonsense ; a striking specimen of the fallacy of reasoning

<sup>1</sup> Late discoveries have shown, that the carbonic acid exists in a liquid state in soda water ; if then it be hastily swallowed, it will rob the stomach of a certain portion of heat, as it passes from a liquid into a gaseous state. It will therefore cool as well as distend that organ.

against the *use* of a custom from its *abuse*. There exists no evidence to prove that a temperate use of good wine, when taken at seasonable hours, has ever proved injurious to healthy adults. In youth, and still more in infancy,<sup>1</sup> the stimulus which it imparts to the stomach is undoubtedly injurious; but there are exceptions even to this general rule. The occasional use of *diluted*<sup>2</sup> wine has improved the health of a child, by imparting vigour to a torpid stomach: we ought, however, to consider it rather as a medicine than as a luxury.

254. Without entering further into the discussion of a question which has called so many opponents into the field, it may be observed, that whatever opinion we may have formed as to the evils or advantages consequent upon the invention of wine, we are not called upon, as physicians, to defend it; our object is to direct remedies for the cure of those diseases which assail man as we find him in the habits of society, not as he might have been had he continued to derive his nourishment from the roots of the earth, and his drink from its springs. As these habits, says Dr. W. Philip, are such, that more or less alcohol is necessary to support the usual vigour of the greater number of people even in health, nothing could be more injudicious than wholly to deprive them of it when they are already weakened by disease, unless it could be shown that even a moderate use of it essentially adds to their disease, which, in dyspeptics, is by no means the case. My own experience coincides with that opinion. In cases where the vinous stimulant has been withdrawn, I have generally witnessed an aggravation of the dyspeptic symptoms, accompanied with severe depression of spirit: like Sindbad, in the Arabian tale, the patient has borne a weight on his shoulders which he has in vain attempted to throw off, until the fermented juice of the grape enabled him to triumph over his enemy.

255. Although it is impossible to enter at any length on the subject of wine, upon which so many volumes<sup>3</sup> have been already written, a work on dietetics would be very imperfect, were the distinctions which exist between the different species to be left unnoticed. Many of these distinctions are important in a medical point of view, as the chemical circumstances, upon which they depend,

<sup>1</sup> An ingenious surgeon tried the following experiment.—He gave to two of his children, for a week alternately, after dinner, to the one a full glass of sherry, and to the other a large China orange. The effects that followed were sufficient to prove the injurious tendency of vinous liquor. In one the pulse was quickened, the heat increased, the urine became high coloured, and *the stools destitute of the usual quantity of bile*; whilst the other had every appearance that indicated high health. The same effects followed when the experiment was reversed. See *Beddoes's Hygeia*, vol. ii. p. 35.

<sup>2</sup> By diluting the wine, we apply the stimulus more generally to the stomach, and thus produce a greater effect with a less quantity of spirit.

<sup>3</sup> For any information upon this subject, the reader is referred to Dr. Henderson's able work, entitled "The History of Ancient and Modern Wines."

confer upon the respective wines qualities which are directly connected with their effects on the body.

256. The term *wine* is more strictly and especially applied to express the fermented juice of the *grape*; although, in common language, it is used to denote that of *any* sub-acid fruit. The presence of *tartar* is perhaps the circumstance by which the grape is more strongly distinguished from all the other sub-acid fruits that have been applied to the art of wine making. Its juice, besides, contains, within itself, all the principles essential to vinification, in such a proportion and state of balance as to enable it, at once, to undergo a regular and complete fermentation; whereas, the juices of other fruits require artificial additions for this purpose: and the scientific application, and due adjustment of these means, constitute the art of making domestic wines.<sup>1</sup> It has been remarked, that all those wines that contain an excess of malic acid are of a bad quality: hence the grand defect that is necessarily inherent in the wines of this country, and which leads them to partake of the properties of cider; for in the place of the *tartaric*, the malic acid always predominates in our native fruits.

257. The characteristic ingredient of all wines is *alcohol*; and the quantity of this, and the condition or state of combination in which it exists, are the circumstances that include the more interesting points of inquiry, and explain the relative effects which different wines produce upon the system. I shall therefore proceed to investigate the various species, with reference to such conditions.

258. Wines may be, at once, resolved into two great divisions; into those which are coloured, and commonly called *red* wines, and into those which have a yellow tinge, more or less deep, termed *white* wines. This colouring matter is not derived from the juice, but from the husk of the grapes. If, therefore, the fermentation be not permitted to take place in contact with the hulls, and sometimes even with the stalks of the fruit, a *white* wine is in all cases produced. This colouring matter is highly astringent, and consequently the red wines differ from the white in their effects upon the stomach; and yet it is difficult to explain the well known extent of this operation, by the presence of so small a proportion of active matter. It must, however, be remembered that irritable stomachs are frequently impatient of astringent matter. Many persons are incapable of drinking port wine, in consequence of the heartburn it occasions; while others, on the contrary, appear to derive advantage from the tonic influence of its astringency. This is a circumstance of idiosyncrasy which no theory can explain. A popular writer remarks, "When my stomach is not in good temper, it generally desires to have *red* wine; but when in best health, nothing affronts it more than to put *port* into it; and one of the first

<sup>1</sup> For an account of which, the reader is referred to a most ingenious and interesting essay by Dr. Maculloch, entitled, "Remarks on the Art of making Wine; with Suggestions for the application of its principles to the improvement of domestic wines."

symptoms of its coming into adjustment, is a wish for *white* wine." On the contrary, a gentleman lately informed me, that when his stomach was not "*right*," the smallest quantity of port wine produced acidity, while, at all other times, it was much more grateful to him than any species of white wine. Every physician must be practically aware of the caprice which the stomach displays in its morbid conditions; but as a general rule, it may be stated, that *white* deserve a preference over *red* wines, because the latter, being pressed, and subjected to a stronger fermentation to extract the colouring principle from the husk, are necessarily more loaded with extractive and astringent matter; and as this remains in the stomach after the liquid portion of the wine is absorbed (97), it will be liable to occasion disturbance.

259. The odour, or *bouquet*, and flavour, which distinguish one wine from another, evidently depend upon some volatile and fugacious principle not hitherto investigated by the chemist: this, in sweet and half fermented wines, is immediately derived from the fruit, as in those from the *Frontignan* and *Muscat* grapes; but in the more perfect wines, as in *Claret*, *Hermitage*, *Rivesaltes*, and *Burgundy*, it bears no resemblance to the natural flavour of the fruit, but is altogether the product of the vinous process. The menstruum of this volatile principle is, doubtless, in most instances, the alcohol contained in wines; but its quantity is so minute as to be incapable of separation. In this latter case it frequently appears to produce a very remarkable effect upon the nervous system, and may, possibly, be hereafter discovered to be a new principle, of extraordinary powers: such an opinion, at least, is sanctioned by the well known effects of *Burgundy*; the excitement produced by this wine being peculiar, and not bearing any relation to the proportion of alcohol contained in it. Some wines are artificially flavoured by the introduction of foreign ingredients, as by almonds in *Madeira* wines, as well as in those of *Xeres* and *Saint Lucar*; and hence their well known nutty flavour. Among the ancients, and in modern Greece, it is at this day the fashion to give a resinous flavour, by the introduction of turpentine into the casks. These wines were supposed to assist digestion, to restrain morbid discharges, to provoke urine, and to strengthen the bowels; but *Dioscorides* informs us, that they were known to produce vertigo, pain in the head, and many evils not incidental to the potations of the same vinous liquor, when free from such admixtures.

260. The quantity of acid contained in wines has been supposed capable of diminishing their salubrity, and in some cases of rendering them eminently noxious. There can be no doubt, that where there exists a considerable excess of gallic or malic acids, or where acetic acid has been generated during a protracted fermentation, such wine will be obnoxious to the stomach; but where the acid arises from the nature of the fruit, it surely cannot merit the odium which popular opinion would assign to it. What, for instance, is the acid contained in *Madeira*, and against which so

many mighty objections have been urged? an atom merely of tartar! And yet the person who fancies that his digestion can be deranged by its action, will swallow twenty times the quantity of the same ingredient in some other shape, with perfect indifference and impunity. Sir Anthony Carlisle,<sup>1</sup> who has carried his prejudices against acids farther than any other writer, says, "Long continued and watchful observation induces me to conclude, that the acid qualities of fermented liquors are no less injurious than the spirit which they contain." If the process of reasoning, by which he arrived at such a conclusion, be not more correct than the experiments which enabled him to ascertain the quantities of acid matter in different fermented liquors, it cannot merit the confidence of the public. His table, which was constructed to exhibit "gross proof (*of error?*) of the relative quantities of free acid in ordinary fermented drinks," is a chemical curiosity. The tyro who has attended a single course of lectures will at once perceive, by casting his eyes over this table, that its results are wholly inconsistent with the doctrine of chemical equivalents. He tells us, that "a moderate sized glassful, containing two ounces (*avoirdupois*) of Port wine, required, for neutralisation, three grains of Henry's calcined magnesia, or six grains of carbonate of potass, or four grains of subcarbonate of soda, or nine grains of prepared chalk." Now these are not the relative proportions in which such bases could, by any possibility, unite with any acid; but granting, for the sake of argument, that our scales of equivalents are in error, and that the true proportions have been ascertained by the experiments in question, we shall then discover, that the tabulated results are not consistent with themselves; for in a second experiment, made with vidonia, the numbers indicating the combining weights of these substances are not, as in the former case, in the relation of 3, 6, and 4, but in that of 5, 7, and 6; in the third experiment with sherry, in that of 3, 5, and 4; in a fourth with London porter, in that of 3, 3.5, and 3; and in the last, with brewers' fresh table beer, the proportions are 2.5, 2, and 2. Sir Anthony was aware of these discordances; and he attempts to explain them by supposing that they may be "owing to the varying affinities of native acids, derived from the fruits, and the acid products of fermentation, as they regarded the several tests." It is almost unnecessary to state, that this supposition is in direct variance with the acknowledged doctrine of definite proportionals, and the fundamental principle of chemical combinations. Let the acids be what they may, let their intermixture be ever so complicated, the respective bases must always unite with them in an invariable and constant ratio.

261. Before we quit the subject of vinous acidity, I shall beg to say a few words upon its supposed influence in exciting paroxysms of gout. That such attacks have followed particular potations, I do not mean to deny; but a slight excess of any kind, whether in

<sup>1</sup> An essay on the disorders of old age.

diet or in exercise, will excite the disease in those predisposed to it. Where the train is laid, an additional glass of claret may have acted as the match; but in all such cases, the explosion would have equally taken place, had, instead of claret, some other exciting cause fired it.

262. It has been already stated, that the characteristic ingredient of all wines is *Alcohol*; and that its quantity, and the condition or state of combination in which it exists, are the circumstances in which the medical inquirer is principally interested. The late experiments of Mr. Brande have thrown considerable light upon this subject; although, as in most instances of discovery, they have raised up new doubts and difficulties. Daily experience convinces us, that the same quantity of alcohol applied to the stomach under the form of wine, and in a state of mixture with water, will produce very different effects upon the body, and to an extent which it is difficult to understand. It has, for instance, been demonstrated beyond the reach of doubt, that Port, Madeira, and Sherry contain from one fourth to one fifth their bulk of alcohol; so that a person who takes a bottle of either of them, will thus take nearly half a pint of alcohol, or almost a pint of pure brandy! And, moreover, that different wines, although containing the same absolute proportion of spirit, will be found to vary very considerably in their intoxicating powers. No wonder, then, that such results should have staggered the philosopher, who is naturally unwilling to accept any tests of difference from the nervous system, which elude the ordinary resources of analytical chemistry. The conclusion was therefore drawn, that alcohol must necessarily exist in wine in a far different condition from that in which we know it in a separate state; or, in other words, that its elements only could exist in the vinous liquor, and that their union was determined, and, consequently, alcohol produced, by the act of distillation. That it was the *product*, and not the *educt* of distillation, was an opinion which originated with Rouelle, who asserted that alcohol was not completely formed until the temperature was raised to the point of distillation. More lately, the same doctrine was revived and promulgated by Fabbroni, in the Memoirs of the Florentine Academy. Gay Lussac has, however, silenced the partisans of this theory, by separating the alcohol by distillation, at the temperature of 66° Fahrenheit; and, by the aid of a vacuum, it has since been effected at 56°. And to complete the demonstration, Mr. Brande has shown that, by precipitating the colouring matter, and some other elements of the wine, by the *sub-acetate of lead*, and then saturating the clear liquor with *subcarbonate of potass*, the alcohol may be separated without any elevation of temperature; and he has accordingly, by this ingenious expedient, been enabled to construct a table, exhibiting the proportions of spirit which exist in the several kinds of wine. No doubt, therefore, can any longer be entertained upon the subject; and the fact of the difference of effect produced by the same bulk of alcohol, when presented to the stomach in different

states, is to be explained on the supposition that, in wine, it is not only more intimately mixed with water, but that it exists in combination with its extractive matter; in consequence of which it is incapable of exerting its full effects before it becomes altered in its properties, or, in other words, partially *digested*;<sup>1</sup> and this view of the subject may be fairly urged in explanation of the fact, that the intoxicating effects of the same wine are liable to vary in degree, in the same individual, from the peculiar state of his digestive organs at the time of its potation.

263. In the former editions of this work, the reader was presented with an abstract of Mr. Brande's table; upon more mature deliberation, however, I agree with Dr. Henderson in suspecting, that several of the wines analysed by that distinguished chemist, must have been mixed with a considerable quantity of adventitious alcohol. I have therefore availed myself of those corrections which the author of the history of wines, in conjunction with his friend, Dr. Prout, has been enabled to afford us.

TABLE of the quantity of Alcohol (sp. gr. .825,) at 60° Fahr., in several kinds of wines and other liquors.

	Per cent by measure.		Per cent by measure.
Port, average of 7 specimens,	22.96	Vin de Grave,	12.80
Do.	20.64	Frontignac,	12.79
Madeira, average of 4 specimens,	22.27	Côte Roti,	12.32
Sherry, average of 4 kinds,	19.17	Rousillon,	17.26
Ditto, very old,	23.80	Cape Madeira,	18.11
Claret, average of 3 kinds,	14.43	Cape Muchat,	18.25
Calcavella,	18.10	Constantia,	14.50
Lisbon,	18.94	Tent,	13.20
Malaga,	17.26	Sheraz,	19.80
Bucellas,	18.49	Syracuse,	15.28
Red Madeira,	18.40	Nice,	14.63
Malmsey do.	14.06	Tokay,	9.88
Marsala,	17.26	Raisin Wine,	25.77
Red Champagne,	11.30	Grape Wine,	18.11
White do.	12.80	Currant Wine,	20.55
Burgundy,	14.57	Gooseberry Wine,	11.64
Ditto,	11.95	Elder Wine, Cider, and Perry,	9.87
White Hermitage,	17.43	Stout,	6.80
Red do.	12.32	Ale,	8.88
Hock,	14.37	Brandy,	53.39
Do.	8.88	Rum,	53.68
Palm Wine,	4.70	Hollands,	51.60

264. We have hitherto only considered alcohol as it exists in a combined state in wine; but it is essential to state, that the stronger wines of Spain, Portugal, and Sicily, are rendered marketable in

<sup>1</sup> Dr. Macculloch has conjectured that alcohol may be subject to varieties of composition, analogous to those which are found in the bodies included under the denomination of carburetted hydrogen gas.



this country by the addition of *brandy*, and must consequently contain more or less *uncombined* spirit; but the proportion of which will not bear a ratio to the quantity added, because, at the period of its admixture, a renewed fermentation is produced by the scientific vintner, which will assimilate and combine a certain proportion of the foreign spirit with the wine; this manipulation, in technical language, is called "*fretting in.*" It is to the quantity of *free*, not to that of *combined* spirit, that the injurious effects of such wines are to be attributed. "It is well known," observes Dr. Macculloch, "that diseases of the liver are the most common and the most formidable of those produced by the use of *ardent* spirits." It is equally certain, that no such disorders follow the intemperate use of *pure* wine, however long indulged in: to the concealed and unwitting consumption of spirit, therefore, as contained in the wines generally drank in this country, is to be attributed the excessive prevalence of those hepatic affections, which are comparatively little known to our continental neighbours.

265. Much has been said about the effects of *new* wine upon the stomach, compared with those produced by that which has been long kept. It will be necessary to consider the changes produced in this liquor by being kept. In the first place, red wine gradually deposits a quantity of cream of tartar, in combination with extractive and colouring matter, forming what is commonly called the crust; so that a considerable portion of that matter which is likely to disagree with the stomach is thus removed; but when kept in a cask, in addition to this change, a quantity of water is evaporated, and the wine becomes comparatively stronger.<sup>1</sup> The custom of exposing Madeira to motion, and a certain elevation of temperature, by sending it a voyage to the East Indies, unquestionably improves the flavour, and produces some internal change in the composition of the wine, which the chemist is unable to explain.

266. In a dietetic point of view, wines may be arranged into four classes; viz. 1. *Sweet wines*; 2. *Sparkling* or *Effervescing*; 3. *Dry* and *light*; 4. *Dry* and *strong*.

1. *Sweet wines* contain the greatest proportion of extractive and saccharine matter, and generally the least ardent spirit, though this is often rather disguised than absent. Since a proportion of sugar has remained unchanged in these wines during the process of vinification, they must be considered as the results of an imperfect fermentation, and are, in fact, mixtures of wine and sugar; accordingly, whatever arrests the progress of fermentation must have a tendency to produce a sweet wine. Thus, boiling the *must*, or drying the fruit, will, by partially separating the natural leaven, and dissipating the water, occasion such a result, as is exemplified by the manufacture of the wines of Cyprus, the *Vino Cotto* of the

<sup>1</sup> This observation, however, will only apply to certain wines, and at certain temperatures. In some cases the alcohol, in others the water, will transpire in the greatest proportion.

Italians, and the *Vinum Coctum* of the ancients; by that of *Fron-tignac*, the rich and luscious wines of *Canary*, the celebrated *Tokay*, *Vino Tinto*, (Tent of Hungary,) the Italian *Montefiascone*, the Persian *Schiras*, the *Malmsey* wines of Candia, Chio, Lesbos, and Tenedos, and those of the other islands of the Archipelago. On account of the sugar contained in such wines, they are liable to become acescent on weak stomachs; but where this is not the case, they are, in small quantities, frequently beneficial to invalids.

2. *Sparkling or effervescing wines*. These are indebted for their characteristic properties to the presence of carbonic acid; they rapidly intoxicate, in consequence of the alcohol which is suspended in, or, more probably, in chemical combination with the gas, being thus applied in a sudden and very divided state to a large extent of nervous surface: for the same reason, their effects are generally as transitory as they are sudden. Independently of the alcohol thus held in solution in the carbonic acid, it is probable that some active aromatic matter is volatilised together with it, and which may account for the peculiar effects produced on some persons by champagne.

3. *Dry and light wines*. These are exemplified by the more esteemed German wines, as *Hock*, *Rhenish*, *Mayne*, *Moselle*, *Necker*, and *Elsass*; and those highly flavoured wines, *Burgundy*, *Claret*, *Hermitage*, &c. The former of these wines combine the effect of an acid with that of the spirit. They do not contain any uncombined alcohol, and on that account are to be greatly preferred. *Genuine Claret* must be considered as the most beneficial of all our vinous liquors; it is well fermented; and, on account of the small proportion of spirit, as well as of extractive, which it contains, it is more salubrious than Port. It has been already observed, that Burgundy appears to hold dissolved some unknown principle of great activity; upon no other supposition can we explain its stimulant properties. A few glasses of this wine will produce heat and headache, which the relative quantity of alcohol in its composition (*see the preceding table*) will not account for.

4. *Dry and strong wines*, as *Madeira*, *Port*, *Sherry*, &c. The name *sec*, corruptly written sack, signifies dry. The *sec* wine, prepared at Xeres, in Spain, is called, according to our orthography, *Sherris*, or *Sherry*. In the manufacture of this wine, lime<sup>1</sup> is added to the grapes; a circumstance, observes Dr. Macculloch, apparently conducive to its well known dry quality, and which, probably, acts by neutralising a portion of *malic* or *tartaric* acid.

267. It is a fact not easily explained, that the stomach is frequently outraged by a wine to which it has not been accustomed;

<sup>1</sup> The sack of Shakspeare was probably Sherry: a conjecture which receives additional strength from the following passage:—"You rogue! here's lime in this sack too. There is nothing but roguery to be found in villanous man. Yet a coward is worse than a cup of sack with lime in it—a villanous coward!"

and it is equally true, that a mixture of different wines is a common source of indigestion. The custom of mixing wine with water has its advantages as well as its evils.<sup>1</sup> By dilution it frequently proves too little stimulant to the stomach, and runs into a state of acescency. An invalid is also thus liable to deceive himself, by taking more wine than may be consistent with his welfare. Much, however, depends upon the quality of the wine taken; the lighter wines cannot require dilution, while Port is certainly rendered less injurious by the admixture.

268. Home made or domestic wines may be generally considered as injurious to delicate stomachs; they are apt to ferment, and produce indigestion. Cider and perry are grateful drinks in hot weather; but as they do not contain a sufficient quantity of spirit to prevent their passing into the acetous fermentation in the stomach of an invalid, they should be avoided by those who have any predisposition to indigestion.

269. *Beer.* This is an article of beverage in almost every country. The Chinese prepare it from rice, and the Americans from maize. We are also informed by Herodotus, that, in very early history, the art of making a fermented liquor from barley was discovered by the Egyptians. As the climate of England is not congenial to the growth of the vine, this species of liquor is perhaps more universal than in any other country; and it has therefore been denominated *Vinum Britannicum*. In the higher walks of society, it has, indeed, of late years, been nearly excluded: but whether this revolution has been attended with advantage, we shall presently have occasion to inquire. Malt liquors differ from wines in several essential points: they contain a much larger proportion of nutritive matter, and a less proportion of spirit; while they contain a peculiar bitter and narcotic principle derived from the hop. It would appear, that the extractive matter furnished by the malt is highly nutritive; and we accordingly find that those persons addicted to such potations are in general fat.<sup>2</sup> Where, however, they are indulged in to any extent, without a corresponding degree of exercise, they induce a plethoric state of the body, and all the diseases consequent upon such a condition. In order to understand the process by which they furnish nourishment, I must once more

<sup>1</sup> This custom was a favourite practice amongst the ancients; indeed, to drink wine unmixed was held disreputable, and those who were guilty of such excess were said to act like Scythians. See *Henderson on Wines*, p. 98. But a question may arise as to the modification thus produced on the intoxicating powers of wine. I suspect that a quantity of wine, in a state of dilution, will be more intoxicating than an equivalent portion of vinous liquor in a more concentrated form.

<sup>2</sup> This fact is so generally admitted by all those who are skilled in the art of *training*, that a quantity of ale is taken at every meal by the pugilist who is endeavouring to *screw himself up to his fullest strength*. Jackson, the celebrated trainer, affirms, if any person accustomed to drink wine would but try malt liquor for a month, he would find himself so much the better for it, that he would soon take the one, and abandon the other.

beg to refer the reader to the observations which are offered on the important subject of the digestion of liquids (97); from which it will appear, that a highly concentrated extract will be left in the stomach after the removal of its watery part. This extract is, for reasons already stated, not very digestible; and will, therefore, require the presence of less inspissated food to promote its chymification. Ale, therefore, when taken without such precautions, is liable to disturb the digestive organs. The addition of the hop increases the value of the liquor, by the grateful stimulus which it imparts, and in some measure redeems it from those vices with which it might otherwise be charged.<sup>1</sup> To those, therefore, whose diet is not very nutritive, ale may be considered not only as an innocent, but as a salubrious article; and happy is that country, whose labouring classes prefer such a beverage to the mischievous potations of ardent spirits.<sup>2</sup> These remarks, however, cannot apply to those classes of the community who "fare sumptuously every day." They will not require a nutritive potation of such a character; and light wines have accordingly, in these days of luxury, very properly superseded its use: but I am not disposed to extend this remark to its more humble companion, "*table beer*." I regard its dismissal from the tables of the great as a matter of regret; its slight but invigorating bitter is much better adapted to promote digestion than its more costly substitutes. But it should be soft and mild; for, when stale and hard, it is likely to disturb the bowels, and occasion effects the very opposite to those it is intended to produce. Nor ought it to have too great a proportion of hops, but should be thoroughly fermented and purified. Sydenham always took a glass of small beer at his meals, and he considered it as a preservative against gravel.

270. The great division of malt liquors is into small beer, ale, and porter.

271. The liquor called *ale* was originally made of barley, malt, and yeast alone. We are told by one of the oldest English writers on medical subjects (Andrew Boorde<sup>3</sup>) that those who put in any other ingredient "sophisticated the labour." "It is," he says, "the natural drink of an Englishman; but beer, on the other hand, which is made of malt, hops, and water, is the natural drink of a

<sup>1</sup> In the observations made upon the Bills of Mortality in the year 1662, by an ingenious citizen, concerning the increase of some diseases and the decrease of others, we meet with the following remark:—*The stone and strangury decreaseth from the drinking of ale.*"

<sup>2</sup> I certainly do not agree with Dr. Franklin when he states, that the bodily strength furnished by beer can only be in proportion to the solid part of the barley dissolved in the water of which the beer was composed; and that, as there is a larger proportion of flour in a penny loaf than in a pint of beer, consequently, that more strength is derived from a penny loaf and a pint of water than from a pint of beer. It is the stimulus of the beer that proves so serviceable to the poor man, enabling his stomach to extract more aliment from his innutritive diet.

<sup>3</sup> The founder of the class of itinerant quacks termed Merry-Andrews.

Dutchman, and of late is much used in England, to the great detriment of many Englishmen." There existed, for a long time, a strong prejudice against hops, which were considered as "pernicious weeds;" but it is now generally admitted, that they constitute the most valuable ingredient in malt liquors. Independent of the flavour and tonic virtues which they communicate, they precipitate, by means of their astringent principle, the vegetable mucilage, and thus remove from the beer the active principle of its fermentation: without hops, therefore, we must either drink our malt liquors new and rosy, or old and sour. There are several varieties of ale, distinguishable by their colour: when the malt is slenderly dried, the ale is *pale*; or *brown* when the malt is more roasted or high dried.

272. *Porter*. This is made from high dried malt, and differs from other malt liquors in the proportions of its ingredients, and from the peculiar manner in which it is manufactured. Much has been said upon the fraudulent adulteration of this article; but I am inclined to believe that these statements have been exaggerated. It is, at all events, certain, that such adulterations are not carried on in the cauldrons of the brewers, but in the barrels of the publican (see our work on Medical Jurisprudence, vol. i. p. 375.) The origin of the beer called *entire* is to be thus explained:—Before the year 1730, the malt liquors in general use in London were ale, beer, and two-penny; and it was customary to call for a pint, or tankard, of half-and-half, *i. e.* half of ale and half of beer, half of ale and half of two-penny. In course of time, it also became the practice to call for a pint or tankard of *three threads*, meaning a third of ale, beer, and two-penny; and thus the publican had the trouble to go to three casks, and turn three cocks for a pint of liquor. To avoid this inconvenience and waste, a brewer of the name of Harwood conceived the idea of making a liquor which should partake of the same united flavours of ale, beer, and two-penny. He did so, and succeeded, calling it *entire* or *entire butt*, meaning that it was drawn entirely from one cask or butt; and, as it was a very hearty and nourishing liquor, and supposed to be very suitable for porters and other working people, it obtained the name of *Porter*.

273. *Ardent spirits*. The art of extracting alcoholic liquors by distillation from vinous liquors, must be regarded as the greatest curse ever inflicted upon human nature. The fatal effects of dram-drinking have been vividly depicted by numerous writers; and the awful truth has been too frequently illustrated, to render any remarks in this place necessary. In a medical point of view, however, spirit may be considered as occasionally useful. Where it is taken in a diluted state, the mixture should always be made twelve hours before it is used. Spirit and water do not easily combine; and much of the force of the former is blunted by intimate incorporation with the latter, as we have already observed under the history of wine. I throw out this hint to those who are in the habit of

drinking weak brandy and water at their meals. There are cases of dyspepsia, in which wine and beer equally disagree with the stomach, producing, acidity, and other distressing symptoms: very weak spirit in such a case may, perhaps, be taken with advantage; but its strength should be uniform, and no circumstance should induce the patient to increase the proportion of the spirit. The habit of drinking *liqueurs* cannot be too loudly reprobated: many of these *cordials* are impregnated with narcotic substances, which add to the noxious qualities of the spirit.

274. I have now brought to a conclusion the history of Alimentary substances. It will be readily perceived that the terms *digestible* and *indigestible*, as applied to particular kinds of food, are but relative in their import, depending upon circumstances which I have endeavoured to investigate: with what degree of success I have performed the task it will be for the professional public to decide; but I may be allowed to observe, that the importance which I have bestowed upon some, perhaps, apparently trivial circumstances, has arisen from a belief, founded on practical grounds, in the influence which they exert on the human body; while, if I have passed over others with less notice than they may appear to deserve, it has arisen from a conviction that they have either been overrated in importance by those writers who have indulged in discussions upon them, or are so involved in doubt and uncertainty, that I have despaired of throwing any additional light upon their nature and bearings. The theory of digestion, and the history of the alimentary substances, are so intimately connected with the diseases to which our organs are exposed, that, without a thorough knowledge of the former, we cannot expect to understand the phenomena of the latter; nor to establish a rational and successful system of treatment for the prevention and cure of dyspepsia. I shall now proceed to the fourth division of the work, which will embrace the history of *indigestion* in all its forms and stages; in which I shall hope to turn the principles already developed to a practical advantage.

## PART IV.

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### OF INDIGESTION.

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275. It has been already observed (9), that authors have differed in their acceptance of the term *digestion*—some regarding it as merely denoting that preparatory process which the food undergoes in the stomach; while others have received it in a more extensive latitude, as comprehending the whole of that elaborate and complicated series of actions, by which nature converts bread into blood. We cannot, therefore, be surprised to find that pathologists should as widely have differed in their definition of the disease termed *dyspepsia*, or *indigestion*. Notwithstanding the distinction which Dr. Philip is disposed to establish between these terms, by considering "*dyspepsia*" as expressing a disease much less varied, and of much less extent, than that which he comprehends under the denomination of "*indigestion*," I am still disposed to regard them as synonymous; and when they occur in the following pages, I must beg the reader to receive them with that impression. The term *indigestion* is evidently nothing more than a literal English translation of the Greek compound *dyspepsia*.

276. I define *indigestion* to be a disease, in which one or more of the several processes by which food is converted into blood, are imperfectly or improperly performed, in consequence either of functional aberration, or organic lesion. This definition may, perhaps, be opposed, on the ground of its too comprehensive signification; but I may observe, that however extensive may be the series of symptoms which are thus included under one general head, they will afford, when viewed collectively, sufficient evidence of their relation with the digestive process—although, on a loose and hasty observation, they may not present any general principle of dependency and connection: if they appear disunited, let the practitioner suspect that he has never viewed them with sufficient reference to that physiological harmony which subsists between the organs in which they arise. Acidity of stomach and urinary depositions are equally indicative of deranged digestion; but the mind that is not acquainted with the relations of the stomach and kidneys, or with the connection which subsists between the formation

of perfect chyle and the discharge of natural urine, will not be disposed to arrange symptoms, so apparently remote in their alliance, under one common head. There are many sympathies subsisting between different functions, which are not perceptible as long as the general balance of health is preserved: this is remarkably the case with the skin and stomach; but the moment this healthy equilibrium is destroyed, the sympathies become apparent. The physiologist, therefore, without an acquaintance with the body in its morbid states, must remain ignorant of some of the more important circumstances of the animal economy. The same reasoning applies to the study of natural philosophy: the discovery of the existence of an electric fluid could never have been made, had the natural conditions of matter, with regard to this agent, remained unchanged: the basis of all chemical research is founded upon the same principle; decomposition, and the developement of the elements of bodies, are effected by overturning the affinities by which they are naturally combined. These observations are introduced in order to warn the practitioner not to deduce any conclusion against the existence of certain sympathies, on the ground of their not being apparent in a state of health. In a practical point of view, I consider the classifications of the nosologist as of very little utility; they have no solid foundation in nature, but are entirely the work of human reason—artificial contrivances, for the purpose of assisting us in the acquirement and retention of knowledge. Such an avowal will sufficiently explain the motive which has induced me to throw off the trammels to which I might have been expected to conform.

277. From the sympathy which the stomach entertains for every part of the living body, its functions may become impeded or perverted from the existence of diseases which originate in organs with which it has no immediate connection. An affection of the head, or even a disease in the urethra, may create sickness, loss of appetite, or a suspension in the digestive process: but such phenomena are not to be confounded with the primary symptoms of dyspepsia—they are affections of sympathy or induction, and will require very different treatment. As connected with this opinion, I beg to direct the reader's attention to the first case which I have introduced, in my "Practical Illustrations," at the end of the present volume. In distinguishing between such effects, consists the skill of the practitioner; and it requires a comprehension of mind, a freedom from prejudice, a clearness of judgment, and a patience of minute inquiry, that do not fall to the lot of every member of our profession. I am strongly inclined to think that many physicians of the present day are too apt to accuse the alimentary functions of offences which should be charged on other organs. It is, perhaps, natural in those who have devoted much time and attention to one particular subject, to fall into an error of this kind; they have a favourite child of their own to support, and they prefer it with the blind partiality of a parent.



## I.—IMPERFECT CHYMIFICATION.

278. The symptoms which arise from the food undergoing its appointed changes in the stomach with difficulty, or in an imperfect manner, are generally those which first indicate the approach of indigestion, and frequently recur at intervals, for a considerable period, without occasioning any constitutional disturbance, or even a degree of local distress sufficient to awaken the alarm of the patient. In some cases indeed they are only produced by the use of particular aliments, or under the operation of peculiar circumstances; but in others, they follow the ingestion of every species of food, although their violence is usually influenced by the quality and quantity of the meal. In this latter case, a morbid state of the stomach exists, which ought to be remedied without delay. In investigating the circumstances of an indigestion produced only by some particular aliment, we shall soon discover whether it is to be attributed to a peculiar idiosyncrasy of the stomach, which cannot be said to amount to disease, or to a debilitated condition of that organ, which renders it unable to digest any food that requires considerable powers for its chymification. The mucous membrane of the stomach in certain persons appears to be irritated by particular aliments, as the skin is known to be by particular coverings: I am acquainted with a person who can never wear cotton stockings without suffering from considerable cutaneous irritation; and I also know a gentleman who is incapable of eating the smallest quantity of mackerel without experiencing uneasiness in the stomach, and yet he digests every other species of food with facility: this is not disease, but idiosyncrasy, and it is very essential to distinguish them from each other. If, on the other hand, a person informs me that, as long as he lives upon mutton or beef, his digestion goes on well, but that if he eats pork, veal, or fried meat, he suffers from heartburn, and other unpleasant feelings in his stomach, I deduce a different conclusion, and infer that his general powers of digestion are feeble, and easily depressed; and that he is consequently unable to convert into healthy chyme those aliments which acquire a higher degree of exertion.

279. There is no fact better understood, than that the living principle of our organs possesses the power of preventing the chemical changes to which their contents would, under other circumstances, be exposed. The blood does not coagulate or putrefy in the vessels; the urine does not undergo decomposition in the healthy bladder; nor does the food ferment in the stomach, unless that organ be in a state of disease; but if its vital powers fail, the chemical affinities gain the ascendancy, and after a certain interval, various symptoms arise, which clearly evince the change which has been produced. This is the philosophy of an ordinary attack of indigestion, when, either from the quantity or quality of the food, the stomach is inadequate to perform its necessary duties.

An uneasiness and sensation of weight and distention is experienced in the region of the stomach, acidity prevails, and eructations of disengaged air distress the patient; a sensation of nausea is felt, arising from an effort of the stomach to eject that which it is unable to digest. Chilliness is perceived, and a general lassitude arises from the sympathy which is produced on the nervous and sanguiferous systems. These effects are felt particularly towards the end of chymification, and, after a certain period, pass off, and the remaining parts of the process are conducted with regularity. But this is a statement of the symptoms which attend a casual fit of dyspepsia, as it may occur to persons in health, from the influence of various circumstances, such as an overloaded stomach, indigestible food, a too hearty meal after long fasting or fatigue, obstructed bowels, or any other cause which may occasion a temporary debility of the stomach. It is only necessary, in such a case, to avoid in future the exciting causes, and to clear the bowels of any superfluous and crude matter which may be supposed to lodge in them. But lightly as we may, in general, treat a casual indigestion of this kind, cases are on record which should awaken us to a sense of its possible mischief, especially if the subject of it be a person advanced in life. If a patient retires to rest before the stomach is relieved from its load, he may pass into a comatose state, accompanied with apoplectic stertor, from which it is not unfrequently difficult to rouse him; and which arises from the sympathy of the brain with the oppressed stomach. It is of great importance to distinguish such an affection from genuine apoplexy, since, if the stomach be not relieved, the stupor increases, and the patient is lost. We should carefully examine the epigastrium, in order to ascertain whether any considerable fulness can be felt in that region, and inquire into the history of the patient; if he can be awakened, no time should be lost in administering an emetic, and it will be a safe practice to abstract a quantity of blood from the arm, which will have the additional advantage of accelerating the operation of any medicine that may have been administered for his relief.

280. I have lately met with two cases which are well calculated to illustrate this subject. The one was that of a gentleman painfully engaged in mercantile speculations of great extent and considerable hazard. His custom had been to proceed to the house of business early in the morning, and to remain until seven in the evening, when he returned to the west end of the town and dined. At ten he retired to bed, and at one or two in the morning, he frequently awoke with palpitation of the heart, and a dyspnoea, which on more than one occasion was so violent as even to have threatened his life. The treatment indicated by the circumstances of this case was as obvious as it was successful. Here was a person exhausted throughout a long day by mental anxiety and fatigue, who imposed upon his digestive organs a labour which they were incapable of performing, and who consequently retired to bed with a

load of undigested matter in his stomach. The paroxysm was invariably relieved by a warm and active purgative; and its recurrence was ultimately prevented by a revolution in his habits—the dinner hour was changed, and the principal meal being thus taken before the waning of the vital powers, its digestion was accomplished before night. The other case was that of a keen sportsman, who, after a day of such severe fatigue as to have been unable to dismount his horse without assistance, partook of a very hearty meal, and retired to rest; in the middle of the night he was seized with a paroxysm resembling *angina pectoris* in its most awful form. It was, however, speedily relieved by a large dose of ammonia, combined with an active purgative. It ought to be stated, that this gentleman had suffered on former occasions, in a less degree, from the same cause, but he had never experienced the same alarm; he was now, therefore, most anxious to obviate the possibility of such another attack; for this purpose, I advised him upon all occasions of excessive fatigue, to retire to rest without taking any other refreshment than that of a cupful of thin gruel with the addition of a table spoonful of brandy; and I have since learnt that the plan has been successful.

281. It must, however, be allowed that under ordinary circumstances such attacks from an overloaded stomach are not frequent, nor likely to occur, except the muscular powers of that viscus be so impaired as to prevent the usual efforts which nature employs to throw off an unmanageable burthen.

282. Should indigestion in the stomach continue to recur, the paroxysm will assume a more troublesome character; its symptoms will increase in number and extent, and the mischief will speedily involve other functions: but before I proceed to follow the course which it usually runs, it will be useful to examine the causes to which the origin of the disease in the stomach is to be attributed.

283. It has been stated that, in every change which the aliment undergoes, we shall discover the combined operation of mechanical and chemical agents: when the food, therefore, is introduced into the stomach, it owes its conversion into chyme to such combined actions, viz. the chemical power of the gastric juice, and the mechanical movements of the stomach. It is to the failure or imperfect operation of the one or the other of these necessary actions that indigestion is to be attributed. However perfectly the gastric juice may be secreted, if the mass be not sufficiently *churned* in the stomach, it cannot become perfect chyme; and the most active motions of the stomach will not compensate for a deficiency in the alimentary solvent. It signifies very little whether the paucity of the gastric liquor be absolute or relative; that is to say, whether it be originally secreted in less than a natural proportion, or the quantity of food taken be so great that the usual proportion of the solvent is insufficient for its solution: in either case, an indigestion must follow; although there appears to exist an accommodating

power in the *healthy* stomach, which enables it to regulate its supply according to the call which may be made for it.

284. The quality and quantity of the gastric fluid, secreted by the stomach, may be influenced by causes immediately acting upon that organ, or by those which affect it through the medium of sympathy. Under the first class of causes may be noticed those which produce a direct influence upon the nerves of the stomach, without whose healthy action no secreting surface can perform its functions with regularity. Amongst these, the injudicious ingestion of narcotic substances, or of alcohol, deserve a distinguished notice. The languor arising from inanition also brings on what Mr. Abernethy calls a "discontented state of the stomach;" in which case the gastric juice is not secreted in a healthy manner. But the causes which act locally on the secreting powers of the stomach are few in number, and perhaps small in importance when compared with those which act through the medium of sympathy. During the periods at which the posterior stages of digestion are performed, the healthy secretion of gastric juice is not easily excited; and if, therefore, food be presented at these times, it will be apt to occasion indigestion.

An overloaded state of the bowels will be attended with the same consequence; exercise, when accompanied with fatigue, or indolence, may, by producing general debility, occasion a corresponding state of collapse in the stomach. Passions of the mind,<sup>1</sup> fear, anxiety, and rage, are also well known to affect the nervous system, and through that medium, the stomach; and so immediately are its consequences experienced, that a person receiving unpleasant intelligence at the hour of a repast, is incapable of eating a morsel, whatever might have been his appetite before such communication.

— — — — — Read o'er this;  
And after this; and then to breakfast  
*With what appetite you may."*

285. The sympathy subsisting between the skin is another source, and often an unexpected cause of gastric debility. If the cutaneous vessels be unusually excited, and this excitation be continued for any length of time, they will at length fall into a state of indirect debility, whence a sense of faintness, loss of appetite, and inability of digesting solid food, will be experienced. This fact explains the diminished appetite of which persons complain in hot weather, and that universal custom in tropical climates of combining the food with large quantities of aromatic stimulants. One of the most striking instances indicative of this consent between the skin and stomach is, where cold or wet is applied to the lower

<sup>1</sup> During a late commercial excitement, so extremely prevalent did dyspepsia become, that it was distinguished by the appellation of the "*City Disease*."

extremities, exciting pain in that organ, and indigestion.<sup>1</sup> Violent spasms, and, in persons predisposed to gout, an attack of that disease in the stomach, have been occasioned by remaining for some time with the feet thoroughly wet. The custom of pouring spirit into the shoes or boots upon such occasions, from the mistaken idea of counteracting the evil, increases the mischief, from the additional cold produced by its evaporation. The first object, under such circumstances, is to prevent evaporation; and the chance of taking cold is greatly diminished, if not entirely prevented, by covering the wet clothes with some dry garment. It has been said, and perhaps with some reason, that thin shoes and light dress render delicate females, notwithstanding their temperance, more subject to the whole tribe of dyspeptic complaints, particularly flatulence and want of appetite.

286. As the skin acts upon the stomach, so does the stomach, in its turn, react upon the skin; for all sympathies are reciprocal. A physician who is conversant with affections of the stomach, well knows how to appreciate the indications which the appearance of the countenance affords; there is a peculiar pallor and relaxed condition of the skin, which is truly indicative of a deranged state of the digestive organs, and which gradually disappears under a successful treatment. The want of appetite for breakfast, which is complained of by invalids, is frequently to be attributed, amongst other causes, to the atony produced on the surface of the body, and consequently on the stomach, through sympathy, by the relaxing influence of a warm bed; and hence arises the utility of restoring a reaction, by fresh air and exercise, before we attempt to sit down to our morning repast. The warm bath, if not at too high a temperature, or indulged in for such a length of time as to induce indirect debility, will be found, by its stimulant operation on the skin, to place the stomach in a condition to digest the dinner when employed a few hours before that meal. I shall have to refer to these facts when I come to consider the modes of curing indigestion.

287. The influence of a healthy condition of the digestive organs upon the skin, is so well understood by those that direct the art of training, that the clearness of the complexion is considered the best criterion of a man *being in good condition*, to which is added the appearance of the under lip, "which is plump and rosy in proportion to the health of the constitution."

288. The stomach also sympathises, in a remarkable degree, with the urinary organs; nephritic complaints are invariably attended with nausea. I lately had a very troublesome case of

<sup>1</sup> I extract the following passage from a letter which I received from Dr. John Badeley:—"A gentleman, who consulted my father, complained that on getting out of bed in the morning, and putting on his leather breeches, he constantly vomited, from the sensation of cold thus occasioned. My father recommended him to drink a glassful of cold water before he commenced dressing. The gentleman followed this advice, and found that the vomiting was entirely prevented by it."

dyspepsia under my care, which was aggravated, if not originally produced, by a stricture in the urethra, which kept up a constant irritation.

289. I have next to consider the causes which may operate in depressing or paralyzing the muscular powers of the stomach, by which the mechanical process, essential to chymification, is imperfectly performed. Of these, undue distention is perhaps the most common, and, at the same time, the most powerful. This may be proved, not only from ample observation on the stomach, but by the analogy of other cavities; if the bladder be distended for some time with urine, its muscular powers are paralysed; it has often happened that where a person has, from necessity, retained his urine for a considerable time, on attempting to void it, he has found himself incapable of expelling a single drop, although the bladder has been ready to burst from over-distention. The same fact occurs with respect to the rectum: if this observation be applied to the stomach, we shall easily perceive why, in an over-distended state of that viscus, vomiting can scarcely be produced by the most violent emetic; and we shall readily understand, from the same train of argument, how greatly the muscular fibres may become *permanently* debilitated by the repetition of such an excess. This over-distention is particularly apt to occur in cases where the food has a tendency to swell, from the heat and moisture of the stomach; for a person may not be aware of the quantity he has taken from any sensation of fulness at the time he ceases to eat, and yet, in the space of an hour, he may experience the greatest uneasiness from such a cause. This generally happens where much new bread has been taken; nuts have also this property in a remarkable degree, and ought, for that reason, to be prohibited, where such an effect is to be apprehended. A draught of soda water, or any beverage which contains fixed air, may be visited with the same penalty. There are certain postures of the body, which, by preventing the necessary egress of the contents of the stomach, favour an accumulation in its cavity; this occurs in the occupation of the shoemaker, tailor, engraver, from stooping on the last, or desk, by which their thoracic and abdominal viscera are compressed together for many hours: the margin of the ribs is pressed upwards, so as force the stomach against the diaphragm, and to impede the passage through the pylorus: it is evident that, if such a habit be continued after a full meal, all the train of dyspeptic terrors must be produced; and we have witnessed too many practical illustrations of the fact, to require further evidence of its truth. The profession is indebted to Dr. W. Philip, for having proved by experiments, related in his Inquiry into the Laws of the Vital Functions, that the muscular fibre, though independent of the nervous system, may, in every instance, be influenced through it; from which it follows, as a corollary, that the muscular fibres of the stomach may not only be affected by causes acting directly on them, but *by such as act through the medium of the nerves*. Hence, the presence of offensive

matter in the stomach, whether arising from noxious aliment, or vitiated secretion, will have the effect of diminishing its muscular energy. It is in this way that a draught of cold water, or a quantity of ice, may at once paralyse the stomach. In cases, therefore, of protracted indigestion, it is evident that both the *chemical* and *mechanical* functions of the stomach will be injured; neither the one nor the other can long remain alone affected. Irritation of the nerves will occasion vitiated secretion, and vitiated secretion will become a source of irritation to the nerves.

290. Amongst the symptoms which attend a fit of indigestion, we must not pass unnoticed the troublesome spasmodic affection of the diaphragm, well known by the name of *hiccup*, a term, no doubt, suggested by the peculiar dissyllabic sound which characterises it. By some it has been considered as a disorder of the stomach exclusively, but it is evident from the sound which accompanies the spasm, that it is immediately connected with an affection of some of the organs of respiration, and this is, obviously, the diaphragm. It is, however, true that the spasmodic contraction of this muscle is generally excited by some irritation within the stomach, and especially about the upper orifice, or *cardia*; thus a large quantity of dry food, taken without any liquid, will often occasion *hiccup*. Certain acrid substances, either taken into the stomach, or generated during its diseased action, will have a similar tendency, for which reason heartburn is frequently attended with hiccup. On the other hand, it may sometimes arise from inanition, in which case we must suppose that the stomach suffers irritation from its own fluids. Such are the causes of the common hiccup, which may be regarded as a natural concussion for the removal of any irritating substance from the lower part of the œsophagus, or from the upper orifice of the stomach, to a less sensible part of that organ. In this point of view it is to be regarded as a trifling affection, scarcely requiring any medical assistance, since it will usually cease spontaneously, or may be readily removed by a little warm liquid. The operation of any sudden emotion in at once removing it, is well known; and may be explained upon the general principle, that spasmodic action of muscular parts is frequently stopped by drawing the patient's attention strongly to any particular object. Hiccup, when a symptom of any other disease, is frequently indicative of danger, or the approach even of death, but this form of the complaint is obviously foreign to our present subject. It may, however, be useful to state, that it is common in almost every disorder of the digestive functions: it is, for example, one of the symptoms of a scirrhus state of the liver, and is sometimes found in simple jaundice, in which the biliary ducts are obstructed, although the liver is sound.

291. We have seen the manner in which indigestion may take place in the stomach; but there are cases in which the secretions of that organ are perfectly performed, and in which the muscular contractions of the stomach are carried on with healthy vigour and

regularity. The chyme is, therefore, duly elaborated, and the paroxysm of dyspepsia may not commence until the food has entered the duodenum.

#### IMPERFECT DIGESTION IN THE DUODENUM.

292. In the earlier part of this work, the structure, position, and functions of this "*second stomach*" have been fully described, and the practitioner must bear in mind the peculiar circumstances which relate to its anatomy and physiology, in order to understand the nature and extent of those aberrations to which it is liable. The chyme certainly undergoes some change in this organ, independent of that which is produced on it by its admixture with the bile and pancreatic juice, and which would appear to be affected by the agency of its own peculiar secretion: this secretion may become insufficient in quantity to answer its intended purpose, or its quality may be occasionally vitiated; but there exists no direct evidence upon this point, and we can only maintain the probability of such an occurrence on the ground of analogy. I am quite satisfied, that many morbid affections which have been usually attributed to the stomach, ought to be solely referred to the functional aberrations of the duodenum; and when we consider the situation of this intestine, with respect to the colon, and the pressure which it must suffer whenever this latter gut is loaded with fæces; when we reflect upon the elaborate manner in which it is constructed; the connection of its nerves with other organs; its limited capacity and motion; its tortuous course; the distress which must arise from its distention, and the irritation which, from such a cause, must be immediately propagated through its nerves to very important parts; when we remember that the pancreatic and biliary ducts may be obstructed by its repletion, and the necessary flow of the bile prevented; and lastly, when we consider that the *vena cava inferior* may be thus pressed upon, and the circulation of its blood obstructed—we shall not have much hesitation in admitting that a morbid condition of the duodenum must prove a pregnant source of local as well as of general distress. It is also necessary to state that, from the confinement which this intestine suffers at its termination within the ring, at the mesentery, the propulsion of its contents is liable to be retarded or obstructed; and, should any hard or indigestible matter have escaped the action of the stomach, it may, by lodging, occasion a temporary stoppage in this part of the canal.

293. The symptoms, which arise from *duodenal* indigestion, are easily distinguishable from those which depend upon an affection of the stomach. In a casual paroxysm of this kind, the distress is not felt until some time has elapsed after the indigestible meal, and then no oppression is felt at the pit of the stomach, but on the right side, and a puffiness is frequently perceptible in the region occu-



pied by the intestine. In some cases a severe pain is felt in the back, especially in the region of the right kidney; and Dr. Yeates states a symptom, which I have also noticed on such occasions—a faint and fluttering pulse, occasioned by the pressure of the *vena cava* against the spine by the distended intestine. Where we have reason to suspect that a fit of *duodenal* indigestion has arisen from some mechanical obstruction, as above explained, an emetic will prove a safer remedy than a purgative; by its action, the offending substance is regurgitated into the stomach, and thus at once eliminated; whereas a purgative may increase the distress, and even produce further mischief. Glysters, however, will be always advisable, in order to remove any pressure which the colon may occasion by its indurated contents. In cases where no such mechanical obstruction can be supposed to exist, purgatives are to be preferred to emetics.

294. I believe that where indigestion in the stomach has remained for any considerable length of time, the duodenum rarely escapes corresponding mischief; it is difficult to imagine a case in which the fluids of the stomach are constantly in a vitiated, and those of the duodenum in a healthy condition. The very circumstance of half concocted chyme being repeatedly urged forward into the cavity of the intestine, will be sufficient to derange its functions. When, therefore, we take a general view of the symptoms which mark confirmed digestion, we must take into consideration the effects produced by the derangement of this important organ. In some cases the evidence of such an affection will be more striking than in others, but in most we shall find some proof of its existence.

295. A casual indigestion in the duodenum may be produced by various causes; in addition to those already enumerated as capable of occasioning such an affection in the stomach, we may mention mechanical obstruction, arising from the presence of nuts, cherry stones, &c.; a vitiated state of the bile, or a temporary suspension of its flow from the liver, by which the chyme will be prevented from undergoing its destined changes, and thus, remaining in the duodenum, may ferment, and distend the intestine with air: accumulations also in the colon, by diminishing the diameter of the duodenum, will necessarily impede its functions.

#### OF HEADACHS WHICH ARISE FROM INDIGESTION.

296. From the intimate sympathy which subsists between the nerves of the stomach and the brain, it is not extraordinary that any casual derangement of the digestive process should communicate its influence to the head. Dr. Warren<sup>1</sup> has described this complaint with an accuracy which, as far as description goes, leaves

<sup>1</sup> Medical Transactions, vol. iv. p. 333.

nothing to be desired. He states that there are two forms of dyspeptic headach; the one he refers to a fault in the stomach, the other to a defective action of the upper bowels. The former is distinguished by a languid and feeble, but not an unnaturally frequent pulse; the tongue is whitish and slightly coated; the edges are of a pale red colour. The patient perceives a sensation of mistiness before the eyes, and general indistinctness of vision; he feels a dull pain or weight in the head, attended with some confusion, is slightly giddy and fearful of falling. These symptoms are attended with slight nausea, or an uneasiness and sense of irritation in the stomach; and often also by a feeling of constriction about the fauces, accompanied with a watery secretion from the posterior part of the mouth. Coldness, slight stiffness or numbness of the fingers, are sometimes present: and the other parts of the system are, in general, affected with a great degree of nervous sensibility. The second species of headach, or that depending upon irritation in the bowels, probably in the duodenum, is remarkable for the appearance of brilliant ocular spectra<sup>1</sup> which distress the patient; there is chillness of the body, and coldness and dampness of the hands and feet; the pain in the head is very severe, attended with a sensation of coldness and tightness of the scalp, slight giddiness, weight, distention and stiffness of the eye-balls. In some cases, as these symptoms increase, they are accompanied by tingling and numbness of the fingers and hand. The tongue, in this disorder, is usually covered with a yellowish white fur, and is often very considerably coated with it. The pulse is of the natural frequency, but languid; nausea is often present, but seldom in so great a degree as to produce vomiting. There is usually flatulency, and a sensation of dryness and inactivity of the bowels. This last symptom I consider as pathognomonic: the patient feels as if his bowels had lost their sensibility, and were unable to propel their contents, which occasions a peculiar sensation of weight and stoppage. Dr. Warren observes, that the appearance of the stools vary so much, that a general rule cannot be drawn from them; but he believes, that in all cases of headach of this description, they will be found of an unhealthy quality. The most frequent appearance in them is bile in too large a quantity; sometimes of various colours, and of different degrees of viscosity: occasionally the evacuations have a natural appearance, but contain portions of undigested food. At other times, the stools are of a faint yellow colour, and float upon water, giving out an odour like that of saliva: a very common appearance, especially where there has been great dejection of spirits, is a loose stool, of a dark greenish

<sup>1</sup> Depending probably upon what has been termed the *phosphorescence of the retina*, and produced by pressure, as any person may readily observe by pressing the eyeball outwards with the point of the finger, when a circle of light will be perceived; in like manner in the act of sneezing gleams of light are seen. In the case of dyspeptic headach the effect is probably induced by the pressure of the bloodvessels upon the retina.

brown colour, in smell resembling that of the grounds of sour beer.

297. The *stomach* headach generally occurs in the earlier stage of digestion ; that which may be termed the *duodenal* headach, takes place when the food has passed into the intestines. The former is relieved by an emetic, the latter receives little or no mitigation from such a remedy : this is consonant with our theory of its origin ; whereas, a purgative, as we should expect, generally cuts short the paroxysm, by hastening the expulsion of the offending cause. The practitioner, however, will remember the circumstances that may render the administration of an emetic *safer* than that of a purgative.

298. From the symptoms above related, he will not be at a loss to discriminate between these two species of headach ; but pain in the head may arise from causes distinct from the alimentary canal ; as from congestion in the brain, from its internal disorganisation, from diseased bones of the skull, or from a deranged state of the nervous system. It will be useful to point out the diagnostic symptoms by which each of these affections may be distinguished. Dr. Warren observes, that headachs which arise from congestion in the brain, are distinguished from those of dyspeptic origin, by the presence of plethoric symptoms, by a full and oppressed pulse, by a difference in the character of the pain, which, in the headach arising from fulness of blood, is accompanied with throbbing, and a sense of action in the system, which alarms the feelings ; while the pain of dyspeptic headachs is described as being either a dull aching, or else a racking pain, often moving from one part of the head to another, and attended with soreness of the scalp. In the first, the eyes look red and full ; in the second, they have a depressed and languid appearance. Those which arise from internal disorganisation, the same eminent physician considers to be marked by an acute fixed pain, by a quick, irritable, and sometimes irregular pulse ; but should pressure on the brain have taken place, the pulse is full and slow, but is not attended with the steady violent heat which accompanies sudden congestion of blood in that organ. When headach is caused by chronic disease of the bones of the skull, it is distinguished by the constancy of the pain, which is confined to one spot, whence violent shootings proceed to some fixed point. As the disorder advances, slight symptoms of pressure on the brain ensue ; and on examination, a tenderness of the bone is observed. The nervous headach is distinguished by the absence of constitutional disorder, and by the smallness of the space on the surface of the head which the pain occupies.

299. There sometimes occurs a soreness of the scalp, with shooting pains, which are produced by the slightest touch. This affection, I believe, generally depends upon some derangements of the biliary system.

300. There is a species of headach which would appear to depend upon a languid circulation through the brain ; it occurs

after an excess of wine ; or, in women, during the catamenial discharge. It is described as rather resembling numbness than pain, or that sensation which is produced by intense cold. The languor of the circulation, pallor of the countenance, and other symptoms of debility, will offer sufficient means for distinguishing it.

301. If the dyspeptic headach be allowed to take its course, it will generally terminate in a few hours ; but when it has become habitual, it is often protracted through one, two, or more days. Its cure is to be effected by those means which we have afterwards to consider, as the best modes of rectifying the errors of the digestive organs.

302. Cutaneous eruptions are not unfrequently produced by a fit of indigestion : such affections are popularly denominated *surfeits* ; they are generally of short duration, and disappear on the removal of the offending cause ; although severe and inveterate diseases of the skin are sometimes established, and continued by a chronic disease of the stomach or other digestive organs. The best mode of treating such affections, and the diet which should be employed for their cure, will form a subject for future consideration.

#### INDIGESTION FROM BILIARY DERANGEMENT.

303. It is evident that a regular and healthy secretion of bile is indispensable to the act of chylication, and to the proper action of the intestines, and that a deficiency, redundancy, or a vitiated condition of this fluid may act as an exciting cause of indigestion. If it be deficient, the chyme cannot undergo that decomposition in the duodenum by which chyle is formed and separated ; and as the bowels are, at the same time, deprived of their natural stimulus, the undigested mass is not protruded, but is left to undergo various morbid changes ; air is extricated, the alimentary secretions become depraved, and the whole series of the digestive functions are thus suspended, or deranged. If the bile be too copiously secreted, it is poured out in large quantities into the intestine, producing temporary diarrhœa, and part of it being regurgitated into the stomach, during the act of vomiting, which, in the first instance, is excited by the sympathy of the stomach with the duodenum and hepatic system, occasions a train of symptoms of greater or less severity, according to the circumstances of each particular case. If the bile be vitiated in quality, it will not only be incapable of accomplishing the alimentary change which it is destined to fulfil, but it will irritate and fret the mucous membrane by its contact. It is evident that the violence and extent of the symptoms produced by such causes will be liable to vary ; and the practitioner must not imagine, that the absence of diarrhœa, colic, and other violent feelings, affords evidence of the healthy state of the biliary secretions. Derangements in these functions often proceed insidiously, and lay the foundation for a serious disease, which, although latent

for a period, will ultimately be kindled into activity, whenever an exciting cause shall fire the train.

304. To explain the origin of biliary irregularities, we have to consider the sympathies by which the liver may be influenced. The investigation of the diseases of warm climates, and the corrected views, with regard to the autumnal complaints of our climate, have sufficiently established the existence of a sympathy between the skin and the liver. Whenever an organ has been in a state of over-excitement, it is liable to fall into a corresponding state of torpor. The perspiration is, therefore, more apt to be checked after the continuance of hot weather, than at any other season of the year; and since the same observation may be extended to the liver, we shall readily perceive the cause of those biliary affections which so generally occur in this country during the autumnal season. The application of cold to the feet, or whatever contributes to check the perspiratory functions, may create, in those predisposed to such complaints, a *bilious* attack. The sympathy which subsists between the stomach and liver has already been adverted to. It seems a wise provision, that the biliary function should be connected, by a close sympathy, with that of the stomach, in order that the food, converted into chyme, may meet with a necessary quantity of bile in the duodenum. In consequence of such a sympathy, irritation in the stomach is generally attended with an increased secretion of bile; the action of nausea is usually followed by such an effect. Hence, melted butter, every thing fried, pastry, and other indigestible materials, are popularly denominated *bilious*; and although such a term countenances a latitude of expression, which is inconsistent with the more definite notions of strict pathology, yet it cannot be said to be erroneous. As the varied and increased action of a gland has much influence in determining the nature of the fluid secreted, we cannot be at a loss to explain the vitiated condition in which the bile is secreted under such circumstances: indeed it is frequently on such occasions of a degenerated colour, extremely acrid, and scarcely possessing the qualities of bile. Dr. Saunders considers it probable, that from the quantity secreted, and the rapid manner in which it is poured into the duodenum, there is not time sufficient for a perfect secretion.

305. We may therefore agree with Dr. Saunders, that whenever, either from an irregular distribution of nervous energy, or from the operation of indigestible and acescent food, the tone of the stomach falls below the degree necessary to the digestive process, the liver immediately sympathises with it, and bile is no longer emulged into the duodenum, until a reaction takes place, when its quantity is morbidly increased in proportion to the degree of previous atony. If this occur to such an extent, that its free admission into the intestine be impeded, it will accumulate in the excretory ducts of the liver, and either regurgitate into the system by the hepatic veins, or be absorbed by the lymphatic system, and a yellow suffusion of the skin will follow.

306. The abuse of spirituous liquors, from their operation on the stomach and brain, is a fertile cause of biliary derangement; and from the sympathy between the sensorium and the liver, the effects of strong and sudden mental emotions, in occasioning an irregular secretion of bile, will also admit of satisfactory explanation. I was lately called to a patient who had become violently jaundiced in the space of three hours, in consequence of having received some intelligence which threw him into the highest state of consternation.

#### PROGRESS AND SYMPTOMS OF CHRONIC INDIGESTION.

307. From considering a fit of indigestion in the stomach or duodenum, let us now proceed to trace its consequences, when it is frequently repeated or protracted. In this case, other organs become successively involved in the mischief, and a train of distressing and complicated symptoms arises. Dr. Wilson Philip has considered indigestion as divisible into three distinct stages. Under the first he arranges those symptoms which merely announce a disturbed and unhealthy condition of the digestive functions. The second stage he considers as denoted by the tenderness of the epigastrium, and the hardness of the pulse. The third stage includes those diseases which he supposes to arise from the change of structure, which is ultimately produced by long-continued functional derangement. I have no great objection to a conventional division of this kind, if it can in any way assist the memory of the practitioner, and contribute to the perspicuity of the description, by presenting the symptoms in well-defined groups, rather than in a separate and unconnected form. But the arrangement is wholly artificial. Nature does not acknowledge it, nor will she submit to it; if, then, any advantage is to be derived from it, it must be received and considered only as an attempt to class together those symptoms which may arise from functional aberration, and those which are more usually associated with organic change. We must renounce all rigid adherence to definite stages and arbitrary divisions, which nature disclaims. Every practitioner of any experience must well know that the hard pulse and tenderness of the epigastrium are likely to occur in even a temporary attack of indigestion; and I have frequently witnessed extensive mischief, with change of structure, without the occurrence of such indications. With regard to the "third stage," I would observe, that if the diseases therein stated as the results of indigestion be purely such, we may as well at once refer all organic disease to the same source, and, like the ancient physicians of Egypt, confine our prescriptions to vomits, purgatives, and abstinence.

308. In the former editions of this work I animadverted upon a form of pulmonary disease, to which Dr. Wilson Philip gave the name of "*Dyspeptic Phthisis*;" I declared myself sceptical as to

the existence of any malady which could be strictly entitled to such a specific appellation. I never doubted the tendency of dyspeptic disturbance to call into activity previously-existing tubercles, nor have I ever ceased to rely upon measures which are calculated to invigorate the functions of digestion, as those most likely to retard the developement of tubercular disease. I know, from ample experience, that persons may pass through a long series of years with extensive pulmonary disorganisation, provided the diet and habits be judiciously managed,—the circulation kept in check, and, above all, the expenditure of muscular power cautiously economised. On the contrary, the fatal termination may be equally accelerated by creating a permanent disturbance in the digestive functions, and by repeated fatigue. The system of exposing such patient to that combination of evils which are inseparable from a constant change of place, or long-continued journeys, has too frequently cut short the thread of life.

309. If Dr. Philip designates a latent disease, thus kindled into activity, *dyspeptic phthisis*, we are no longer at issue. Mr. Travers, in one of the most philosophical works that has appeared in our times,<sup>1</sup> has demonstrated, by argument and examples, that “most individuals carry within themselves the seeds of disease and death. Upon examination of the bodies of persons dying from disease or accident after the middle of life, it is rare not to meet with some palpable evidence of organic change not previously known, or at best only vaguely surmised to exist.” Diseases sometimes lie hid, as if they had, by slow introduction and encroachment, inured the system to bear with them; “but,” continues Mr. Travers, “it is unnecessary to urge this argument farther than to show that minute organic changes, scarcely discernible in detail, because not actually inducing illness, compose in the aggregate an amount of mischief which clogs the machine when called upon by any extraordinary emergency.” Mr. Rose has stated that, during the Peninsular war, he met with several instances of abscesses in the lungs occurring after amputations and wounds of the extremities.

310. But to return from this digression to the subject more immediately before us, viz. the complicated train of symptoms which successively present themselves in cases of protracted dyspepsia.

311. It has been seen that indigestion may originate in the stomach or intestines, either from vitiated secretion, muscular imbecility, nervous derangement, or biliary and pancreatic disturbance; but, from whatever cause the disease may primarily originate, after it has remained for some time in operation the different organs, directly or sympathetically connected with the chylopoietic apparatus, will participate in the mischief, and it will not be easy to distinguish between primary symptoms, and those of mere induction. There is, perhaps, not any disease which is more proteiform

<sup>1</sup> “A Further Enquiry concerning Constitutional Irritation, and the Pathology of the Nervous System.”

in its aspects than dyspepsia : we shall rarely find any two cases precisely similar in the origin and progress of their symptoms, although, to an experienced judge, they will present such a general similitude, as to leave no doubt of their nature and causes.

312. The dyspeptic patient having, for some time, suffered from those feelings of uneasiness which have been already described, experiences some diminution in his strength. This, at first, is only occasional, and is for awhile attributed by him to some accidental circumstance ; he had felt it before, and the readiness with which his elasticity and strength returned, naturally inspires a hope that his present depression may be removed ; but it has endured longer than usual, and he ultimately becomes alarmed. It is in this stage of the malady, that the patient frequently introduces himself, for the first time, to a physician. It is of great importance, upon such an occasion, to distinguish between that feeling of transient depression, which, as Tissot observes, is invariably associated with alimentary disturbance, and that debility which announces a general diminution of constitutional energy. In the former case, there are periods in which the patient feels perfectly well and strong ; but in the latter, although his spirits may vary, he never rises to the healthy standard of vigour. He tells you, that "he begins to feel his usual avocations irksome, and too laborious ; that he has long suffered from *a bad digestion*," which by care and management he had been hitherto enabled to control ; but that he has now little or no appetite, that his strength fails him, and that he fears he is "getting into a bad way." He finds that the slightest exercise occasions fatigue, and deluges him with perspiration. On examining the tongue, it will be usually found coated on the posterior part, and on its centre, with a brownish-yellow fur : his bowels are, by turns, costive, and too much relaxed ; the pulse at this period is generally slow and small, although it is sometimes hard ; his countenance is more pallid than usual ; the eyes appear sunken, and the eye-lids swollen, and the eye-balls are occasionally injected with yellow streaks.

313. In some cases, heartburn and a sense of oppression are experienced after meals ; but in others, the patient only complains of languor and extreme listlessness. On some occasions, a sense of constriction is felt about the fauces, and a difficulty of swallowing is experienced, as if the œsophagus presented some mechanical obstruction to the passage of food. Dizziness ; unusual drowsiness ; pains in the head ; ringing in the ears ; a disagreeable taste in the mouth ; an altered state of the salivary secretion, being sometimes limpid like water, and at others thick and ropy ; palpitation and a sense of faintness are symptoms which also, in a greater or less degree, usually distress the dyspeptic sufferer. His hands are alternately hot and cold ; in the former state they are dry, in the latter more usually damp. His nights are sometimes, but not generally, disturbed by restlessness and uneasy dreams. He wakes in the morning without that feeling of refreshment which follows repose in health, and is unwilling to rise from his bed, or indeed to move ;



his limbs ache, the muscles of the trunk are even sore to the touch ; and any change of position is attended with inconvenience. Every alteration in the weather is felt as a serious evil ; if it becomes a degree or two colder, he creeps to the fire, and inveighs, in terms of bitterness and sarcasm, against the variableness of the climate : if its temperature be raised, he is oppressed with heat. His bowels become more and more untractable ; the usual purgative ceases to produce its accustomed effect ; he increases the dose, and when it does operate, the action is too powerful, and its effects are not easily checked ; a diarrhœa is established, and this again, in its turn, is superseded by still more obstinate constipation. "If I could but obtain a medicine," cries the invalid to his physician, "that would keep my bowels in a regular state, I should soon become convalescent : " there lies the difficulty ; the evil arises from the inconstant and unsettled state of the alimentary secretions, and it is not easy to graduate an artificial stimulant so that it shall always correspond with the varying state of the organs upon which it is to operate. The depression of his spirits increases as the disease advances : he gives his case up as lost ; loses flesh, suffers a thousand distressing sensations, and fancies the existence of a thousand more. Wandering pains are felt in the bowels and side ; a tenderness in the epigastrium is experienced on pressure ; the abdomen is often preternaturally tense ; his breathing is occasionally oppressed ; a short dry cough distresses him, and expectoration is extremely difficult. If, under such circumstances, the alvine discharges be inspected, they may present every variety of morbid appearance ; they may be unnatural in colour, odour, consistence, figure, or quantity. I shall, hereafter, have occasion to speak more fully upon this subject, as well as upon the morbid appearances which the urine presents under such circumstances.

314. The patient, in this state of his disorder, will sometimes complain of being disturbed, on first falling asleep, by fearful startings, and catching of the limbs, uneasiness in the region of the chest, attended with difficulty of breathing, so as to resemble *angina pectoris* ; and it is not unusual for him on such occasions to perceive flashes of fire, like lightning, with a numbness in his hands ; this numbness is sometimes only felt in one or two fingers. Sore throat, occasioned by relaxation, is also a very usual symptom ; the skin is frequently dry, and even scaly ; the tongue also becomes drier, and sometimes clean, and of a brighter colour than usual. Harassed by such feelings, the unhappy invalid anxiously proposes a trial of change of air, and his friends acquiesce in the belief that such a plan will tend to his recovery. He quits his residence, but to no purpose ; his emaciation increases : his ancles swell : and the general debility thus produced sooner or later calls some other disease into activity, the nature and locality of which will necessarily vary in different cases. If the spring of a piece of machinery snaps, and all its different parts are hurried into violent motion, the wheel upon which the greatest strain is made, or that which is of

the weakest construction, will be the first to give way. Just so is it with the human body. Those organs more immediately connected with the digestive function will more readily undergo a change of structure, on account of the protracted irritation they must have sustained. Then, in succession, those which are connected by the ties of sympathy; while the general loss of balance, thus occasioned, will render any organ, originally weak, very liable to disease. This view of the subject is supported by experience; the history of those complaints which terminate the life of the dyspeptic patient will sufficiently explain the manner in which they were produced. Unless they take their origin in a viscus immediately connected with the digestive functions, as in the stomach, intestines, mesenteric glands, liver, &c. dyspepsia can only be considered in the light of a general debilitating cause; and it is a circumstance no less extraordinary than important, that when any new disease is permanently established, the original symptoms are mitigated, and sometimes wholly suspended; whereas, if the new affection be only symptomatic, instead of relieving, it often aggravates them.

315. Dr. Philip lays great stress upon the hardness of the pulse, as indicative of approaching mischief; I confess that my experience does not confirm the importance he has ascribed to it. The *permanent* tenderness of the epigastrium, if accompanied by a clean bright tongue, excites a greater apprehension in my mind. The pulse is very treacherous in its indications: I have found it to be soft and undulating in cases where no doubt could exist as to the presence of organic mischief. It is just, however, to state, that Dr. Philip acknowledges that its hardness is sometimes only perceptible when examined in a particular way. He says that those who have been much in the habit of examining the different states of the pulse, must be aware, that its hardness is most perceptible when a slight degree of pressure is employed. A certain degree, by greatly compressing the vessel, will give some feeling of softness to the hardest pulse, and a slight degree of hardness is not perceptible with the pressure generally employed in feeling the pulse. If the pressure be gradually lessened till it comes to nothing, it often happens that a hardness of pulse is felt before the pulse wholly vanishes under the finger, when no hardness can be perceived in the usual way of feeling.

316. After indigestion has continued to harass the stomach for some time, its villous coat may certainly become affected: and as the pylorus, from the peculiar nature of its office, is more exposed to the continued source of irritation than other parts of the stomach, it is perhaps liable to become inflamed, and the tenderness in the epigastrium may possibly in some cases be thus explained; but it should be remembered that, in internal diseases, the pain is frequently referred to a part at some distance from the real source of it; a morbid distention of the liver, an irritated state of the duodenum, and a gorged condition of the colon, are not uncommonly

attended with the same feeling. It is, at the same time, difficult to imagine, how serious mischief can be inflicted upon the pylorus without the occurrence of vomiting.

317. When the bowels have been long in a state of disorder, the villous coat becomes tumid, turgid with blood, and sometimes ulcerated; and Mr. Abernethy states that these appearances have been most manifest in the large intestines. He says that he has repeatedly observed, in dissections of these cases, the large intestines to be more diseased than the smaller ones, and he accounts for this fact in the following manner. If digestion is incomplete, the indigested food must be liable to chemical changes, and the products resulting from this cause are likely to be most stimulating to the large intestines. Indeed, he adds, in advanced stages of this disorder, mucus and jelly tinged with blood are discharged, and it seems probable that a kind of chronic dysentery may be thus induced. In my own practice, I have witnessed several cases of this kind; but I confess that I cannot perceive why the duodenum and smaller intestines should not be equally exposed to such a source of irritation, unless we suppose that nature has kindly thrown a protection around that part of the canal which is most active in the process of digestion.

318. It is not extraordinary that protracted dyspepsia should sometimes terminate in a disease of the mesenteric glands; it is only surprising that such a state of irritation and imperfect development of chyle should continue for so long a period, as they are in many cases known to do, without occasioning such an effect. We must suppose that the selecting tact with which the lacteals are endowed, enables them for a considerable time to reject imperfectly formed or vitiated chyle, and that it is not until this is destroyed, that the irritating matter finds its way to the glands. The circulating fluids of the body are for the same reason not materially deteriorated until the dyspeptic disease has continued for some time; the blood then undergoes some important change, but animal chemistry is not yet sufficiently advanced to demonstrate its nature. I have examined the blood of a patient who had long laboured under a disease of the digestive organs, and the most remarkable character which it presented was the loose texture of its crassamentum, and a deficiency in its red globules. In some cases the serum assumes an opaline appearance.

319. When we consider the connection which subsists between the function of the kidneys and that of the chylopoietic organs, we shall easily explain the disturbed appearance of the urine, and the occurrence of calculous disorders in cases of dyspepsia.

320. In relating the diseases immediately consequent upon a deranged state of the digestive organs, it may appear somewhat strange to introduce the consideration of a condition of the body, generally arising from a vigorous action of these organs, but which, nevertheless, must be considered, when it passes beyond certain bounds, as a serious evil; I allude to the excessive formation of

*fat.* The subject has been very ably considered by Mr. Wadd, (*Cursory Remarks on Corpulence,*) and his work, which, during its progress through three editions, has *fattened* from a meagre pamphlet into a portly octavo, may be said to comprehend nearly all the knowledge we possess upon the subject. It is written in a humorous style, and if there be any truth in the popular adage, "*Laugh and grow fat,*" I will, without hesitation, assert, that the perusal of the work is ill calculated to benefit the class of patients for which it was written. He enumerates the several remedies which have, at different times, been proposed to check the excessive formation of fat; but he appears to have overlooked the most important, and, in my judgment, the only medicinal agent which is likely to answer the object of its exhibition, viz. small doses of the *sulphate of magnesia*, so as to increase the peristaltic motion of the alimentary canal, at that period of the digestive process, when the chyle is about to enter the lacteal system.

321. Before I proceed to consider the medical treatment and dietetic regulations most appropriate for the cure of the several forms of indigestion, it will be necessary to inquire into the remote and immediate causes of that disease. In fulfilling this part of my duty, I shall deviate from the usual plan of such investigations, and arrange my observations in an order that may, in some degree, correspond with that which should be adopted by every physician who undertakes to examine a patient with a view to detect the cause, nature, and seat of his disease. I shall first present the reader with a tabular arrangement of the objects of such an inquiry, and then comment upon the relative importance of each.

A SCHEME FOR INVESTIGATING THE CAUSES, NATURE,  
AND SEAT OF INDIGESTION.I. LEADING QUESTIONS, *concerning*

- SPECIFIC SYMPTOMS.** {
1. Their Nature; Intensity; Duration; Permanence and Locality.
  2. Their Accession; Concourse; and Order of Succession.
  3. Whether increased or mitigated by any particular posture or motion.
  4. Assignable Causes. {
    - a. *The Patient's own belief.*
    - b. *Preceding Aliments.*
    - c. *Hereditary Predisposition.*
- 
- GENERAL SYMPTOMS.** {
- |                    |   |  |  |
|--------------------|---|--|--|
| Animal Functions.  | { | 1. Strength and regularity of voluntary motions. | sensations.<br>intellectual operations.  |
|                    |   | 2. _____   |  |
|                    |   | 3. _____   |  |
| Vital Functions    | { | 1. Pulse, with respect to                        | { <ol style="list-style-type: none"> <li>a. <i>Strength.</i></li> <li>b. <i>Frequency.</i></li> <li>c. <i>Hardness.</i></li> <li>d. <i>Order.</i></li> </ol> |
|                    |   | 2. Respiration.                                  | { <ol style="list-style-type: none"> <li>a. <i>Its Degree.</i></li> <li>b. — <i>Uniformity.</i></li> <li>c. — <i>Equable Diffusion.</i></li> </ol>           |
|                    |   | 3. Animal Heat.                                  |  |
| Natural Functions. | { | 1. Appetite and Thirst.                          | { <ol style="list-style-type: none"> <li>a. <i>Salivary.</i></li> <li>b. <i>Cutaneous.</i></li> <li>a. <i>Alvine.</i></li> <li>b. <i>Urinary.</i></li> </ol> |
|                    |   | 2. State of the Tongue.                          |  |
|                    |   | 3. State of the Secretions.                      |  |
|                    |   | 4. — of the Excretions.                          |  |
- 
- PARTICULAR CIRCUMSTANCES,** {
1. Age.
  2. Occupation. {
    - a. *Whether sedentary or active.*
    - b. — *conducted in any particular posture.*
    - c. — *in heated rooms, or in the open air.*
  3. Former Habits and Customs. {
    - a. *With respect to Diet.*
    - b. *Activity of Mind and Body.*
  4. Residence. *Climate.*

II. OCCASIONAL QUESTIONS, *concerning*

- FEMALES.** {
1. State of Menstrual Discharge.
  2. Married or Unmarried State.
  3. Impregnation. Lactation. Number of Children.
- CHILDREN.** 1. Dentition. 2. Former Diseases. 3. Diet, &c.

III. GENERAL OBSERVATIONS, *upon*

- PHYSICAL CHARACTER.** {
1. Bulk and Stature.
  2. Particular Conformation.
  3. Complexion and Physiognomy.
  4. Mobility and Irritability.

## IV. COLLATERAL CIRCUMSTANCES.

1. Season of the Year.
2. Nature of Prevailing Epidemics.
3. Weather. {
  - a. *Moisture and Dryness.*
  - b. *Prevailing Winds.*
  - c. *Abundance and Quality of Fruits.*

## COMMENTARY UPON THE PRECEDING TABLE.

322. In order to illustrate the relative importance of the several subjects which are embraced in the preceding tabular scheme, as well as to direct the practitioner into the more direct path of pathological inquiry, let us suppose a person labouring under some one of the forms of dyspepsia, to present himself for examination. We first learn, from his own report, the general nature of the symptoms by which he is distressed; and we then proceed to make such further inquiries as may enable us to form an opinion respecting their origin and mode of cure.

323. The *intensity* of the symptoms cannot be always inferred from the patient's own report, but must be deduced from our experience in such cases. The dyspeptic is too apt to depict his feelings in extravagant language, and to become unnecessarily anxious and apprehensive. An inquiry into the *duration* of his complaints is of much importance; for it has been already stated that the intervals of comfort are abridged as the disease progresses, until at length he becomes harassed by an uninterrupted series of sufferings. It is, however, from the *locality* of the symptoms that we are to form our opinion with respect to their seat and origin; and for ascertaining this fact we must be particular in our inquiry, and minute in our examination. Is the stomach affected? If a sense of weight or burning after the ingestion of food, acid, or putrescent eructations be present, we may conclude such to be the case. If there exist any uneasiness or fulness in the epigastric and right hypochondric regions, produced or increased by pressure, we may infer that there exists some diseased condition of the liver, duodenum, or, perhaps of the stomach; and that we may be enabled, under such circumstances, to form a diagnosis, the patient must be submitted to a manual examination. For this purpose, every ligature must be removed from the abdomen, and he must be placed on a sofa, reclining on his back, with his legs drawn up, so as to throw the abdominal muscles into a state of relaxation. Where the fulness and tenderness arise from a distended state of the duodenum, the sensation given to the hand is very different from that which is produced by organic disease of the liver; the tumour in the former case is more diffused and less defined. It also deserves particular notice, that, by pressure, *on* the region of the liver, no uneasiness will be complained of, but if the pressure be made with the edge of the open hand under the ribs, with the palm of it flat upon the abdomen, considerable uneasiness will be felt up towards the liver, and down towards the right kidney; a soreness is likewise felt an inch or two to the right, just above the navel. In such cases, also, the anatomical accuracy with which the patient will trace the course of the duodenum with his finger, from the stomach to the loins on the right side, and back again across the abdomen

to the umbilicus, will greatly assist the diagnosis. There are, besides, other symptoms to be hereafter enumerated, which will enable us to arrive at a still more positive conclusion. It is of the greatest importance to distinguish between a morbid state of the duodenum and that of the liver: I have frequently, in the course of my own practice, seen patients who have undergone salivation, from a belief in the existence of hepatic disease, but who were merely suffering under duodenal irritation. On the other hand, I am equally satisfied that chronic inflammation of the liver has been repeatedly mistaken for a dyspeptic state of the stomach. Dr. Saunders says, that he has seen many cases of this kind, which have been supposed to arise from indigestion. The patient generally complains of pain, which he falsely attributes to the stomach; but its continuance is so short, and the degree of it frequently so inconsiderable, that no alarm respecting the future health of the patient is produced. The relief obtained by eructation and discharge of air tends to confirm the opinion that the seat of the disease is in the stomach; but this relief may be explained on the principle of removing the distention of the stomach, and so taking off the pressure of this organ from that which is the seat of the complaint.

324. Where the tenderness in the epigastrium is extremely circumscribed, not occupying a space larger than a shilling, Dr. Philip infers the presence of an inflammatory affection, or a state approaching to it, of the pylorus, excited by the passage of the irritating contents of the stomach; I cannot, however, conceive such a state of pylorus, as to occasion pain on pressure, to be unattended with vomiting.

325. *The accession, concurrence, and order of succession* of the different symptoms, are calculated to throw considerable light upon the nature of a dyspeptic disease; indeed, in protracted cases, it is only by a careful examination of these circumstances that we shall be able to separate primary from secondary affections. The stomach cannot long err without communicating its vice to the other chylopoietic organs; the liver may become affected from mere irritation, and every part of the body, from sympathetic influence, may put on the appearance of disease. How are we, then, except by a careful examination into the history of the case, to ascertain the organ in which the mischief originated?

326. *Whether the symptoms are mitigated, or increased, by any particular posture or motion.* This is an important question. Where the disease is confined to the stomach, the patient appears capable of lying with equal ease on either side; but if the duodenum or liver be affected, he will experience some uneasiness on lying on the left side. Where the disease has become complicated, lying on either side is irksome, and the easiest position is found to be that of lying on the back, with the shoulders a little raised, and inclined to the right side. The muscles of the chest are, on such

occasions, not unfrequently sore, and the patient finds it difficult to turn even in his bed without pain.

327. *Assignable causes.* It will be always right to inquire of the patient whether he can account for the accession of his disease. He will tell you whether he has exposed himself to the operation of any of those causes which are known to be active in producing it. His previous state of health should also be investigated, for we may be thus enabled to explain the occurrence of symptoms, and to connect them with the derangements of distant organs. An affection of the stomach may, for instance, be traced to some sympathetic action, which might otherwise be mistaken for a primary disease.

328. *Hereditary susceptibility.* So many vague notions are entertained upon this subject, that it will be necessary for me to define the latitude in which the term is to be received. Dyspepsia, depending upon peculiarity of stomach, is certainly hereditary, but it is only hereditary in *predisposition*, always requiring the influence of some cause to produce it, and consequently always to be prevented, and often relieved, by avoiding such exciting cause. In cases of great obscurity, a knowledge of the disease to which the patient's parent is particularly obnoxious, must, for reasons sufficiently obvious, assist our judgment.

329. Having acquired all the information which is to be obtained by questioning the patient upon the subject of his "specific symptoms," we are next to investigate the "general symptoms," connected with the animal, vital, and natural functions. In this line of inquiry, the judgment which we have been able to form will be confirmed or modified; we shall, at the same time, be enabled to discover the influence which the local affection has produced upon the general system.

330. It has been observed that the strength of the patient, both as it regards the voluntary motions, and intellectual operations, does not suffer until the dyspeptic disease has acquired a considerable influence over the system. The condition, therefore, of these functions will serve as a measure of the severity of the complaint; but in forming such an estimate, we must be careful to avoid the fallacies with which it is surrounded.

331. *The pulse* only affords indications of questionable value; when taken in conjunction with other symptoms it may serve to fortify our conclusions; but I am anxious to impress my strong conviction upon the mind of the practitioner, that when received as an isolated testimony, it will be liable to lead him into error. Its strength, when other evidences concur, will undoubtedly throw some light upon the general state of the vital powers; its frequency may indicate a state of morbid excitement, its *hardness* must excite the suspicion of organic mischief, and its irregularity will denote a disturbed state of the circulation, the cause of which must be deduced from other symptoms.



332. *The state of the respiration* is a circumstance worthy of attention: for it may concur, with other symptoms, to indicate a state of congestion in the abdominal viscera, by which the descent of the diaphragm is impeded. It will also suggest other states of primary or secondary disease, the nature of which the reader will easily understand from the various observations which are interspersed through the preceding pages of this work.

333. *Animal heat*.—The degree, uniformity, and equable diffusion of heat are circumstances of importance: they will enable us to form some estimate of the state of the vital powers generally; and when we consider what an intimate connection subsists between the temperature of the body and the different stages of digestion, it will throw some light upon the comparative energy with which they are performed.

334. With regard to the indications afforded by the state of the appetite for solids or liquids, I have already delivered my opinions.

335. *The appearance of the tongue* has also been noticed in the preceding pages of this work; it is natural to expect that a part, which is so immediately connected with the functions of the stomach, should be the first to exhibit a deranged condition in dyspepsia, and we accordingly find this to be the case. Baglivi has said that the pulse may deceive you, but that the indication afforded by the tongue is infallible. It greatly varies, however, in appearance, in different cases, and in different stages of the same case. When white and milky, it announces general irritation, frequently from mental causes. When brown or dark-coloured, foul congestions in the primæ viæ, or the presence of vitiated secretion; and when unusually bright and shining, a morbid condition of the villous coat of the stomach or intestines, which is usually associated with, or is the precursor of, organic mischief; for it indicates the presence of a degree of fever not commonly excited by the simple functional aberrations of the digestive organs. In some cases the tongue is comparatively clean, but its cuticle loses its natural hue and natural transparency, and presents a sodden appearance: this generally depends upon the secretions having been for a considerable length of time in an unnatural state.

336. There is a phenomenon connected with the appearance of the tongue of much importance in its indication, and which, as far as I believe, has been so little noticed, that I am anxious to call the particular attention of the practitioner to its nature. It is a dirty brown fur principally occupying one half of the tongue, longitudinally from its root to its tip. I believe that such an appearance may be very generally received as an evidence of cerebral disturbance. In paralysis it is frequently very striking, but in morbid states of the nervous system, short of such mischief, I have noticed its presence in a less defined form, and have found the conclusion deduced from it subsequently confirmed by other symptoms.

337. *The salivary secretion* is susceptible of various morbid conditions, to which the labours of the animal chemist have not

hitherto been directed ; it is sometimes unnaturally ropy or viscid, so as to occasion an incessant hawking ; at other times it is so preternaturally thin and copious, as to be discharged from the mouth in considerable quantities. I have lately seen a dyspeptic patient who declares, that his pillow is thoroughly wet in the morning with the discharge which takes place during the night ; and yet dryness of the mouth, and a parched tongue, are amongst the most disagreeable of his symptoms, as if the secretion had lost the power of lubricating the parts to which it is applied. Frank states that he has known the saliva, when secreted in unnatural quantities, to have become saccharine.

338. *The state of the cutaneous discharge* is a circumstance of more importance than physicians usually assign to it. The reciprocal connection which subsists between the functions of the skin and stomach is so obvious, that if the latter be deranged, the former is immediately affected, and *vice versa*. It is the change produced upon the skin which assists in bestowing that peculiar physiognomy so characteristic of protracted indigestion ; and amongst the most useful remedies in this disease, will be found those which are calculated to restore the healthy action of the cutaneous organs. When we remember that a person in health who takes eight pounds of aliment during the twenty-four hours, will discharge five of them by perspiration, we shall readily perceive how greatly the suspension or derangement of such a function must burden the digestive organs.

339. *The condition of the excretions*, as to quantity and quality, is another object of important inquiry. I shall first describe the different appearances which the *fæces* may present in the various cases of chylopoietic disturbance. On some occasions they will contain an excessive quantity of bile ; on others they will not be sufficiently tinged with that secretion, and will therefore assume a light yellow, or a clay brown colour. They will sometimes more particularly indicate by their appearance the presence of vitiated secretion, and have a dark olive, or a blackish brown hue. In some cases they have so far degenerated as to resemble pitch. The gall bladder frequently discharges highly concentrated and acrid bile, scalding the anus during its passage. Where the biliary secretion has been irregularly supplied, the *fæces* may assume a partially coloured appearance. It is not unusual to notice mucous and gelatinous matter accompanying, but not mixed with the *fæces*, and which have been sometimes mistaken for worms. It must have derived its origin from the alimentary membranes, or from the glands situated in the canal. There is a very peculiar morbid evacuation which I have occasionally witnessed, and which has been described as resembling yeast in colour and consistence. This frequently comes on suddenly, and as suddenly departs ; it is generally very profuse in quantity, and is usually preceded by uneasy sensations in the alimentary canal. It would appear to be a morbid secretion of the intestinal juices during a torpid state of the liver :

although in one case, in which I witnessed its occurrence, it was evidently connected with a diseased state of the pancreas. I may, in this place, take notice of the appearance of fat-like lumps of matter which are sometimes passed from the intestines. I suspect that they are inspissated portions of mucus from the cæcum; I have, at least observed such evacuations to be accompanied by pain in that region. In most cases of dyspepsia, the stools will contain portions of undigested food, showing at once the failure of the assimilating powers. The odour of the discharge is a circumstance of importance; a fetid stool indicates less permanent or extensive change, than one which is deficient in the characteristic odour, and yields a faint smell. The consistence of the fæces will likewise be found to afford some useful signs. It has been generally supposed that their dryness affords a proof that the nutritive part of the aliment has been duly absorbed; and there can be no doubt that such motions, if their colour be natural, should be considered as favourable in cases of indigestion. Boerhaave has remarked, that "people who complain of going too seldom to stool, and of voiding hard and dry fæces, complain without reason, because this proves the strength of their constitution." The least favourable consistence is that of a soft pudding, especially if the discharge of the motion be unattended with a feeling of relief corresponding with the quantity evacuated; a sensation of something being retained, accompanied with that of a bearing down in the lower portions of the intestines, is not unusual upon such occasions. There is a peculiar appearance connected with this species of evacuation, which, I believe, has never been described in any work, nor indeed is it easy to convey by words its exact nature. It was first pointed out to me by Dr. Baillie, and I have since noticed it in numerous instances, and become satisfied of its immediate connection with diseased secretion. The consistence of the motion is that of a pudding, but it is of unequal density in its different parts, and exhibits a surface as if it had been rasped by a file. I have still another form of fæces to describe, which would seem to depend upon a contraction of the intestine; the excrement is hard, but having a diameter not much exceeding that of a tobacco-pipe. In protracted cases of dyspepsia, the occurrence of this appearance has given origin to a belief in the existence of stricture in the rectum; but I believe its cause is always seated in the higher portions of the large intestines. In order that we may deduce safe conclusions from the appearance of a feculent discharge, we must be well acquainted with the nature and extent of the change which may be produced upon it by the operation of different aliments and medicines. The air, too, has the effect of altering the colour, for which reason it should be examined as speedily as may be convenient. This observation applies with great force to the stools of infants, which, although perfectly yellow when voided, rapidly assume a green appearance; a fact which would seem to arise from the decomposition of the bile.

340. Certain green vegetables, especially spinach, impart to the *fæces* a green hue, which may be mistaken for vitiated bile. Beet root will also give a colour to the alimentary discharge, which it is necessary to distinguish. Persons who take a considerable quantity of milk, will pass pale-coloured evacuations, as if the bile were imperfectly secreted. Where the aliment has been of a very complicated description, the *fæces* will generally assume a crude and diversified character, owing, probably, to the several parts not having undergone the same degree of digestion; as already explained. Where much stimulant drink has been used, and the person has been subjected to long fasting or much labour, or has perspired profusely, the *fæces* acquire a hardened character. It is essential for the practitioner to know, that certain parts, both of animal and vegetable substances, pass through the body without undergoing any change: this is the case with the skin and seeds of fruits, &c. Cheese is also very apt to pass in an undigested state. Dr. Marcet records an instance of this kind, in which the substance was at first mistaken for an intestinal concretion; but it proved to be either a piece of cheese formed into a ball by the action of the intestines, or a portion of caseous matter actually formed in the intestines, from milk taken as nourishment by the patient, and coagulated by the gastric juices into an undigestible mass. This latter supposition is the more probable, as Dr. Wollaston, a few years afterwards, had several concretions of the same kind brought to him for examination by a medical practitioner, and which proved of the same nature, and had been discharged by a patient whilst using a milk diet. It has also been stated by Dr. Marcet, that concretions of oat seeds are not unusually passed by the inhabitants of Scotland and Lancashire, where the oatcake is in common use as an article of food amongst the lower classes. The spawn of lobsters, a very indigestible substance, has also occasioned similar deception. Magnesia, when repeatedly taken, will, by the assistance of a little animal mucus, become consolidated into masses of formidable magnitude. Mr. E. Brande has recorded an interesting case of this kind in the first volume of the Journal of the Royal Institution. The influence produced by certain medicines upon the colour of the *fæces* is equally striking; iron and bismuth have the property of tinging them black, and magnesia of giving a white appearance. We see, therefore, the importance of attending to such circumstances, where it is an object to ascertain the state of the biliary secretion from the colour of the stools; and it would be judicious, on such occasions, to restrict patients to a diet that is not likely to colour the *fæces*.

341. The *quantity* of feculent discharges is also an important object of inquiry; and in estimating it, we must always consider it with reference to the nature as well as quantity of the food. I have known persons who have lived for some time on the fat of veal, marrow, &c. for the purpose of obtaining nutriment with the least possible quantity of excrement, in order to avoid irritation in a

diseased rectum, and it is surprising how scanty the evacuations have been on such occasions. Rice scarcely leaves any excrementitious matter to be transmitted along the intestines, and hence has arisen the idea of its astringent quality. Fish, on the contrary, leaves a large quantity of excrement.

Some of my readers may perhaps consider the observations which I have been induced to offer upon the appearances of the feculent discharge as unnecessarily minute; but I am anxious to urge upon every practitioner the absolute necessity of such inspections. No one can successfully conduct the treatment of a severe dyspeptic complaint unless he submits to the performance of such a duty. All the great physicians of antiquity relied upon such a source of information for their guidance. Hippocrates carried the practice to such an extent as to have acquired from some of the wits of his age the appellation of *σκατοφαλος*, as Arisphanes had before named Esculapius. Some modern practitioners have, from the same scrupulous attention, been obnoxious to a similar charge; but I trust that no physician will be induced to swerve from the performance of a paramount duty by such intimidation.<sup>1</sup>

342. *The examination of the urine* is also a matter of considerable importance. Its appearance will not only assist us in forming a judgment respecting the seat of the dyspeptic disease; but, if carefully watched from day to day, will point out the beneficial changes which our plan of diet and medicine may have produced. It will also instruct us in the species of food which best agrees with the patient; for slight errors of diet, although imperceptible in other respects, are generally announced by obvious changes in the urinary deposits.

343. Without entering with chemical minuteness into the history of the changes which the urine undergoes under different conditions of the body, there are certain phenomena with which every practitioner ought to be well acquainted: these I shall briefly enumerate, and endeavour to point out the indications which they severally afford. The quantity evacuated during a given interval is the first question which presents itself; a diminished flow of deep coloured urine is invariably associated with febrile action; while an increased quantity of pale urine more generally indicates a peculiar state of nervous irritability, unattended with fever. When urine of this description (*Diabetes Insipidus*) flows most copiously during the night, I have generally found it to be symptomatic of some affection of the brain. In estimating, however, this symptom, the practitioner will see the importance of inquiring into the vicarious excretion of the skin. Much has been written

<sup>1</sup> A patient may be so circumstanced, that the preservation of the fæces, for inspection, is attended with inconvenience. It is, therefore, worthy of notice, that a table-spoonful of sweet oil poured over them, by investing the surface with a film, effectually prevents evaporation, and the consequent stench they might otherwise occasion. This precaution should always be adopted in the wards of hospitals.

upon the subject of *albuminous* urine, or that in which a coagulum is produced by the application of heat; Dr. Blackall has maintained that it is connected with too great an action in some part of the system, and he considers that its occurrence in dropsy should be received as an indication of the necessity of blood-letting. I have met with several cases of dyspepsia, in which such a state of urine occurred, and I am disposed to believe with Dr. Prout that it is derived from the chyle. I have, at this time, two patients under my care, who have long suffered from the effects of tuberculated lungs; and during the progress of the present work, I examined their urine, and found, in both cases, that it was albuminous. We have, probably, too few data to lead us to a safe conclusion with regard to the cause of the phenomenon; but I am, at present, impressed with a belief that it arises from imperfect sanguification; the chyle, not undergoing the necessary changes to convert it into perfect blood, is eliminated by the kidneys. It is essential, in every case of protracted dyspepsia, to inquire into the state of the urinary secretion, in order to ascertain whether the patient may not be labouring under diabetes; for this disease is far more common than is generally supposed. So many valuable works have appeared upon this subject, that I consider it unnecessary to enter upon its history; but I should not discharge my duty to the professional reader, were I to omit noticing the concise but luminous chapter with which Dr. Prout has favoured us, in his valuable work on the diseases of the urine.

344. But of all the changes of which the urine is susceptible, none perhaps are less equivocal, or more indicative of a deranged state of the alimentary functions, than the deposit of lithic acid, either in an amorphous or crystalline form. Dr. Prout states that this acid, when in the former condition, is always in some state of combination, generally with ammonia; but when in the latter, it is nearly pure. He observes, that in healthy urine the lithic salt exists in such a proportion, as to be held in permanent solution at all ordinary temperatures; but that, from particular causes affecting the health, its quantity is preternaturally increased, and the *excess* is deposited as the urine cools. Dr. Philip is inclined to account for its appearance in the urine from an increased quantity of acid passing through the urinary organs: from this view of the subject the lithic acid deposited must be considered as arising, not from the excess of that substance in the urine, but from a decomposition of the compounds into which it enters, by the agency of a free acid. He considers that, in a healthy state of the system, the precipitating acid is thrown off by the skin, and he supposes that, even when generated in excess, it may be diverted to the surface of the body by merely increasing the insensible perspiration; an opinion which is certainly strengthened by the admitted fact, that calculous affections are more frequent in cold and moist climates than in those regions where the *cutaneous* is in a state of predominant activity in relation to the *urinary* system. But, from whatever

cause the precipitation may take place, its occurrence must be considered as a very delicate test of alimentary disturbance. By watching the occurrence and disappearance of these deposites, we are enabled to form a very just conclusion as to the efficacy of any plan of medicine or diet that may have been prescribed. I am acquainted with a gentleman who can never eat bread without discovering a change in his urine. He told me that he had entirely overcome the lithic diathesis by substituting biscuits. To those who are not acquainted with the influence which the slightest error in diet possesses over the urine, this may appear a refinement scarcely within the bounds of credibility: Dr. Prout, however, has stated a parallel case. The variety of colour exhibited by the lithic sediments is also deserving of some attention, and the profession is under deep obligations to Dr. Prout for the able manner in which he has described such modifications. He arranges them under three divisions, viz. 1, *Yellowish* or *nut-brown* sediment; 2, *Reddish-brown* or *lateritious* sediments; and 3, *Pink* sediment. The first variety indicates a strong tendency to the lithic acid diathesis: although in some cases an opposite state of system prevails, and an alkalescent condition of the stomach and bowels may be supposed to exist; in general the nearer such sediments approach to white, the more of the phosphates they contain. He says, that the second variety varies in tint from nearly white, in which state it is with difficulty distinguished from the last variety, to a deep brick-red or brown. It is to be considered as a symptom indicative of phlogistic fever, or very frequently of local inflammatory action. The third variety of sediment owes its colour principally to the *purpurate* of *ammonia*: its presence indicates the existence of certain chronic visceral affections, especially of the liver.

345. These observations are sufficient to impress upon the practitioner the necessity of inspecting the urine of his patient, but the indications it affords are not to be received without due caution. If taken alone, they may not be worthy of any considerable degree of credit, but when viewed in conjunction with other symptoms, they will undoubtedly assist his diagnosis.

346. We come now to consider the "particular circumstances" of the patient under examination. His *age*, for obvious reasons, is a fact of importance. By learning the nature of his *occupation*, we shall be enabled to form some judgment with respect to the causes that may have excited his disease. The posture in which some persons are accustomed to sit is a frequent source of affections of the stomach and bowels. Literary people and clerks, from bending to the desk or table, are frequently thus affected. Tailors and shoemakers are notoriously obnoxious to serious obstructions from such a cause: by the position in which these artisans pass a considerable portion of the day, the margin of their ribs is pressed upwards so as to force the stomach against the diaphragm, and to impede the passage through the pylorus. It is equally essential to inquire into the *former habits and customs* of the patient; we thus

become acquainted with his dietetic irregularities, the degree of exercise to which he has been accustomed, and with various other circumstances which may have contributed to produce the disease under which he labours. Nor ought we to overlook the mental condition of the patient; for while one class of persons are suffering from the anxious and intemperate exercise of the mind, another class become the victims of an ever wearying indolence and a blighting ennui. It is perhaps difficult to say from which of these two cardinal evils the greatest portion of mischief arises; whether the machine suffer most from excessive friction or from rust. Persons, whose minds are wholly unoccupied, especially after active employment, are led to exaggerate every sensation, and to watch and criticise each action of the body, as if life were nothing more than a wearisome reiteration of the animal functions; give a man, under such circumstances, occupation, and you will cure him; idleness has been "the head and source of his distemper," and would you charm away the dusky gnome by which he is possessed, you must treat him, as the enchanter Michael Scott treated his demon, by finding him constant employment. If he has resided in a warm climate, we shall be led to suspect the existence of hepatic affection. The "occasional questions" which I have introduced, as necessary for the examination of females and children, are too obvious in their importance to require any further comment. With respect to the value of "general observations" upon the physical character of the individual, I have only to state, that those accustomed to medical physiognomy will derive much information from such an inspection; although the evidence is of such a nature that it cannot well be described: it is to be learnt only by experience. There is, however, an important fact, in connection with the colour of the skin, which deserves some notice, as it has given origin to a very general and fallacious opinion. The sallow and subdued yellow aspect of the dyspeptic has almost universally been placed to the account of bile, morbidly afloat in the circulation. This is not the fact, the appearance to which I allude arises from a degenerated state of the serum of the blood.



OF THE

## CURE OF INDIGESTION,

AS IT RELATES TO DIET, EXERCISE, AND MEDICINAL  
TREATMENT.

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347. The previous habits of the patient, and the origin and seat of the disorder, are the circumstances from which the physician is to derive his indications of cure. If the disease has not extended its influence beyond the stomach and bowels, the means to be adopted will be more simple, and, at the same time, more prompt in their salutary operation, than where it has involved the functions of remote organs; but in this latter case, the symptoms are so frequently those of mere sympathy, that the practitioner has often the satisfaction of witnessing their removal by remedies that can only have acted on the primæ viæ.

348. It has been stated, that the stomach may fail in the performance of its duties, either from a deficiency in the secretion of its menstruum, or from a loss of power in its muscular fibres; but in either case we must refer the disease to a loss of nervous energy. Some persons, predisposed to indigestion, and who inherit the temperament most favourable to its production, would seem to have less than an ordinary ratio of nervous energy supplied to their muscular structures. In such cases, there is an unusual torpor in the bowels, even during health. An attention to this fact has frequently led me to adopt measures which might have proved less successful under other circumstances. As a general proposition it may be stated, that the secretion of gastric juice, and the muscular power of the stomach, are so intimately associated with each other, that the one cannot long be deficient without the other partaking in the torpor; and the practitioner, who has had much experience in the treatment of dyspeptic disease, will readily believe that whatever tends to restore a healthy nervous power to the stomach, tends to form the food into that substance which is best fitted to excite the muscular fibres of this organ; and that whatever excites the natural action of these fibres, tends to relieve the nerves from their

load, and, in the most favourable way, to bring into contact with their extremities the food on which, through the intervention of the gastric fluid, their powers are to be exerted.

349. The pathology of the stomach may, therefore, be greatly simplified by referring it to a defect of nervous action; and our first duty is to inquire into the causes that may have occasioned it, and which, in general, may be identified with errors of diet, affections of the mind, or irregularity of exercise.

350. The nature and influence of such remote causes have been fully discussed in the preceding pages; and by carefully appreciating their operation, the practitioner will obtain a clue for his guidance. He must lay down a system of rules for his patient, by which the remote causes of his complaints may be removed; but, in his attempts to reform bad habits, he must be careful to avoid all abrupt transitions, except in those circumstances which have no direct influence upon the vital powers of the body. I should, for instance, be very cautious how I withdrew spirituous stimulants, although I might be well satisfied that the indulgence of such potations had given origin to the disease; but I should not feel any hesitation in at once withholding every species of pastry, or other indigestible matter, without reserve. Upon the same principle, we should gradually diminish the number of meals, where they have exceeded the proper limit, adapting them with skill and caution to the fluctuating circumstances of the patient. The same observation applies to exercise; nothing would be more injudicious than to expose the invalid, debilitated by sedentary habits, to the effects of sudden and protracted exercise; nor should the person, whose habits have been laboriously active, be abruptly restricted to an irksome state of indolence. The discipline, in such cases, must be graduated according to the previous habits of the patient; to his age, strength, and the nature of his disease. Exercise can never prove salubrious, if it be followed by fatigue. Mr. Abernethy has prescribed to his patients a set of rules, which I shall take the liberty of quoting in this place, in order that I may offer such observations upon their value, as my own experience has suggested. "They should rise early when their powers have been refreshed by sleep, and actively exercise themselves in the open air till they feel a slight degree of fatigue." Upon this first rule, I am disposed to make the following comment. Although we must all agree in the advantages of early rising, yet, in dyspeptic cases, I have frequently known the disease greatly aggravated by the patient suddenly changing his habit, with regard to the hour of rising; and that if he becomes the least fatigued, before his morning repast, he remains languid and uncomfortable during the rest of the day. A long walk before breakfast, unless the person has been accustomed to the practice, will frequently produce a fit of indigestion. I have already observed, that it is advisable to allow an interval to pass before we commence the meal of breakfast; and where the weather and circumstances will permit it, this interval may be

passed in the open air, but the body should not suffer the least fatigue. Mr. Abernethy then proceeds to say, "they should rest one hour, then breakfast, and rest three hours, in order that the energies of the constitution should be concentrated in the work of digestion." It appears, then, that the patient is to rise early, to take exercise until he feels slightly fatigued, and then to rest an hour before he is allowed to take any refreshment. This plan might succeed very well in preserving a robust and healthy man in vigour; but where we have to deal with a person whose energies are languid, and whose feeble powers are easily exhausted, I fear that such discipline would be ill-calculated to afford assistance. It is notorious that all dyspeptic persons are especially languid in the morning, and they accordingly require a regimen the very reverse of that which Mr. Abernethy recommends. Such, at least, is the conviction of my mind. To the practice of resting three hours after breakfast there can be no objection; it is the period best adapted for intellectual business. He then recommends "active exercise again for two hours, rest one; then taking their dinner, they should rest for three hours, exercise two, rest one, and take their third slight meal."

351. It is impossible to frame any general rule that shall apply to every case, but I will offer a sketch of the plan I have usually recommended: the practitioner will readily modify its application to meet the circumstances of any particular case. The dyspeptic patient should rise from his bed as soon as he awakes in the morning: for, as Mr. Abernethy justly states, "many persons upon first waking feel alert and disposed to rise, when, upon taking a second sleep, they become lethargic, can scarcely be awakened, and feel oppressed and indisposed to exertion for some time after they have risen." This is undoubtedly true. He should then walk, or rather saunter for some time in the open air, previously to taking his breakfast, the material of which is to be selected according to the principles already discussed (132.) He is now in a condition to follow his usual avocations; but it is a circumstance of no slight importance to procure an evacuation at this period, which is easily effected by habit (92); a person who accustoms himself to the act at a certain hour of the day, will generally feel an inclination at the appointed season. The invalid should not allow his occupations, if sedentary, to engage him for more than three hours, after which, exercise on horseback, or by walking, should be uniformly taken. I have already observed, that the state of the weather ought not to be urged as an objection to the prosecution of measures so essential to health. Where the season of the year, and the situation of the patient, will allow the exercise, I strongly urge the advantages to be derived from digging: the stimulus thus given to the abdominal regions is highly salutary in dyspeptic affections. The hour of dinner should not be later than three o'clock (134), and the patient should rest for an hour before he sits down to the meal.

It should consist but of few articles, should be carefully masticated,<sup>1</sup> and the invalid should rise from the table at the moment he perceives that the relish given by the appetite ceases. The manner in which he should regulate his potations, at and subsequent to this meal, has been already considered (146.) With respect to the allowance of wine, every practitioner must use his discretion, and be guided by the former habits and recent condition of his patient (254.) It is essential that the invalid should enjoy rest for at least two hours after dinner (121,) that is to say, he should not enter upon any occupation or diversion that may occasion the slightest fatigue; to a gentle walk, or saunter in the garden, there can be no rational objection, especially at that season of the year when such a pastime is the most inviting. At six or seven o'clock, he may take some diluting liquid, as tea; after which, exercise will be highly useful, to assist the sanguification of his previous meal: in the summer season there will be no difficulty in accomplishing this object; and if the strength of the patient will allow the exertion, some active game, as bowls, will be attended with advantage. At ten o'clock he may take some toasted bread, or a lightly boiled egg, with a glass of wine and water, should his previous habits render such an indulgence necessary, and at eleven he may retire to rest. The bed-room should be well ventilated, and its temperature should, as nearly as possible, be that of the apartment from which the patient retires. A well stuffed mattress is to be preferred to a bed of down, and the curtains should not be so drawn as to exclude the free circulation of air. The invalid should be careful in not retiring to rest with cold feet: nothing contributes more readily to disturbed sleep, and uneasy dreams, than the unequal circulation which takes place on such occasions.

352. Such are the general rules which I should enforce for the protection of those invalids who are liable to dyspeptic attacks. There are particular features in the history of every case which will require appropriate treatment, and I shall now proceed to their consideration.

#### ACIDITY OF STOMACH, FLATULENCE, &c.

353. It has been a question more frequently discussed than satisfactorily answered, whether the morbid acidity which occurs in the stomach of invalids be the product of a fermentation generated by indigestible food, or the consequence of a certain condition of the gastric secretion? It seems to me that it may arise from either of these causes. In cases of imperfect chymification it may depend upon the ingesta actually undergoing the acetous fermentation, or

<sup>1</sup> Too much stress cannot be laid upon this circumstance; and, since a person who dines alone generally hurries his meals, I have generally advised the dyspeptic to dine in company with his friends.

upon an increased acidity in the gastric juice itself, occasioned by the indigestible nature of the aliment upon which it has to operate; for it has been already remarked (30) that the gastric solvent varies in this respect, according to the character of the ingesta which excite its secretion. The acidity, therefore, so prevalent in weak stomachs; instead of being regarded as of morbid origin, ought to be frequently considered as an effort of nature to assist digestion. It has been very truly stated that the necessity of acid for the chymification of vegetable food affords an explanation of the fondness which the Germans and Dutch display for *saur kraut*, or cabbage is a state of acetous fermentation, and of its alleged easy digestibility.<sup>1</sup> Besides the above sources of acidity there still remains one to be examined, more obscure in its nature, and far more difficult in its cure; it is a condition of the stomach arising from its sympathetic action with some distant organ, as the kidneys, uterus, &c. Cardialgia, from this latter cause, resists the ordinary methods of cure, and is more frequently relieved by acids than alkalies, or by the exhibition of a narcotic.

354. The above view of the sources of cardialgia, or *heartburn*, will suggest some very important hints for its cure. Should it arise from the indigestible nature of the food, a change of diet will promise success; if, however, it can be supposed to depend upon a condition of the gastric solvent, rendered necessary for the solution of the ingesta, a different plan of treatment will suggest itself to the practitioner; and let me here protest against the too prevailing fashion of taking, indiscriminately, doses of soda, or of some alkaline salt, after a meal, "to correct any acidity,"—to correct acidity! say rather to neutralise that power which nature has provided for our well being. Acidity is essential to chymification—if it be excessive, let us inquire how far it may be morbid, or salutary, before we attempt to remove it from its sphere of action by the interference of art.

355. In ordinary cases of acidity, or those depending upon an acetification of the food, and complicated with symptoms of indigestion, the procuring evacuations from the bowels is the first measure to which we are to resort, and this may be effected by the combination of some purgative and antacid. According to my own experience, which has been tolerably extensive, I have never found any formula so efficacious as the following.

℞. Decoct. aloes comp. f. ℥iv.  
 Infus. sennæ, f. ℥iss.  
 Ammoniæ sesquicarb. ℥ss.  
 Tinct. sennæ, et  
 Tinct. rhei, co. aa. f. ℥ij.

Fiat mistura, de qua sumr. cochl. duo ampla quotidie mane.

The purgative force of the mixture may be readily varied according to circumstances, by modifying the proportion of *infusion of*

<sup>1</sup> Dr. Combe on the Physiology of Digestion.

*senna*. If, from the appearance of the discharges, we discover an undue secretion of bile, a pill composed of the *compound extract of colocynth*, with a grain or two of *calomel*, may be given with advantage. We have afterwards to adopt such treatment as may prevent its recurrence. This indication is to be fulfilled by bringing the digestive organs into healthier action by a well regulated regimen, and by such medicines as may give tone to the stomach, and increase that propulsatory action of the bowels, by which they are enabled to pass off the undigested portions of food; and here again, the *compound decoction of aloes*, in combination with some bitter and aromatic ingredients, will be found a most valuable compound for the occasion; or the following formula, which is a modification of one proposed by Dr. Fothergill, may be adopted:—

℞. Aloë spicat. ℥j.  
Rhei rad. et calumbæ rad. aa. ℥ss.  
Liquor calcis, f ℥vij.  
Spir. armoraciæ comp. f ℥ss.

Infunde per horas xij. in vase clauso, et cola. Colaturæ sumr cochl. ij. ampliora, bis de die.

356. The exhibition of alkalis and absorbent earths, although it may remove the existing evil, will not avert the cause from which it arises. Carbonate of ammonia is, perhaps, the most efficacious of the antacids, since it neutralises a portion of the acid matter which appears to exist in a gaseous state in the stomach, and which on that account eludes the action of the fixed alkalis. It is, moreover, calculated to relieve the gastric debility which so frequently follows an attack of this nature. Diarrhœa, as might be predicated, is not an unusual attendant, in consequence of the irritation which the mucous membrane receives from the contact of the acrid matter; small doses of magnesia, combined with a few drops of laudanum, and made into a draught with mucilage will generally be found to pacify the bowels, and relieve the complaint.

357. We are, however, to look for permanent relief to a change in the food; all the vegetables should be withdrawn, and a diet of animal food substituted: but if such a change should excite the disgust of the patient, we must relax in our commands, for the stomach will never digest that against which the inclination rebels. The substances which are found, by experience, more particularly liable to create this disorder, are all fried articles, butter and greasy viands, pastry and crude vegetables; in short, whatever is indigestible may act as its exciting cause. Astringent wines, as port, are very apt to favour its occurrence. I have before observed, that the stomach is frequently sensible to very minute portions of astringent matter (258). Dr. Philip says, that he has known more than one instance in which the stomach was even sensible to the difference between coloured and colourless brandy. Broths of every description, but especially those made of the meat of young animals, are a fruitful source of heartburn. Veal contains a saccharine principle which is very susceptible of acetification.

358. It has been stated that in certain morbid conditions, the contents of the stomach exhibits an opposite character, and that in the place of acid, an alkali may predominate. Dr. Thomson, in a highly interesting paper<sup>1</sup> on "The Chemistry of the Digestive Organs," has announced the important fact of having actually detected such a condition in several cases of pyrosis, and that the attack was cured by diluted sulphuric acid. It has unfortunately occurred to me to have met with many cases of this disease, which baffled all my efforts. In most of them I can assert that the gastric liquid was generally neutral, occasionally acid, but, as far as I know, never alkaline; I do not, however, intend by these observations to throw the slightest discredit upon the experiments of Dr. Thomson; on the contrary, I place implicit reliance upon his results, and the relief which I have witnessed from acids, in certain forms of gastric disease, tends to confirm the opinion. If, however, I can adduce one case of pyrosis, in which the liquid is proved to be neutral, it must be admitted that alkaline, like acidity, is only contingent, and not essential to the disease. The profession is much indebted to Dr. Thomson for his researches upon the subject; they will have the effect of more immediately directing the attention of the practitioner to the state of any liquid that may be ejected from the stomach, and of thus leading to a more scientific and successful plan of practice.

359. Flatulence is often a very distressing disease; it sometimes is associated with acidity, but frequently is the only symptom which indicates an imperfect digestion. Whether the gas, with which the intestines are inflated, be a product of fermentation, or a secretion from their vessels, is a question which has given origin to some discussion. It may probably arise from either of these causes, although it is generally attributable to the former. In some cases, it appears to contain sulphuretted hydrogen gas, and eructations take place which are characterised by the smell of rotten eggs. Where this occurs, we may infer the existence of great alimentary disturbance; the natural affinities, by which the digestive changes are produced, appear to be subverted, and a new chain of compositions and decompositions established. The albumen would seem to be the substance from which this compound is generated; and in several cases which have fallen under my notice, relief has been obtained by confining the patient to a strictly farinaceous diet. Ordinary cases of flatus, however, are of a different nature; the air appears to be the product of fermentation, and by avoiding such vegetables as are known to be susceptible of it, the disease has been removed. In certain states of the alimentary canal, a sense of distention may be felt, without any morbid increase in the quantity of intestinal gas; an undue sensibility or irritability of the bowels may

<sup>1</sup> This paper was read before the Medical Section of the British Association, 26th August, 1836, and subsequently published in the *British Annals of Medicine*, March, 1837.

occasion such a feeling. This fact has been well illustrated by Dr. Parry:<sup>1</sup> he observes, that "there is often considerable variation in the degree of inconvenience resulting from the use of food or drinks which disagree." "Sometimes," says he, "if I take acids, as considerable quantities of fruit, and immediately afterwards eight or ten scruples of kali at a dose, in saturated aqua kali carb. I feel no distention of the stomach, and bring up no carbonic acid gas: several hours afterwards there is a great uneasiness in the colon, which is not relieved till a great quantity of wind passes downwards. In this case it was absolutely necessary that the wind should have existed in the stomach, because an acid and an aerated kali were mixed there. But no dyspepsia, or what is called wind, was produced by it, because the stomach itself was not thrown into a spasmodic state from being over irritable. Afterwards, however, when the same wind passed into the colon, that bowel being in a state of morbid irritability, the uneasiness from the wind was produced there till the wind was expelled." Although the terms in which this fact is expressed may not be consonant with those of modern science, the fact itself, as well as the explanation of it, are of great practical value. It is not the presence of gas in the intestinal canal, but the irritability of the intestines, which renders them impatient of the slightest stimulus of distention, that occasions the distress so common to dyspeptic invalids. In different forms of dyspepsia different parts of the alimentary canal have their sensibilities excited: I have a patient, who, from the slightest error of diet suffers from flatulency, but he never feels the distress but in the sigmoid flexure of the colon. A person in robust health may, from various accidental circumstances connected with the nature of his food, experience an unusual intestinal distention; but it will not occasion distress, for the reasons above stated. The practice to be founded upon such observations is evident: we shall obtain more advantage from calming the irritability of the bowels, than by dispelling the flatus by carminatives. I have found small doses of the extract of hyoscyamus, combined with two grains of ipecacuan, produce relief in attacks of flatulence which have resisted the ordinary methods of cure.

360. Some dyspeptics, in consequence probably of an uneasy sensation at the *cardia* of the stomach, acquire the habit of swallowing a quantity of air, and of again expelling it. I have seen a patient who, for a considerable period, has thus appeared to bring up torrents of wind from his stomach, whereas in truth he merely suffered the air to return into the mouth which he had previously forced through the pharynx. I do not intend to insinuate that this is a voluntary deception; it is evidently a habit originally acquired from a spasmodic effort to relieve a painful sensation.

361. Dr. Parry considers that dyspepsia consists in such a state

<sup>1</sup> Collections from the unpublished medical writings of the late Caleb Hillier Parry, 1925.



of the villous coat of the stomach or intestines, or both, as subjects them to be morbidly susceptible of irritation from certain kinds of food, or certain changes of the food, which are not perceived, or produce no uneasiness in healthy stomachs; and that this affection of the villous coat, throughout all its degrees, up to inflammation itself, is apt to be followed by sympathetic or symptomatic affections of the secretory arteries or glands seated in it, and often of the muscular coat of the alimentary canal itself. I believe that such an affection is the general consequence, although not the cause of dyspepsia. In the treatment, therefore, of this complaint, we may frequently interpose sedatives with advantage. Protracted dyspepsia not unfrequently depends upon a morbid condition of the alimentary surfaces; the mucous membrane becomes affected, and the disorder is not removed until measures have been adopted to restore its healthy secretions. A fretful state of the intestinal discharges is generally associated with such a disturbance, and I have found the administration of a lenient aperient every morning, with small doses of the *vinum colchici*, repeated twice a day, eminently successful in such cases.

362. Where the dyspeptic disease is connected with duodenal irritation, I know of no medicine more useful than the *vinum colchici*; taking care to accompany its exhibition with that of occasional laxatives. Purgatives that act with violence are always followed with an aggravation of the symptoms. Dr. Yeats speaks in high terms of commendation of the sulphate of potass: "It appears to me," says he, "to have a more specific effect upon the duodenum than the sulphate of magnesia. I give ℥j. of it twice a day in the infusion of quassia. If much feverish irritation prevails, arising, as I imagine, from some slight inflammatory action in the duodenum, the saline draught, in a state of effervescence, is substituted, with the sulphate of potass, for the bitter infusion, with the happiest effects." This is very excellent practice: I am satisfied that nothing is more mischievous than active purgation in every stage of dyspepsia. Drastic doses of calomel, to which some practitioners resort, are calculated to increase the morbid irritability by which the disease is kept alive. In cases even of loaded bowels, it will be more prudent to excite their peristaltic action by a gentle but continued stimulant, than to irritate by active purges. Where the biliary discharges are faulty, small doses of mercury are useful; and I prefer the *hydrargyrum cum creta*, on such occasions, in doses of three or four grains, and combined with two or three grains of *pulvis ipecacuanha*, to every other form of combination.

363. Mr. Abernethy has justly stated that persons may be purged without having their bowels cleared of the fæcal matter which may be detained in them; we should therefore endeavour to ascertain what kind or combination of purgative medicines will excite a healthy action of the bowels, without teasing them, or producing discharges from the organs themselves. The best mode of proportioning the degree of excitement to the end designed, is to take a

dose of a suitable medicine at night, but short of that which may prove irritating; if it fail sufficiently to excite the organs, a similar dose may be taken in the morning: which also failing, it may be repeated at regular intervals during the day. The principle that should govern our conduct in the administration of purgatives, may be briefly stated—*the excitement is to be repeated till the requisite action is induced, yet no single excitement being such as may prove an irritant to the organ.*

364. The mischief which may be produced by too active purgation seems to have been well understood by the ancients; but the modern practitioner has too frequently rejected the advice which the sages of our profession have recorded for his instruction. "He who takes a rough purge," says Plutarch, "to relieve his body from too great a load of food, may be compared to the Athenian, who finding the multitude of citizens troublesome to him, contrived to drive them out by filling the city with Scythians and wild Arabs." I do not wish to invest the Grecian historian with the attributes of a medical oracle, but we may be allowed to borrow from him a figurative allusion to illustrate the importance of a precept which cannot be too frequently or too forcibly impressed upon the mind of the medical practitioner, who, I cannot but believe, is far too indiscriminate in this practice; the idea of purgation would seem to predominate over every other, he sweeps away the meconium of the new-born child, and he administers a black dose to the expiring octogenarian.

365. Where the symptoms of dyspepsia are accompanied with an evident spasmodic affection of the alimentary canal, as indicated by its inverted and convulsive movement, the malady may be inferred to exist more particularly in the muscular structure. Dr. Parry is inclined to regard such cases as distinct from those of dyspepsia, and to class them under the head of *nervous irritability of the stomach*; but they evidently constitute a link in the same chain, and are so intimately connected with the series that they cannot be practically separated from it. In such cases the symptoms of flatus are prominently distressing: the air which exists in the canal, and which should pass insensibly downwards, inviscating itself with the food, is thus arrested in its course, producing borborygmi and eructations from the stomach. Under these circumstances, the medicines most likely to afford relief are aloetic stimulants: I have found the *decoctum aloes compositum* a truly valuable remedy in all affections connected with a torpid or irregular action of the muscular coats of the intestines. On some occasions I have subjoined the *infusum armoraciæ compositum* with evident advantage; and on others the oil of cajuput, in doses from three to six minims have produced much relief.

366. The administration of the white mustard seed, which has been lately revived with all the confidence which attaches to a newly discovered remedy, is certainly a useful medicine in several morbid states of the intestinal canal; but, according to my experi-

ence, it is serviceable only in such cases as are marked by alimentary torpor. In affections attended with muscular inirritability, or in those associated with a diseased state of the mucous surfaces, it is unquestionably useful. I have known it to ensure a regular alvine discharge in persons of costive habits; and I have also found it to correct that species of diarrhœa which attends a diseased condition of the mucous membrane of the intestines. These unbruised seeds were much commended by Dr. Mead in ascites, and by Bergius in intermittents, and numerous writers have extolled their virtues in stimulating the stomach and intestines. Dr. Cullen, however, observed that the seeds given in this form are never broken down or dissolved in the stomach, but pass away entire by stool; and he therefore inferred that they were incapable of producing any beneficial effect. This statement appears to have been thrown so much discredit upon their value, that they fell into disuse, and they have only lately regained the confidence of the profession. I confess myself to have been amongst those who were disposed to consider the *unbruised* seeds as perfectly inert; but experience has taught me that such an opinion is incorrect. The seeds consist of fecula, mucilage, an acrid volatile oil, on which their virtues depend, and which on standing deposits a quantity of sulphur, a bland fixed oil, which considerably obtunds the acrimony of the former constituent, and an ammoniacal salt. The fixed and volatile oils may be obtained by expression, and if the mixture be submitted to the action of alcohol, the latter will be dissolved, and be thus separated from the former. It has been lately discovered, by some experiments conducted in France, that if the alcoholic solution be evaporated, a solid and crystallisable substance, distinguished by acid properties, may be obtained; and as sulphur is said to enter into its composition, it has been termed "*sulpho-sinapic acid*." If the whole seeds be macerated in boiling water, we shall at first obtain an insipid mucilage, which, like that of linseed, resides in the skin; but if the maceration be long continued, the water will become impregnated with matter yielding the odour of sulphuretted hydrogen; a proof that a portion of the volatile oil may be thus extracted; and it is probable that this process may even proceed more rapidly in the digestive canal. In administering them, however, as a remedy, we should be cautious to prevent their accumulation in the bowels. A patient, to whom I recommended their use, informed me that his evacuations became extremely offensive, so that it is not improbable that a portion of sulphuretted hydrogen may be disengaged during their passage. Their administration evidently requires caution: if any inflammatory irritation exists, they must prove injurious: where, however, there is a sluggish or deficient secretion of the alimentary juices, I have no doubt respecting their utility.

367. The practitioner is well acquainted with the doctrines of Broussais: he maintains, that almost every disease arises from an inflammatory affection of the digestive canal; and, although the

absurdity of so general a proposition must be admitted, we shall act wisely in suspecting the existence of such a state of disease in *protracted* dyspepsia: permanent tenderness upon pressure, and the appearance of the discharges from the bowels will generally announce such a condition: and lenient purges, the application of leeches, and a low diet, will furnish the best methods of treatment.

368. The utility of bitters, in the treatment of dyspepsia, is a very questionable and often a dangerous practice. It is, however, the popular resource of those who suffer from deficient appetite; and I am satisfied that many serious evils have arisen from its indiscriminate application. Where the disease arises from a mere want of tone, and is not complicated with intestinal irritation, such medicines are, of all others, the most effectual; a truth which will be readily deduced from the observations which I have already offered upon the operation of these agents (183.)

369. Blisters are of eminent service in cases of intestinal irritation, accompanied with tenderness on pressure; they will frequently also put a stop to obstinate vomiting, when other methods have failed of success.

370. The external application of heat to the region of the stomach will often allay gastric irritation that depends upon the presence of indigestible matter. The process of chymification is thus promoted by a species of contiguous sympathy that is not well understood.

371. The application of heat to the feet will be attended with the same beneficial consequences: this connection is still less apparent, but it is a fact, no less remarkable than true, that the digestion of a person in health may be arrested by the sudden application of cold to the lower extremities.

372. The use of friction, when applied by means of the flesh-brush to the abdominal region, deserves a distinguished place in the catalogue of dyspeptic remedies. I have usually directed its application for a few minutes, night and morning, and the most obvious benefit has arisen from it. The ancients are well known to have held friction in high estimation, not only in the cure, but for the prevention of disease. The moderns have unwisely suffered the practice to fall into disuse. If it were necessary to illustrate the utility of friction, we have only to adduce the well known effects which are produced on horses by the operation of *currying*; and which can alone depend upon freeing the surface from the recementitious part of the perspirable matter, and promoting a due circulation in the skin. In thus making them sleek, they become more gay, lively, and active, and will preserve their strength with half the quantity of food, than when it is given to them without such assistance. In cases where the application of cold may be considered useful, the brush may be immersed in equal quantities of vinegar and water.

373. With respect to the utility of wearing flannel next the skin, some diversity of opinion has existed. Its advantages consist in

gently stimulating the surface, promoting perspiration, and conveying away the moisture as it may be deposited. When worn only in the day it does not appear objectionable, but is, on the contrary, salutary to those whose skin may be supposed to require such a stimulant; but I agree with Dr. Beddoes in believing that no good reason can be assigned why any one, who is the master of a comfortable bed, should wear it during the night. In that state of increased sensibility of the skin which sleep induces, it is more likely to be injurious than at any other time, by the stimulating effects of its piles, and by the warmth it keeps collected round the body. There is also another objection to its use, under such circumstances: the perspirable matter, by accumulation, undergoes a chemical change, and the skin is thus, as it were, immersed in a noxious atmosphere. For the same reason, the flannel should be frequently changed. I have generally preferred, in dyspeptic cases, the use of a flannel *stomacher*, or a piece of loose flannel worn over the stomach and bowels during the day, and which may be thrown off at bed-time.

374. The use of cold and warm bathing offers another subject for consideration. The advantages arising from it, in the treatment of dyspepsia, are indisputable; but its application requires skill and prudence. When we consider the functions of the skin, in their relations to the digestive process, we cannot be surprised that an improvement in the state of the former should confer a corresponding benefit on the latter. The cold bath appears eminently serviceable to those who are suffering from dyspepsia, induced by the enervating modes of life peculiar to great towns, or by great mental exertion. Where, however, there exists considerable biliary disturbance, it generally does harm. It is also a matter of great consequence to ascertain the strength of the patient, and whether his vital energies are sufficient to produce that reaction, without which the cold bath must ever prove a source of mischief. This circumstance must likewise direct us in appointing an appropriate period for the operation. The robust and healthy may bathe early in the morning, or before breakfast, without the least hesitation; but the dyspeptic invalid should never venture into the water until his stomach has been stimulated by a slight meal. The period best calculated for immersion is about two hours after breakfast, which will enable him to take some previous exercise; he ought never to feel any degree of chilliness, but should be rather warm than cool, before he attempts to bathe. Dr. Currie has justly observed, "that persons ought not to wait on the edge of a bath, or of the sea, until they are perfectly cool, for if they plunge into the water in that state, a sudden and alarming chilliness may be expected, which would not have been the case had they been moderately warm when they went into the water." There exists a popular belief that, unless a person plunges head foremost, an accumulation of blood may take place in the brain. There is no truth in this observation. A sudden plunge is a violent and

unnatural exertion, and if the patient has not strong powers of reaction, it may be followed by unpleasant consequences. The shock thus given to the nervous system may, like a blow on the head, produce syncope. A case occurred at Brighton, in which a person in a state of debility died suddenly from the shock of a shower-bath.

375. An invalid should never remain longer than two minutes in the water, and the body should be kept during the whole time under the surface. If, instead of a genial glow, chilliness, languor and headach follow, we may conclude that the vigour of the system is not equal to create and sustain that reaction upon which the benefits of bathing must depend, and the practice should be immediately abandoned. It is, I think, generally advisable for invalids to bathe only on alternate days, until they find their strength so much increased as to allow them, without risk, to indulge in it daily.

376. The patient generally inquires whether, before bathing in the sea, it may not be proper to prepare himself by the use of a warm bath. I generally recommend a previous immersion in the *tepid* bath, at a temperature commencing at 90° Fahr. lowering five degrees each time, and terminating at 65°. Some laxative should be taken a few days before the course of bathing is commenced; but all violent purges must be cautiously avoided. I have known persons who, from a popular notion of the safety of purgation on such occasions, have taken violent doses of medicine, and been rendered extremely ill by their first immersion.

377. The warm bath is better calculated for those invalids whose reaction is not sufficient to sustain the shock of cold water. In such cases it will augment rather than diminish their natural strength and vigour; it will regulate the functions of the skin, promote the digestive powers, and concur with other measures to re-establish their health. To ensure objects so desirable, there are several precautions which it may be necessary to enumerate. As our purpose is not to induce profuse sweating, the temperature should not, on the first going into the bath, exceed 94° or 95°, but it may be gradually increased to 98°. In ascertaining its heat, we should never trust to our sensations; the thermometer is the only indication upon which we should rely. The most proper period for using the warm bath is an hour or two before dinner. If it be used during any of the ulterior stages of digestion, as in the evening, it will be liable to accelerate the circulation, and to produce disturbance. I have known persons, troubled with indigestion, to suffer considerable restlessness and irritation, by going into a warm bath just before bed time; so susceptible, indeed, are some dyspeptics to the stimulus of heat, that the immersion of the feet alone in hot water, at this period, will be followed by a restless night. The patient ought not to remain immersed longer than twenty minutes; and upon coming out, he may walk in the open air, but should be cautious not to occasion fatigue. Count Rumford has published an

interesting essay on the subject of warm bathing, in which he observes that "a person may gain fresh health, activity, and spirits, by bathing every day at two o'clock in the afternoon, at the temperature of 96° or 97° Fahr., and remaining in the bath half an hour. He continued that plan for thirty-five days, and derived from it permanent advantage;" and he adds, "that the idea of going into bed after a warm bath, in order to prevent taking cold, is erroneous; that no alteration should be made in the clothing, and that the body, on exposure to the air, is not more susceptible of catching cold than it was before going into the bath." This coincides so perfectly with my own experience, that I feel it unnecessary to offer any further remarks upon the subject. Count Rumford also justly reprobates the idea of any advantage being derived from temperate baths of from 55° to 60°. The animal temperature, he observes, is 98°: in those temperate baths therefore, we lie motionless in a temperature inferior to that of our own bodies, and consequently must lose instead of acquiring heat, or even retaining that which we possessed.

378. *Shower baths* have been supposed to be more efficacious, in certain diseases, than baths of less partial application. In stating the result of my own experience upon this subject, I have to observe, that in debilitated habits they are not unattended with danger. I have certainly seen that species of indigestion which would seem to arise from, or be intimately connected with nervous irritability, greatly alleviated by the use of such partial baths, but I have generally recommended that the temperature of the water should be raised to 50°. Persons of a strong habit, who have been exhausted by intellectual exertion, are greatly resuscitated by such means.

379. *Change of air* is one of the most efficacious methods of curing dyspeptic complaints. The chemist has proved that the essential constituent parts of the atmosphere are the same in all places and situations; it has been collected in cities and in the country, on mountains and in plains, and even at the height of 7250 yards above the level of the sea, by Gay Lussac, in his aerial voyage in September, 1805; but it has never been found perceptibly different in composition. From the latest and most accurate experiments, the proportions of oxygen and azote are 21 and 79. It is indeed true, that various foreign bodies may be present, such as an increased quantity of carbonic acid, animal exhalations, smoke, &c. The quantity of aqueous vapour is also liable to constant variation. What then renders the air of some places so much more salubrious than that of others? or, whence arise the advantages which the invalid so constantly experiences from change of place? The proposition itself may, perhaps, be denied; and any attempt to establish an explanatory theory upon such a subject may be compared to that made by the Royal Society at the command of king Charles, to explain "why, if a vessel is filled brimful of water, and a large live fish be plunged therein, that it shall nevertheless

not overflow."—Is it a fact? Is one situation more salubrious than another? and do dyspeptic patients actually derive any benefit from mere change of air? I do not imagine that any physician, who has practised a few years, will require any evidence of these facts beyond that which his own experience must have supplied. It is notorious that children, who may be regarded in the light of sensible instruments, become unhealthy, if constantly confined to the air of large cities; robust and healthy persons are not so affected; but the delicate, and, above all, the *dyspeptic* invalid, is notoriously injured by it. Let him retire only for a few days into the country, and the effect which is produced by the change is too apparent to admit of any question. Some have supposed that the insalubrity of the air of a large city may depend upon the greater dampness and stagnation of the air, occasioned by its numerous buildings: I am not disposed to assert that such causes may not have a share in producing the effect; but the animal effluvia, and the carbonaceous matter so abundantly floating in the atmosphere, must also be taken into consideration. How does it happen that plants wither and die in a short time after they are brought from the nursery grounds into the more capacious streets of the metropolis? Why should iron rust with so much greater celerity in London than in the country? These observations, however, merely go to prove that the air of a city is less pure than that of the country. Is there any evidence to show that the air of different places, remote from towns, varies in its salubrity in different places, or in the same place at different times? I apprehend that most of the beneficial or evil effects of different air may be ultimately referred to its relations to moisture and dryness. That such changes are considerable and striking, under certain circumstances, have been rendered apparent by the admirable researches of Mr. Daniell, who, by the invention of a simple and correct hygrometer, has been enabled to throw very considerable light upon this hitherto obscure subject. That the cutaneous discharge is very materially affected by the degree of moisture in the atmosphere is evident; and that the digestive organs may therefore be thus influenced, through its medium, is a corollary which no one will refuse to admit. When the air is very moist, it is a bad conductor of the perspirable matter, which, therefore, instead of being carried off in an insensible form, is condensed upon the surface; hence we appear to perspire greatly upon the slightest exercise, whereas the cuticular discharge is, at that time, absolutely less. We have all experienced the sensation of heat, and disposition to sweating, during the moist weather which so frequently occurs in this country in April and May, the wind being at the time stationary at southwest or south. On the contrary, during the prevalence of an east wind, the most violent exercise will scarcely prove diaphoretic, and yet the quantity of cutaneous exhalation is far greater than during that state of atmosphere when the slightest exercise deluges us with perspirable matter. Dr. Schmidtmeier says, that in Chili, notwithstanding the



high temperature, which would have been intolerable in Europe, and deluged the inhabitants with perspiration, so rapidly does evaporation proceed, that it might even be doubted whether, after considerable exercise, any perspiration was occasioned by it.<sup>1</sup> It is scarcely necessary to observe that the atmosphere of Chili is remarkable for its dryness. The functions of the lungs are no less influenced by the state of the atmosphere than those of the skin. The former organs are constantly giving off water, and if it be not carried off, with equal rapidity, it is reasonable to suppose that some influence will be produced upon them, beneficial or otherwise, according to the peculiar condition of the patient, as I have endeavoured to explain in the last edition of my Pharmacologia, under the history of expectorants. How is the cure of hooping-cough, by change of air, to be explained, unless we adopt the belief which I have endeavoured to enforce?

Experience has taught us that the air most beneficial to the dyspeptic patient is that which is dry and keen; a residence in an elevated spot should therefore be selected: for the atmosphere of a valley, however congenial to the pulmonary invalid, will be generally found injurious to the class of patients whose welfare it is the object of the present work to promote.

380. The advantages which attend "change of air," in the treatment of various diseases, have been ascribed by many physicians to the exhilarating impressions thus produced upon the mind, and to the simultaneous change of habits which usually takes place upon such occasions. I am willing to admit the extensive and powerful operation of such causes in the treatment of diseases in general, but more particularly in those cases in which the digestive organs constitute the source of the derangement; for such affections are influenced by the state of the mind to an extent to which it would be difficult to assign a limit. It therefore follows that, in the recommendation of a place of resort for invalids, various circumstances are to be taken into consideration: it is no less important to furnish amusement for the mind, than to provide salubrious air and wholesome food for the body. A continual change of residence is, perhaps, better adapted for insuring our object, than a protracted stay in any one place. The genial excitement, which a succession of novelties produces on the mind, to say nothing of the advantages which necessarily arise from the exercise of the body, is more likely to insure exhilaration and cheerfulness, and to break down the associations which continued disease will always engender, than a monotonous residence in a *watering place*, where, after the first few days, the patient becomes familiarised with the objects around him, the spell by which he is to be cured is broken, and his mind is watching every pulsation, in order to discover some indication of that returning health which he so anxiously anticipates. This truth is beautifully illustrated by an anecdote related by

<sup>1</sup> Travels into Chili.

Sydenham, and will go further in establishing the importance of the principle I am desirous of enforcing, than any argument which it is in my power to adduce. This great physician, having long attended a gentleman of fortune with little or no advantage, frankly avowed his inability to render him any further service, adding, at the same time, that there was a physician of the name of Robinson, at Inverness, who had distinguished himself by the performance of many remarkable cures of the same complaint as that under which his patient laboured, and expressing a conviction that, if he applied to him, he would come back cured. This was too encouraging a proposal to be rejected: the gentleman received from Sydenham a statement of his case, with the necessary letter of introduction, and proceeded without delay to the place in question. On arriving at Inverness, and anxiously enquiring for the residence of Dr. Robinson, he found, to his utter dismay and disappointment, that there was no physician of that name in the place, nor ever had been in the memory of any person there. The gentleman returned, vowing eternal hostility against the peace of Sydenham; and on his arrival at home, instantly expressed his indignation, in not very measured terms, at having been sent so many hundred miles for no purpose. "Well," replies Sydenham, "are you better in health?"—"Yes; I am now perfectly well, but no thanks to you."—"No?" says Sydenham, "but you may thank Dr. Robinson for curing you. I wished to send you a journey with some object of interest in view: I knew it would be of service to you: in going, you had Dr. Robinson and his wonderful cures in contemplation, and in returning you were equally engaged in thinking of scolding me." There was more wisdom and address in such a scheme than in that which is said to have been practised by Hippocrates, who sent his patients from Athens with no other object than to touch the walls of Megara, and then to return.

381. I have thus endeavoured to investigate the principles upon which the treatment of indigestion is to be conducted. I might have descended into fuller detail, but the art of selecting remedies, of graduating their strength, and of modifying their powers by combination, constitutes a subject to which I have directed the attention of the practitioner in a distinct work, the extensive sale of which convinces me that it must be already in the hands of every professional reader, and will render any further observations in this place unnecessary. After all, more benefit will arise in dyspeptic diseases, from a judicious regulation of the diet and habits of the patient, than from large quantities of medicines: although I do not intend, by this observation, to undervalue the importance of such agents, when directed by the skilful hand of the physician. The unhappy invalid, who seeks for relief from the nervous cordials and stomachic mixtures of the empiric, may occasionally derive the feeling of temporary relief, from the operation of stimulants to which the regular practitioner will never resort. Let him remember that such relief, if obtained, must be at the expense of his future

welfare. Such expedients have been aptly enough said to be drafts upon the constitution, payable with compound interest a few months after date. If we examine the history of quackery, we shall generally find that the administration of a boasted panacea has been associated by its crafty author with some reformed system of diet and habits, to which any benefit that may have arisen ought in justice to be assigned; for mystery carries with it a spell that overcomes every prejudice, secures the implicit obedience of the patient, and reconciles the most refractory to privations which reason would in vain endeavour to enforce.

381. I shall now recapitulate some of the more prominent doctrines which have been established in the preceding pages—a plan which will not only have the advantage of placing the subject in a simple and perspicuous point of view, but of affording the reader a convenient reference to the practical parts of the work.

#### RECAPITULATION.

1. The first object is to discover the origin and seat of the disease (322).

2. If it arise from a debilitated state of the stomach, in which either the secretions are deficient or depraved, or the muscular powers of that organ have lost their vigour, we have first to remove, as far as we are able, the remote causes which may have produced the disorder. The alimentary canal must be cleared of all foul congestions, and their future accumulation prevented, first, by a strict adherence to a diet most likely to insure the digestion of the food; and, secondly, by the careful exhibition of laxatives, which may carry off the superfluous parts. The functions of the skin must be restored, and a general vigour imparted to the body, by remedies which are calculated to strengthen the nervous system.

3. If the dyspeptic disease has continued long, and we have reason to suspect an inflammatory state of the gastric membranes, we must employ antiphlogistic means for its cure (266).

4. If the duodenum be the seat of the disorder (292), we must carefully insure, by appropriate diet, the complete chymification of the food, so that it shall not be irritated by the contact of half-digested food; the secretions which enter its cavity must be regulated and improved, by small doses of mercury; and colchicum may be administered in the manner above directed (361). Above all, the colon must be carefully preserved from feculent accumulations.

5. If the bowels be distressed with flatus, we must ascertain whether the feeling arises from an increased quantity of air present in the canal, or a morbid sensibility of the membranes, which renders the ordinary quantity of elastic matter burthensome. In the former case the treatment must be regulated by such measures as

may prevent fermentation (359); in the latter, the irritability of the intestines must be appeased by sedatives.

6. If acidity prevails, we have to enquire whether it arises from the nature of the food, or the morbid state of the gastric juice, and regulate our measures accordingly (353).

7. Where disease exists in the bowels, and the appearance of the stools indicates a dysenteric affection, we may infer that the mucous membrane is in a state of disease.

8. The administration of tonics and aromatic stimulants will always be attended with mischief, where a phlogistic condition of the mucous membranes exists: mild aperients and light diet are to be prescribed under such circumstances (368).

9. When there exists a languor in the muscular powers of the alimentary canal, and a torpor in the secreting membranes, bitters, aromatics, and other stimulants, such as mustard seed, &c. may be safely administered.

10. The dietetic code of the dyspeptic patient may be summarily included under the following precepts:—

#### *A. Precepts in relation to the Quality of Food.*

*a.* Animal food is more digestible, but at the same time more stimulant and less flatulent, than vegetable diet. A dyspeptic invalid may be restricted to meat and bread with advantage, until his digestive powers have gained sufficient energy to enable him to convert vegetable matter into healthy chyle (129), after which a due mixture of both species of aliment will be essential (131.)

*b.* The wholesome quality of food depends as much, or even more, upon its mechanical condition, as upon its chemical composition (171); and as this is influenced by various circumstances under our own control, we may render food, naturally indigestible, of easy digestion (174). The digestibility of any species of aliment, as well as its nutritive qualities, are influenced by the different modes of cookery (177). The addition of condiments is also capable of producing the same effects (183). The practitioner will be enabled to direct that species of food, which is best calculated to fulfil the indications of the case, by an attentive perusal of those remarks which are introduced in the body of this work. And he will also find ample directions for his guidance in the selection of liquids for drink.

#### *B. Precepts in relation to the Quantity of Food.*

This must, in every case, be regulated by the feelings of the patient: let him eat slowly, masticate thoroughly, and, on the first feeling of satiety, dismiss his plate, and he will not have occasion for any artificial standard of weight and measure. But he must, in such a case, restrict himself to one dish; an indulgence in

variety provokes an artificial appetite which he may not readily distinguish from that natural feeling which is the only true indication.

*C. Precepts with regard to the Periods best adapted for Meals, and on the intervals which should elapse between each.*

I have, upon every occasion, endeavoured to impress upon the practitioner the high importance of these considerations. In every situation of life, we too frequently pass unheeded objects of real importance, in an over anxiety to pursue others of more apparent but of far less intrinsic value; so is it with the dyspeptic invalid in search of health: What shall I eat? Is this, or that species of food indigestible?—are the constant queries which he addresses to his physician. He will religiously abstain from whatever medical opinion, or even popular prejudice has decried as unwholesome; and yet the period at which he takes his meal is a matter of comparative indifference with him: although he will refuse to taste a dish that contains an atom of vinegar with as much pertinacity as if it held arsenic in solution, he will allow the most trifling engagement to postpone his dinner for an hour. So important and serious an error do I consider such irregularities, that I have frequently said to a patient labouring under indigestion, "*I will waive all my objections to the quality and quantity of your food, if I were sure that such a sacrifice of opinion would insure regularity in the periods of your meals.*"

- a. The principal solid meal should be taken in the middle of the day.
- b. Four hours after which a liquid meal should be indulged in.
- c. The digestion of one meal should be always completed before fresh labour is imposed upon the stomach.
- d. The intervals at which food is to be taken must be regulated by the digestive powers of the individual, and the rapidity with which they are performed.
- e. The patient should never take his meal in a state of fatigue.
- f. Exercise, if practicable, should always be taken three or four hours after dinner.

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CONCLUSION.

I have now fulfilled the objects, which I proposed to myself in the composition of the present work. I have attempted to establish the general principle upon which the digestibility and nutritive powers of different aliments depend; and I have endeavoured to point out the circumstances which may render any species of food

indigestible and noxious; but, after all, it is impossible that any standing orders, however judicious, can be made applicable to every case; nor can any work be written which shall embrace every modification of so proteiform a disease; I therefore trust that the practitioner will make a liberal allowance for the defects of the present treatise, and not like the country fellow, in Aristophanes, pick a quarrel with the map, because he could not find a particular farm in it. It only remains for me to relate a few cases in illustration of the views I have offered, with regard to the causes and nature of dyspepsia, and in confirmation of the utility of that medicinal and dietetic treatment which has been developed in the preceding pages.

## CASES

### IN ILLUSTRATION OF THE PRECEDING VIEWS.

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#### CASE I.

A. B., a gentleman of rank and fortune, of the age of twenty-four years, had suffered for several months with occasional headach in the evening, which, at first, was generally relieved by a cup of strong coffee, and it therefore excited little or no attention. The pain, however, became more severe, and returned at shorter intervals; it sometimes attacked him during the morning, and was accompanied with sickness, by which a strong quantity of acid was ejected from his stomach, and the paroxysm was thus terminated. His person was strong and athletic, his countenance florid, and he underwent considerable exercise during the pursuit of the field amusements to which he was devoted: his appetite was therefore considerable, and the quantity of food which he was in the daily habit of taking, exceeded that which is generally sufficient for the most robust; he had never been in the habit of restricting his diet, because he had hitherto never felt any inconvenience from its excess. In the use of wine, however, he was temperate. The first professional communication which I received from him was in April 1824; he had then for some weeks been suffering from headach and sickness, and distressing symptoms of acidity. I shall quote that part of his letter in which he describes the treatment he had received. "My medical attendant ordered me aloes and blue pill, and a potion made of gentian, bark, cascarilla, and liquor potassæ. I found the prescriptions, word for word, in your Pharmacologia. I cannot however, say much for them, although the draught certainly does me some little good: he also ordered me lime water, which is worth all the other put together: as for magnesia, I might as well eat powdered glass. What do you recommend next? I am regularly feeding on mutton, beef, &c., to the utter disgrace of vegetable diet." From this period he gradually grew worse; his attacks of headach increased in severity and frequency, and were rarely relieved until a great quantity of bile and intensely acid matter were thrown off the stomach: he grew rather thinner, but was by no means emaciated. I ordered him doses of

carbonate of ammonia an hour after his dinner, and desired him to confine himself to an animal diet. He was well purged, and the action of the bowels kept up by small portions of a neutral salt. The stools were always natural in appearance. He now found the slightest deviation from the prescribed diet to produce a headach; and when he prognosticated its approach from the presence of acid eructations, he was frequently enabled to avert it by a dose of ginger and carbonate of soda, which I had also prescribed for him. He says, "I have found it necessary to take your prescription once or twice a day, which has averted many a vile headach, as I always take it if I feel any symptoms of the generation of acid, such as heartburn, or an acid taste in my mouth. Having thus converted 'my stewpan, vat, mill,' &c. into an apothecary's shop, I am much better than I have been, and have been nearly free from headach for the last fortnight, until yesterday, when I was in dock all day, and shall be so to-morrow. There is still, however, remaining to plague me, a sort of languor and laziness, which perhaps Dr. C.'s bitter prescription is intended to obviate, though it scarcely has such an effect. I wish the shooting season had arrived." I have introduced the relation of his feelings in his own words, because they will serve to convey a good idea of their nature and intensity, as well as of that hilarity and natural flow of spirits which constantly accompanied the progress of the disease in this highly-gifted and amiable young man. In November I received from him a letter, of which the following is an abstract: "I find that the perpetual recurrence of my old headachs leaves me nothing for it but to turn them into a subject of amusement. I have been reading some speculations about muriatic acid in the human stomach, and would like very much to know what acid is in mine; and I wish you would put me in the way of testing it, for I can obtain any quantity. If it is a vegetable acid, how does it get into giblet soup, or salt beef, or fresh butter, *cum multis aliis*? If it is an animal acid, I know of none except the phosphoric, and I have no idea of making a match-box out of my viscera, so I vote at once it is not that. If it is a vegetable acid, how comes it that I may eat a dozen *ripe* peaches, and be none the worse for them? but wo to me if I eat a buttered muffin! *Ergo*, I infer that it is not wholly the acetic acid; and if not, what else can make *sweet* tea, or any thing like ale, beer, or porter, perfect poison to me? As for an animal acid, there is no poison for me like strong broth, or soup; *ergo*, there must be some villany in that. I was told, the other day, that baked meat would disagree with me, and I find this to be the case. Now, for the muriatic acid, which I strongly suspect to be the one under which I suffer, for the action on my teeth, when I am sick, is too sharp for any thing less pungent—I find that if I eat salt meat, an acid is immediately formed in my stomach, and yet I can take any quantity of salt with my meat without being the worse for it: how can this happen? I am so often almost frantic with these headachs, that I am quite willing to devote myself to



any experiment which you may choose to institute. The next curious, and to me unaccountable fact is, that if I eat *any thing*, even a mutton chop, between breakfast and dinner, I am sure to suffer from it, and that severely. About a week ago I went to Dublin, to transact some important business; and, lo, when the day came, my head felt as if it were nailed to my pillow. They sent for Mr. Crampton, the surgeon-general, who greatly approves of the carbonate of soda and ginger, and added to it five grains of rhubarb. This very day I have taken, at three times, thirty grains of the soda, which gives a very temporary relief. I am particular in my diet, and take no drink but water; still, in spite of these precautions, I have a very bad headach once a week, and a moderate one or two besides. It is very odd that I never had two of my severe headachs on two successive days; that they never make me look the least pale or yellow. Their progress is exactly similar: I am at first heavy and dull, then headach comes; then I *feel* sick, then I *am* sick: the produce of the operation is very acid, or very bitter; then I get better, and go to sleep, but in a quarter of an hour I wake worse, and so on, every half hour, until about four in the morning, when I gradually get better, and invariably wake quite well."

By a steady perseverance in the plan of diet and medicines prescribed for him, he found considerable alleviation, until April, 1825, when he complained of having a return of his old headachs, with their usual severity; but he had relaxed in the strictness of his diet: and he adds: "I think, by more care in future, I shall be able to keep them in check; but I ought to state that I now suffer from a sense of weight and oppression, chiefly after meals." On the 18th of May he had a most violent attack, owing to having eaten a mince pie, and his subsequent letters complain of a listlessness and want of energy, which rendered him incapable of the slightest exertion. I expressed a wish to see him, and he arrived from Ireland on the first of June; the journey had been of service to him, and I found him much thinner, but better than I had expected. His numerous friends in London, anxious to pay that respect which his talents and urbanity so justly commanded, poured in their invitations, so that to expect obedience to any plan of regimen was not to be calculated upon. He left London, and proceeded to Leamington, where he unfortunately, by the explosion of the fowling piece, lacerated his little finger, and was compelled to suffer its amputation. His health declined under this operation; he lost flesh, experienced increased headachs, and was so ill as to induce his friends to call in the aid of a popular practitioner in that neighbourhood, under whose superintendence he took drastic doses of scammony, not only without relief, but with an evident aggravation of the symptoms. He became thinner, and more than proportionally reduced in strength; so much so, that he found himself incapable of horse exercise: he suffered severely from constant nausea and oppression. In this state he continued, until his bowels, for the first

time since the commencement of the disease, exhibited signs of torpor. "From a daily pill of camboge, scammony, aloes, and colocynth," says he, "I was obliged to increase the dose to four, and at last to discontinue them as entirely inefficient; and medicine having become as necessary to me as food, my medical attendant in Ireland has contrived a more active combination, which I take daily; but I fear that I shall be obliged either to increase its dose, or supersede it by one still more powerful, as I find that this is even losing its effect." His bowels at length became so torpid, that the most powerful drastics failed in their operation; his strength was daily declining; scarcely a day passed without headach and sickness: he suffered, during the night, from most violent cramps in his legs. In the middle of December I received a letter from him, which was nearly illegible; and he states that he can scarcely see his hand, not from dizziness, but from an indistinctness of vision, which continues without any amendment during the day. His vision at length became so imperfect, that he could no longer correspond with me: I then urged the necessity of his once more coming to town—a proposal which he eagerly embraced; but such was his weakness, and so severe his sickness, vomiting without any cessation for forty-eight hours, that he was many days on the road. His face, hands, body, and legs, swelled to a considerable degree, and he experienced great difficulty in breathing. As soon as he arrived in town, I immediately proposed a consultation. His bowels had not been moved for ten days, and every medicine given for that object had failed in its effects: this circumstance, connected with the fact of his deficient vision, which now rendered him incapable of recognising his friends, or even of distinguishing the window frames, induced me to suspect that all the symptoms of this unfortunate case were to be referred to some disease in the brain. Sir H. Halford, Dr. Maton, and Dr. Warren met me in consultation. The first great indication to be fulfilled was the evacuation of the bowels; he had already, by my directions, taken ten drops of the oil of the *croton tiglium* without effect. He was now directed to take twenty grains of calomel, with five grains of scammony; and a dose of the infusian of senna, with jalap and a neutral salt, every hour until an evacuation was procured. After some hours the bowels answered, and a perfectly healthy and figured motion was obtained. The vomiting was appeased by effervescing draughts; and a trial of the hydrocyanic acid was proposed. He was cupped, and blistered at the back of the head; but his vision grew daily more obscure: his headach was relieved, but he constantly experienced a sense of weight and uneasiness in the region of his stomach; his pulse was regular, but hard, and rarely less than a hundred beats in a minute. In this distressing state he remained for ten days; when I was suddenly called to him in the middle of the night, in consequence of a violent dyspnœa which had seized him. I found him in a state of apparent suffocation, and immediately requested the attendance of Mr. Keate, in

order that some blood might be abstracted from the arm. He lost sixteen ounces, but no relief was afforded by the operation. Dr. Maton saw him shortly afterwards with me: hemorrhage had taken place from the lungs, and he died at two o'clock, after the failure of the methods usually adopted in such an exigency. What was the nature of the disease? I confess that I had long considered the brain as its seat; and I explained the dyspnœa from a deficient supply of nervous energy, his symptoms bearing a striking analogy to those which were produced by a division of the eighth pair of nerves. The result, however, of the dissection, will throw some light upon this obscure and interesting case. Upon inspecting the abdominal viscera, not the slightest trace of disease could be discovered; the stomach was larger, and the diameter of the intestines smaller than usual, but there was no other appearance worthy of notice. On opening the thorax, the lungs appeared so gorged with blood, as almost to resemble the spleen in texture; they were emphysematous in several places. The heart was apparently healthy in external appearance, but of a large size; upon making an opening into the right auricle and ventricle, the cavities were morbidly dilated, so as to constitute what has been termed *passive aneurism*: their parietes were not thickened. The left ventricle was also unusually large: the valves were in a healthy condition. Upon opening the head, the structure of the brain and its membranes were found in a perfectly healthy state, but without the usual presence of blood. The substance of the brain itself was perfectly blanched, and, upon cutting into it, the usual spots of blood were not produced. This organ, therefore, although not injured in structure, must have been unfitted for the performance of its functions from a deficiency of blood; in consequence, probably, of the feeble action of the heart. The history of this extraordinary case will admit of much physiological speculation. That the heart was the primary seat<sup>1</sup> of the disease, appears to be the most probable conjecture; the loss of vision must have arisen from a deficient circulation through the brain; and to this also we are to attribute the obstinate state of the bowels. The derangements of the stomach may be referred to its sympathetic relations to the heart, or brain. The gorged state of the lungs may be accounted for, either by the imperfect action of the heart, or by the deficiency of nervous energy; for a similar appearance is observed in cases of narcotic poisoning, where the death of the animal takes place from the destruction of the powers of the brain. I have lately met with a case of diseased heart, in which the patient complained of a similar imperfection in his vision; and he died in consequence of pulmonary hemorrhage. I had no opportunity of examining the body.

<sup>1</sup> I have learnt, since his death, that the pulsations of his heart frequently produced a considerable noise in bed, but he was himself unconscious of it, and never experienced the least unpleasant feeling in his chest; nor did the pulse, or any other symptom, indicate disease in that organ.

## CASE II.

C. D., a gentleman resident in the country, and far advanced in life, was seized with a violent pain in the gastric region at two o'clock in the morning: he arose from his bed, walked for some time about his room; and at length, the pain having left him, he again retired to rest, and awoke in the morning perfectly well. The paroxysm returned every morning, at about the same hour, for several weeks: his medical attendant administered large doses of calomel, from a conviction that the disease arose from some hardened fæces in the colon; but this treatment aggravated the complaint. He afterwards gave him five grains of *pil. hydrargyri* every night, and a dose of neutral salt in the morning; but the disease continued to harass him with more or less violence every successive morning. Under these circumstances, he proceeded to London for advice, and placed himself under the care of a physician of celebrity, who decided at once that the liver was the seat of the disease. The patient was accordingly subjected to a course of mercury; his gums were affected, but still no alleviation of the pain was experienced. It was several weeks after this event that I first saw him, and the effects of the mercury had subsided. My first object was to inquire into the state of his digestive functions, with a view to ascertain the length of time which his organs required for the completion of their operations. It appeared that his digestion was unusually slow, and that one meal in the day was amply sufficient to satisfy his wants. He dined at six o'clock, and I therefore thought it probable, that at the period when he was usually awoke out of his sleep by pain, the food might be undergoing its ulterior changes in the duodenum. I carefully examined the seat of this complaint; there was evidently a puffiness in the region of the duodenum, and, by pressure, he experienced a slight pain, which extended into the lumbar region. I directed him to change his dinner hour from six to three o'clock, and I laid down for his guidance such a plan of diet and exercise as would be best calculated to insure a perfect digestion. I also prescribed the following mixture:—

℞. Mist. camphoræ, f ʒvss.  
 Vini colchici, f ʒij.  
 Magnesiæ carbonatis, ʒj.  
 Spir. juniper. co. f ʒij.

Fiat mistura, de qua sumantur cochlearia duo ampla, mane nocteque.

I saw him after the interval of a week: he informed me that he had entirely lost the pain, and that his bowels had been gently relaxed by the medicine. His tongue, which was previously furred, had become clean, and no pain was now produced on pressure. He called upon me several times, and left London perfectly cured.

## CASE III.

E. F., a young man, twenty-six years of age, and a clerk in one of the public offices, applied to me under the following circumstances. Previous to the attack of which he complained, he had enjoyed very good health, although his bowels were constitutionally sluggish, and he had been in the habit of taking, occasionally, a purgative pill to excite them into action. He was attacked with a sense of oppression in the region of the stomach, accompanied with an uneasiness in his head, and great depression of spirits. His skin was harsh and dry, his tongue furred on the back part, and his appetite was greatly impaired. He awoke in the morning with a parched mouth, and a feeling of lassitude which he had never before experienced. His urine deposited large quantities of lithic acid: he was unable to give me any satisfactory account of the appearance of his alvine evacuations; I however desired that measures might be taken in order to obtain the necessary information. I directed him to take a pill composed of five grains of the compound extract of colocynth, and two grains of calomel, at night, and a draught of senna, with sulphate of magnesia, in the morning. It produced four copious evacuations of highly offensive matter, of a greenish hue, and mixed with a quantity of undigested matter, like soft soap. He experienced a feeling of relief, but still his uncomfortable sensations were not removed. After an interval of three days the dose was repeated; the evacuations were more healthy in appearance, but his symptoms were rather aggravated by the medicine. His head felt heavy, and his ideas were confused. His pulse was perfectly natural. I directed him to take three grains of the *pil. hydrargyri*, with two grains of the powder of ipecacuan, every night, and to take each morning a draught composed of three fluid drams of the infusion of senna, six fluid drams of mint water, and a dram of tartrate of potass. His diet and habits he had told me were perfectly regular, and that his occupation would not allow him to alter the hour at which he took his dinner. At this period I lost sight of him for several weeks; his friends had persuaded him to apply to some other practitioner, who, as I afterwards learnt, had directed a very proper plan of medicine for his cure; but he daily became worse, lost flesh, and suffered much from uneasiness in his head: he had, at his own desire, been cupped, but the operation afforded no relief. On his return to me, I found him labouring under all the symptoms of protracted dyspepsia, and the greatest depression of spirits. I told him that nothing short of a complete revolution in his habits would cure him; that it was in vain to expect relief from medicine, unless its administration was associated with a strict adherence to such a plan of regimen as I should propose. He reluctantly consented to obey my injunctions. I learnt from him that his usual habit was to breakfast at nine o'clock, to proceed to his office at ten, where he

continued till five o'clock, after which he walked for two hours, and dined at seven, or sometimes later. I was satisfied that this plan had gradually debilitated his digestive organs, and rendered them inadequate to the healthy performance of their functions. His mind had been exhausted by the duties of the morning, and his body by the fatigue consequent upon exercise at so unfavourable a period. I desired him to dine at three o'clock, to take some tea at six, and to walk for an hour afterwards: the only medicine which was directed for him was a draught of a saline aperient every morning. He continued this plan of diet for six weeks, and was perfectly restored to health.

## CASE IV.

G. H., the active partner in an extensive firm at the west end of the town, applied to me for advice, in order that he might be relieved from a severe attack of heartburn and flatulence, which invariably assailed him every evening. He informed me that he had tried every species of food for his dinner; sometimes restricting himself entirely to animal food, and at others to a vegetable diet; that he had taken water, and drank wine, but that no perceptible difference was experienced. His usual hour for retiring to rest was eleven o'clock; but although fatigued by the labours of the day, he was unable to close his eyes before two or three o'clock in the morning. I told him that I suspected the error was not in the quantity or quality of his food, but in the periods at which it was taken, and requested that I might be informed as to his general habits in this respect. He told me that such was the nature of the business in which he was engaged, that it was impossible for him to leave the counting house before six o'clock; and that he could not therefore dine before seven; but, as he commenced business at an early hour, he was compelled to take a luncheon at three or four o'clock. I immediately discovered the origin of his complaint: and told him, that he must either abandon his meat luncheon, or convert it into a regular dinner: for the simple fact was this, that the digestive organs were thus rendered unable to dispose of the second meal, since the stomach was called into action before the food, of which the luncheon consisted, was converted into chyle. I ordered him no medicine, but he called upon me after the interval of a fortnight, and informed me that he had entirely lost all his unpleasant symptoms, having made an arrangement which enabled him to dine at his house of business at five o'clock, and to return home to tea at eight.

## CASE V.

K. L., a gentleman of forty-five years of age, who had long indulged in the luxuries of the table, and sacrificed liberally to Bacchus, was attacked, about six months before I saw him, with

severe symptoms of dyspepsia ; loss of appetite, pain and distention after eating, depression of spirits, loss of strength, restless nights, and various other symptoms, which it is unnecessary to enumerate, were sufficient to mark the nature and intensity of his complaint. He had been under the care of different practitioners ; but the treatment suggested for his relief had been unsuccessful. When I first saw him, there was considerable tenderness in the epigastric region, his tongue was furred, his bowels extremely irregular, being sometimes relaxed, and at other times obstinately costive ; he had occasionally passed stools loaded with mucous matter, and tinged with blood. His pulse was quick and small. He complained particularly of attacks of fever, which occasionally assailed him in the evening ; they were preceded by nausea, and a slight shiver ; he then became extremely hot, and his head throbbed : this feeling continued for three or four hours, and left him extremely languid and dejected. He was unable to account for these paroxysms : sometimes he fancied that they might have been induced by exposure to cold, at other times he referred them to some indigestible food which he had taken. I frankly told him, that, unless he would strictly conform to the plan of diet and medicine that I should propose, I considered him in a hazardous situation. I directed him to be cupped on the epigastric region, and to take two grains of ipecacuan, with five grains of the extract of hyoscyamus, every night. I prescribed a laxative draught, composed of tartrate of soda, with a small quantity of manna, in a vehicle of mint water, to be taken twice a day. His diet was directed to consist of the most digestible and least stimulant species of animal food, to be taken but once in the twenty-four hours, at about three o'clock. I advised him to take thin gruel with dry toast for his breakfast, and to use a tepid shower bath on alternate mornings. I saw him again in the following week. There was less tenderness in the epigastrium, his bowels had been slightly relaxed, and he thought himself rather better, but there was no material improvement in his general health. I impressed upon him the importance of persevering in the plan, and allowed him to take two glasses of claret, diluted with an equal bulk of water. I did not see him again until after the expiration of a fortnight. He was then evidently improved, and told me that he felt confident that the plan upon which he was proceeding was the right one. He had already experienced less uneasiness after his dinner, and slept better. I found his pulse fuller, and at the same time slower. I now prescribed for him doses of the *vinum colchici*, with magnesia, in mint water, and desired that the pills of ipecacuan and hyoscyamus might be continued. At this time he went into the country, and I lost sight of him for two months ; but he returned very much better : his tongue was now clean, his bowels regularly acting twice a day, but he had still no appetite ; I therefore ventured to prescribe an infusion of calumba, adding to each five ounces, an ounce of the infusion of senna, and two drams of tartrate of soda. He continued this medicine regularly twice a

day, for three weeks, and is at this time so far recovered, as to be able to take two mutton chops for dinner, without experiencing any unpleasant feelings after the meal. I consider this simple plan to have succeeded in correcting the alimentary secretions, and imparting tone to the digestive organs; and I have introduced the relation of the case, merely to show that the most aggravated case of dyspepsia may be cured by a strict adherence to a judicious diet, with scarcely any other medical remedies than such as are calculated to keep up a gently increased action of the bowels.

I could adduce many similar cases; but my object is to avoid prolixity. I trust that, in the preceding pages, I have succeeded in demonstrating the great importance of a well regulated diet, and in establishing the principles upon which the digestibility and indigestibility of various aliments depend.



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A

SHORT TREATISE

ON

**TYPHUS FEVER.**

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## P R E F A C E .

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The subject briefly discussed in the following pages involves a considerable share of medical literature, and is as complicated in its nature as difficult in practice. To have approached the consideration of a most important fever without thought and reflection would have been quite unpardonable, yet the pains bestowed upon it appear as nothing when compared with the attention that it deserves. Of the faults and incompleteness of this short treatise, no one can be more aware than its author, but only those who have studied the prevailing epidemic, traced the history of corresponding disorders, and consulted the numerous works which have been written upon it, can appreciate the toil which a full investigation would require. The objects which have been aimed at are the following: to assert the claim of the prevailing epidemic to be ranked among specific fevers, to separate it from some with which it has long been improperly confounded, to show at the same time its analogy with others, and to improve the pathology of all. The following treatise would

have been more complete, and been illustrated by more cases, had not the author's time been much occupied by various professional avocations, and his labours interrupted by severe indisposition: but he prefers that his work should at once be published, imperfect indeed, but with the chance of being useful, whilst the fever which gave rise to it is still raging, than be kept back with the possibility of improvement till the disease which it treats of has passed away.

15, Welbeck street, Cavendish Square,  
February 28, 1839.

ON

## TYPHUS FEVER.

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It will readily be granted that we are but imperfectly acquainted with the nature and cause of many diseases. It will also be admitted, that unless the seat, the character and the progress of a disorder be ascertained and understood, treatment will be without precision, and practice must be unsatisfactory and often unsuccessful. Typhus fever will exemplify these remarks. True it is that we have very many writers on the subject, but their descriptions are so indefinite, and their nomenclature so varied, as to leave it doubtful whether their several statements allude to the same affection under different appellations, or to numerous ailments allied in character and only to be distinguished by nice discrimination.

Febrile diseases of various kinds are always present to a great extent amongst the humbler classes of the community; they often prevail epidemically, unknown to or unnoticed by society at large, and provided they be mild in degree and confined to a circumscribed district, little general attention will be paid to them. When, however, the occurrence of any such disorder is frequent, and its attacks severe, alarm is excited, calculated on this as on other occasions to distort facts and to favour erroneous impressions. The aggravation or more full developement of any ordinary malady may thus be mistaken for a fresh commencement, and an unusual form or a heightened feature in a known complaint may be thought to constitute a new disease.

In every city the great hospitals will always indicate the general state of health, and in proportion as they afford facility of admission will be a true criterion of the rise, extent and decline of any serious ailment. The regulations of our public institutions for the reception of the sick, throw the door widely open to those labouring under fever, and by this wise as well as humane arrangement, the spread of many infectious maladies is arrested and the best means are

afforded of relieving the severest afflictions of the poor. To the records kept at such establishments and to the cases therein admitted, must we turn for instruction, and to those entrusted with their charge will the public naturally look for information. When therefore, as during the present year, apprehension has been created by the unusual prevalence of an infectious disorder, some account of it from one attached to such an institution may rather be expected as a duty than need an apology for presumption.

A malignant disease has been, and it may be said is at this moment, rife amongst us. This is a fever which, from its frequency as well as from its nature, well merits the especial notice of the profession. It has in truth been more or less prevalent for several years past, and my attention has been particularly directed to it from the fact that a disorder precisely analogous appeared as an epidemic in the outskirts of London in 1831, when many cases were sent from the river side to the floating hospital for merchant seamen at Deptford, where they were under my charge as physician. Both before and since that time similar cases have frequently been met with, especially during the spring of the two last years.

Numerous instances have occurred in the crowded and ill-ventilated districts in the neighbourhood of St. Bartholomew's Hospital: and the admission of many patients under my care in that establishment, has enabled me to watch the course of this complaint, and from experience to learn much in its treatment.

To this disease it is proposed to apply and confine the name Typhus. As this term has been used by authors to designate diseases entirely different in their type and origin, much ambiguity exists, and many contrary opinions are entertained upon the subject. It becomes then an important matter to define accurately the malady to which the term should be restricted, and at the same time to assign to it a proper nosological position. This has not been accomplished, either by Sauvages, or Cullen; nor, it is submitted, has its real character been elucidated by more recent authors in our own country, though a point of the highest possible interest, and essential to the proper treatment of the disease.

Before my views on this subject are stated and the reasons specified which induce me to differ from the authority of others, it is imperative to give the definitions of the best and most modern writers.

Typhus is ranked by Sauvages in his *Nosologia Methodica*, published in 1768, amongst the continued fevers, and he thus describes it "*Genus est febris continuæ quæ ultra duas septimanas sæpius tres extendi consuevit, cum calore et urinâ sanorum similibus, pulsuque quoad frequentiam, sano fere simili, quoad robur, non majori: artubus interea maxime prostratis.*"<sup>1</sup>

Cullen also places typhus in the list of continued fevers, and gives us the following description of it: "*mobrus contagiosus, calor*

<sup>1</sup> Sauvages *Nosol. method.* 4to. Amst. 1768, vol. i. p. 308.



parum auctus, pulsus parvus, debilis, plerumque frequens," "urina parum mutata; sensorii functiones plurimum turbatæ, vires multum imminutæ."<sup>1</sup>

In the Cyclopædia of Practical Medicine, published in 1833, we find typhus constituting a division of continued fever; and it is there described as "a peculiar form or type of fever, characterised by the more early and severe affection of the brain and nervous system—by the more constant changes which the mucous membranes undergo—by the affection of the cutaneous and glandular tissues—and in the advanced stage by great prostration and symptoms denoting putrescence."

And it is further added, "That it is not uncommon to find fever, which at first is very mild, assume by degrees the typhoid character." And again, "There can be no doubt of the existence of every intermediate gradation between the common forms of fever (synochus) and typhus, so that it becomes a matter of nicety to discriminate to which class a particular case or number of cases properly belongs. Sometimes we find, indeed, the one form passing into the other, more frequently mild fever lapsing into typhus."<sup>2</sup>

In the elaborate work of Dr. Copland,<sup>3</sup> typhus is described to be "a disease which after lassitude and general mal-aise, imperfect or suppressed vascular reaction, depressed vital power manifested especially in the nervous, vascular, and muscular system, gives rise to changes more or less evident in the circulating fluids and soft solids." Dr. Copland goes on to observe "that this fever cannot be said to differ specifically from synochoid fever, although certain varieties of it present very marked distinctions, indeed the severer forms of synochoid fever very closely approach or run into certain states of typhoid fever, the chief difference consisting in the sthenic vascular reaction in the early part of the period of excitement in the former. Even the milder cases of simple continued fever may gradually assume a typhoid state."

In the above descriptions, typhus is considered to belong to the continued fevers. It is looked upon by the more recent authors in this and other countries, not as an individual disorder, but as one into which others may readily be and frequently are converted.

Now the result of observation has been forcibly to impress upon me the conviction that the prevailing fever is owing to a certain specific cause. For when closely observed, it has been found to pursue a definite course, passing through its stages with regularity, spreading by infection, and being marked in its progress by a distinctive rash. Here then we have all the characteristics of the genuine exanthemata of authors, to which class it seems correctly and exclusively to belong. It has indeed for many years been so considered by me, and this view was submitted to the public in a

<sup>1</sup> Culleni Synop. Nosol. method. 8vo. 1780., vol. i. p. 82.

<sup>2</sup> Cycloped. Pract. Med. vol. i. p. 175.

<sup>3</sup> Dictionary of Pract. Med. still in progress, by James Copland, M. D.

paper read before the College of Physicians in 1831, and has been daily impressed upon my pupils on all occasions of clinical instruction. The idea I thought original, and, feeling that if established it would be important, my time has been much occupied in its investigation. On referring to authorities, in order to trace this epidemic in different countries and at various periods, I lately met with quotations on the subject, from a treatise by Professor Hildenbrand of Vienna.<sup>1</sup> In the account of this distinguished author the ideas just expressed are most explicitly stated. It becomes then necessary to give up all claim to originality, and as the disorder is fully detailed by this eminent physician, it is but just to adopt his account as a standard with which others may be compared. An abstract of his description will then be given in the first place, the analogy of other epidemics to this will be shown, afterwards some remarks will be made upon the succession of the symptoms and the nature of the phenomena observed in this fever.

Although Professor Hildenbrand especially alludes to the epidemic typhus of 1806, yet he observes that for twenty years and upwards he had studied the disease and had been placed in circumstances singularly favourable for such an enquiry, having had the charge of many prisoners as well as other persons infected with it. After explaining the meaning of the term typhus, and after giving a short history of the disorder, and other preliminaries, he proceeds to state that simple contagious typhus has eight stages or periods.

1. The first stage is that of contagion; this period he considers to be probably instantaneous, and is not indicated by any marked impression of which the infected person is conscious. On this point he speaks from his own personal experience as well as from that of others.

2. The second stage is that of incubation. In this there will be some slight alteration in the character or temper of the individual, there will often be vertigo, lassitude, weakness after exercise, unrefreshing sleep, tremor of the hands, pain in the loins, uneasiness at the præcordia, and foul breath. Yet the persons infected are able to pursue their usual occupations and do not consider themselves ill. This period may vary in duration, it is not usually shorter than three days nor longer than one week.

3. The third stage is that of the invasion or commencement of the fever. Typhus begins like other fevers by pain in the head, creeping sensations in the back, shiverings, alternating with flushes of heat, paleness of the skin, horripilation, and with feelings of despondency and great general depression. The effect on the system is a powerful one, as is the case in all serious and important maladies. Its actual commencement lasts six hours at least, and never exceeds twelve.

<sup>1</sup> This work is apparently but little known in our country, as not a single copy of the original could be met with in any of our libraries. I have therefore been obliged to content myself with a French translation by Mons. Gasc.

4. The fourth period is the inflammatory stage. This stage lasts a week, and the condition of the patient on the first day is as follows:—To the shivering which marked the commencement, febrile heat succeeds, irregular however in its distribution; the limbs if covered are hot, if exposed are liable to be chilled, moisture is often found on the skin. There is weight on the head, with a feeling like intoxication and vertigo, which is one of the most constant of all the symptoms. Nausea and vomiting are often present, which are rather to be referred to the state of the brain than to any morbid condition of the stomach, as the tongue is clean. The face is flushed, the urine scanty and high coloured, the pulse is full or depressed.

On the second day, after a sleepless night, the patients are restless and agitated. The nausea and vomiting have abated, traces of delirium begin to show themselves, a roaring in the ears takes place, with impairment of the sense of hearing. The vertigo greatly increases, the patients stagger if they attempt to walk, sometimes they appear to sleep, but are in a state of great internal agitation and excitement. The mucous membranes of the throat are gorged and the chest is oppressed, but pains in the back, loins, and calves of the legs are sources of the greatest distress.

These symptoms continue to increase during the third day. There is disinclination to the least exertion, and even to speak is an effort.

On the fourth day extraordinary redness appears on the surface of the body, which is the exanthema. Hildenbrand considers that a condition similar to that of the skin may exist in the membrane of the lungs and in the inner lining of the intestinal canal. The rash to which he applies the epithet "purpurous" is especially seen in those parts of the body which are kept warmest, as the back, the chest, and a portion of the limbs nearest the trunk. After the eruption of the rash, the disease continues without any particular change for the remaining three days of the first week.

In this, the inflammatory period, there is no real debility; the pulse is frequent, strong, more or less sharp, but never really weak: there is a diminution of muscular power, there is general turgescence with redness of the skin, with a disposition to epistaxis; the tongue is white and moist, the skin damp, the bowels sluggish. The fever has no apparent remission; and on the authority of Lind and Milman, as well as on his own, Hildenbrand asserts that blood now drawn exhibits a buffy coat. This inflammatory period typhus shares with all infectious diseases. It is connected as in other exanthemata with a rash; the appearance of which is always preceded by the febrile disturbance. In this as in others disorders of the same class, the excitement of the system has not the stamp of simple inflammatory fever, and it is often associated with symptoms referable to the chest and abdomen which in many cases render the diagnosis extremely difficult. This complication shows itself by an inflammatory state of the throat or of the trachea, with oppression

of the chest and consequently by pneumonia. The eye is often congested in this period.

According to our distinguished author the gastric symptoms are consecutive upon the catarrhal.

In this stage there are none of those signs of weakness which so essentially characterise this disease in the advanced periods. Exacerbations take place on the third and on the seventh day.

5. The next period of the disease is the nervous. Towards the end of the seventh day an extremely remarkable aggravation of symptoms takes place, additional features present themselves, there is an accession of febrile heat, the proper exanthematous and inflammatory symptoms disappear and other phenomena succeed, and occupy in their course the second week.

The nervous system is now principally affected, and the weakness becomes real which before was only deceitful and false. The fever itself continues, accompanied however by a new train of symptoms precisely opposed to the former ones; the pulse becomes more feeble and in general slower, the tongue dry, the skin dry and burning, the urine pale and clear, the evacuations by stool more frequent and liquid. There is dulness of hearing with delirium, loss of sensibility, muscular irritation, tremblings, subsultus, and convulsions. These symptoms, says M. de Hildenbrand, are proofs of an affection of the nervous system, but they must not always be referred solely to debility; and he states among other reasons for coming to this conclusion, the fact that the disease is comparatively little under the influence of medicine, that a slightly depleting plan is not unsuccessful, and that the pulse in this state is not without power.

It is now that the disease is most infectious.

In this stage he observes that although the exanthema disappears yet the petechiæ remain: they indeed increase, and if they have not previously appeared they now show themselves, though less numerous than in the earlier stage. The intellectual faculties are greatly deranged, the patient is perfectly indifferent to all impressions and ceases to call for drink although the tongue is dry, the throat parched, and the cavities of the mouth and nose are black. The oppression of the chest is relieved although the breathing continues hurried; the cough ceases but hiccup comes on; the stools are fetid; and pains in the bowels from inflammation of the intestines are invariably present at this period of typhus. The urine is more abundant than is common in acute fever, it is clear and rarely deposits a sediment, and is retained in the bladder by spasm of the sphincter. The pulse varies much in number, force, and fulness, it is frequently slow and has a peculiarity difficult to describe, which Hildenbrand says is rather a constant dilatation than a beat: and there is a sort of irregular agitation of the blood in the artery which he compares to the movement of boiling water, or to the impulse of certain aneurisms.

In this period, the second week of the disease, the affection of the

brain and the nervous system furnish the prominent symptoms. The hearing and all the other external senses are blunted. The character of the delirium is peculiar, being singularly incoherent, ideas are furnished by the brain with wonderful rapidity, but there is always some one prevailing notion. It is a dream without sleep, and the mind seems entirely occupied with its own creation, and totally insensible to all external objects. Stupor reigns throughout; hence the propriety of the term typhus.

6. The next period he calls that of the crisis. The disorder which has now continued a fortnight is found to diminish without the intervention of art or the employment of any special remedy. A change in the state of the patient takes place, which in the regular and moderate cases of typhus brings with it the cure, provided no obstacles arise. According to Hildenbrand, at the close of the thirteenth day the heat of the skin increases, and a peculiar comatose state comes on; nevertheless, he adds, towards the middle of this day or on the fourteenth, the skin evinces a disposition to become moist, the exhalants begin to act. This is the crisis. Some patients are a second time subject to hemorrhage affording relief to the head, the nostrils discharge and the tongue becomes moist, cleaner, and red at the tip. A salutary perspiration breaks out, which has a peculiar odour; the urine passes freely, and there is a disposition to diarrhœa, which in this case is beneficial to the patient.

7. The next period is that of remission. The time of the crisis, like that of the invasion, only lasts for a few hours. When the crisis is favourable, the remission of the disease is obvious in twelve hours; but the transition to health is not immediate, a series of processes are to be undergone which dissipate the remains of the disorder and thus by degrees bring about the cure. The first active symptom which abates is the delirium. The patients awake as it were from a dream or from a fit of intoxication; some instantaneously recover their consciousness and are astonished at their situation; the memory however will be found to have suffered much, and passed events are completely forgotten or only recalled with great effort. The indifference testified in the earlier periods subsides, the eye and look become more lively and free, notice is now taken of passing events. All the natural feelings are restored, but the hearing remains dull and noise in the head continues. The muscular system gains power and the pulse becomes calm, and even, and free, but its feebleness continues: the heat of skin is moderate and uniform, the thirst abates, appetite and sleep are restored, though the functions are not performed as in health, and the patients complain much of their weakness. Any exertion produces fatigue; the mind is weak; there is great irritability, and a disposition to perspiration and costiveness. The head still feels heavy; but every day removes some of these ailments, the last of which is the dullness of hearing. A period of seven days is thus occupied.

8. The eighth period is that of convalescence. All the phenomena of the disease are dissipated during the period of remission; still the strength is not firmly re-established, the patient is emaciated, the skin loose, the flesh soft and flabby, desquamation of the cuticle takes place, the hair falls off, and the nails are renewed. The appetite returns, nay is craving. There is usually constipation, and in women menstruation is suppressed; this secretion however is restored when the strength is regained. The period of convalescence in many cases lasts some weeks; recovery varies, being slower after this than after any other fever. Complete restoration, with exemption in some degree from the recurrence of the disease, at length takes place, and other ailments previously existing sometimes depart with it.

Such is the outline which professor Hilbenbrand has given of the disease to which he proposes to apply the term typhus. In this sketch he considers the disease as occurring in a marked but regular manner.

There are many circumstances which complicate the disorder; many irregularities in its course, which render it difficult in some cases even to identify it. Irregularities however which typhus shares with other exanthemata.

The disease offers many variations in its course, and its order is not unfrequently disturbed. The same cause may produce different phenomena in different individuals according to their age, temperament, habits, present or previous state of health, or season of the year. Anomalies may thus arise in the different periods: the irregularities however of the first or second period, according to M. de Hildenbrand, are but little perceptible; there may be some difference in the intensity of the shivering fit, it may be very severe, last an unusual time, or there may be none at all.

The most remarkable modifications take place in the inflammatory period—and are such as quite to change the aspect of the fever; the anomalies which it presents are innumerable. The inflammatory character is sometimes unusually intense: the fever at this time will put on the form of severe feverish cold without in some cases any marked local affection. Sometimes the symptoms of violent local inflammation mingle with the signs of typhus. Should the determination to the head be intense, the delirium becomes frenzy, and stupor becomes true apoplexy. The throat and the parotid glands, the lungs, the bowels, the liver, the intestines, the peritoneum, the bladder, all become the seat of acute inflammatory action.

The tendency to inflammation is indeed the great cause of the anomaly in the progress of this disorder.

The symptoms referable to the bowels are often so prominent as to deceive even the most observant.

The rash varies, sometimes it does not appear at all, or is so little developed as to escape notice; it occasionally presents itself under

the form of miliary petechiæ, and disappears in a few hours, or having been out its usual time departs without affording corresponding relief.

Instead of the inflammatory symptoms, nervous ones present themselves, as tremors, subsultus, convulsions, a dry and parched tongue; or the local inflammation changes its nature, and real weakness declares itself. The disease highly malignant may prove fatal at once, or putrid symptoms show themselves and under the influence of the general weakness the blood and circulating fluids may become extravasated both internally and externally, in the form of black petechiæ, or hemorrhage. A disposition to gangrene appears, a putrid smell is exhaled—signs which portend speedy dissolution. In this form carbuncle is sometimes seen.

The duration of the inflammatory stage has been found to vary; it is very short in some cases, in others it is prolonged beyond the ordinary period of a week and extends to the ninth or eleventh day.

Irregularities during the nervous period in some measure depend upon the preceding stage. Should inflammation, for example, have been set up in the first period it may extend into the second, in which case there will be an especial tendency to gangrene. Nervous inflammation, as Hildenbrand terms it, will be produced; this most commonly is met with in the lung, the brain, or the intestines, when it assumes the character of putrid dysentery.

The rash which usually diminishes may continue, the petechiæ put on a new aspect, or swelling of the parotids take place.

Amongst the signs of nervous debility, the most remarkable, Hildenbrand adds, are the dry, hard tongue, extreme thirst, dryness and heat of skin, a disposition to dysentery with distention of the abdomen by flatus, urgent pains in the belly, universal tremors, convulsions, delirium with the picking of the bedclothes, muttering, hiccup, cramps, paralysis, black sordes on the tongue and teeth, fetid breath, passive hemorrhage, coldness of the limbs, and clammy sweats. When these symptoms occur the fever instead of terminating on the 14th is prolonged to the 17th, 21st, or 28th day, or even longer.

Amongst the anomalies during the critical period, he notices, that the natural termination may be retarded by many circumstances, such as local inflammations, especially those of the lungs and abdomen, by debilitating causes, or by large evacuations, and that sometimes the amendment at the critical periods takes place without any obvious evacuation, either by the skin or from the bowels.

During the period of remission unusual occurrences are met with, such as stupor, delirium, unrefreshing sleep, deafness, much loss of appetite, derangement of the intestines, weakness and slowness of the pulse; or the fever, though slight, may continue. A sort of metastasis may come on and prove fatal, though not immediately. Sometimes at this period an inflammation of the throat will take place, or a fresh infection occasion relapses.

Sometimes, when the earlier periods of the disease have been regularly passed, anomalies arise during convalescence. The state like intoxication, vigilance, great weakness, exhausting perspirations, constipated bowels or irritability of temper may long remain.

Such is the description given by Professor Hildenbrand of the fever, which he clearly defines and vividly portrays. A disorder peculiar in its character, obeying the laws which regulate other contagions, and presenting phenomena which are common to other exanthemata, such as measles and scarlet fever.

The next point to be considered is whether or not the epidemics which have appeared from time to time, and have recently prevailed, ought to be classed with the disorder thus described. Those who have had an opportunity of watching the symptoms and progress of the now prevailing fever, and have had many cases under their care, will agree with me that it is impossible to deny its identity with the one described by the German professor; no leading symptom of the one is indeed wanting in the other, all the essential characteristics, all the irregularity and appalling complications, are met with. We daily recognise the suffused dusky countenance, the injected eye, the great prostration of strength, deafness, confusion of the head, rash upon the skin, tremors of the muscles, tendency to hemorrhage, disturbance of the mental faculties, and inflammation of various parts. The disorder has conformed to its prescribed course; and too many proofs amongst members of our own profession have attested its infectious nature. Some additional circumstances will be pointed out at a future time, which took place this year, and either did not occur in the epidemic of 1806, or then escaped the attention of Hildenbrand.

During the spring of last year the same fever prevailed extensively, and the cases which were then under my care accurately corresponded in all important particulars with our standard of reference. The epidemic in 1831, of which an account has already been published by the author,<sup>1</sup> presented all the striking features of this formidable malady.

If Dr. Armstrong's description of the typhus fever of 1817 be referred to, the symptoms of this same disease may be collected from amongst his different varieties. He notices the congested eye, the confusion of mind, the delirium, the black parched tongue, the low mutterings, the tremor of the hands, the subsultus tendinum, the watchfulness or stupor, the relaxation of the sphincter muscles, signs which enable us to recognise this disease. He takes but slight notice indeed of one important characteristic, when speaking of the symptoms, viz. the rash. He says, however, that "peculiar petechiæ show themselves upon the extremities, which are at first only few in number, and appear as if a drop of very black ink had been allowed to dry here and there upon the skin—they soon become numerous and spread over different parts of the body, and at

<sup>1</sup> Some Account of a Fever prevalent in 1831.



last are generally accompanied by discharges of blood from the nostrils, mouth, bladder, or bowels."<sup>1</sup> And later in his account he adds, "most recent writers on fever seem disposed to attribute the appearance of petechiæ to the hot regimen, and thus account for their frequency in the typhus of former times when that practice was prevalent; but though they may have been often thus produced formerly, yet this was not the case in a great many of the epidemic cases which have occurred in the metropolis, for the petechiæ in some instances appeared on the first day of the attack, and frequently on the second and the third; and it is therefore highly probable that petechiæ sometimes occur as epidemical peculiarities wholly unconnected with the mode of treatment which may be pursued; nay, this is certain in the instances above adduced. The petechiæ were sometimes so peculiarly small as to have the character of an almost *anomalous rash*, and sometimes so large and thick set as to make the skin almost as red as in the measles or scarlet fever, for the eruptions of which, indeed, I have known them occasionally mistaken."<sup>2</sup>

Real petechiæ could never be mistaken for measles or scarlet fever, the eruption therefore here described could not have had reference to them, but such a mistake would be very pardonable, with regard to the rash in typhus, for in some cases it is extremely difficult to distinguish it simply by the aspect of the patient. Many of the other symptoms too are analogous; there are, however, abundant means of distinction which will be hereafter pointed out.

The description by Huxham of the epidemic of 1734-5, which he calls slow or nervous, bears great analogy to that under consideration. Of this he gives us the following description in his work *De Aere et Morbis Epidemicis*. "*Lenta adeo,*" he says, "*et nervosa febris lento quodam invadit gressu at firmo nimis; hac quippe correpti de levi vagoque horrore; incerto quodam et errante calore intercurrente subinde; de lassitudine porro membrisque quasi fatigatis queruntur quidem, dum obambulant interim oscitantes tamen et torpidi. Accedunt mox præcordiorum oppressio, nausea, gravedo capitis, astricta tempora aut vertigo quædam. Pulsus frequens est semper, at debilis plerumque, ac inordinatus. Calor autem haud insignis excitatur unquam; at sæpe dum volæ manuum uruntur extrema frigescunt, dum caput ardet algent pedes. Obrepiet indies malum, jamque loqui aut moveri piget. Ac vel inopinantes lecto affixi vix quo se habent modo exponere vellent, aut sopore nimio detenti aut vigiliis mire anxiis et fere perpetuis. Nihil poscunt interea prorsus ne vel potum. Jam tendinum subsultus adest, tremunt manus, tremit lingua quæ mucos subalbido obducta, haud multum fere inarescit, nisi media solum in parte ubi fusca est. Tandem et aliena murmurant subinde et desipientia, furens tamen abest insania. Tenuem plerumque reddunt urinam;*

<sup>1</sup> Armstrong on Typhus Fever, 3d edit. Lond. 1819, p. 117.

<sup>2</sup> Ibid. p. 223.

vapidi instar vini, aut cerevisiæ luridam, aliquando limpidam haud raro etiam subnigram, subinde paulo crassiorem inspersa quasi farina. Breves, inæquales et parum constantes habent sudores sæpe frigidulos et glutinosos sæpe profusos maxime, et paulo ante mortem non raro gelidos cum pulsu exili et formicante. Stragula contrectant interim, et inanes quasdam imaginesprehendere tentant, jamque vox faucibus hærens, unguis digitique lividi, facies cadaverosa perpetue fere et frigide suspiria certissimam instare mortem denunciant.

“En hujus febris dira facies quam nervosam ideo nominarunt quod nervos potissimum afficere videatur lentam vero quod ad diem vicesimum primum et ultra sæpe perduret.”

The leading features of the fevers which have recently prevailed are surely portrayed in this description; we perceive the great loss of strength, the confusion of the head, the stupor or vigilance, and the tremors of the hands and tongue. But he goes on still further to prove the identity, “pestifera semper est,” he adds, “ubi aphthæ nigræ, petechiæ fuscæ, lividæ, atræ, aut vibices quasi, apparent. Præsertim si accedit alvus cita, pl. nbea, nigra, colliquans aut sudores oleosi—ubi pustulis, papulis, aut maculis cutim deturbanantibus febris lenta stipata, contagiosa est ut plurimum; cum verò exanthemata mali sunt moris vulgo (audit) maligna. Papulæ, rubræ, floridæ copiosæ aut plurimæ pustulæ miliares turgidæ, statu morbi erumpentes bona præagiunt—salutaris nonnunquam erumpit parotis,—convalescentes frequentissime surdiscunt et sæpe habent apostemata in meatu aurium salutifera.”

It is unnecessary to insist upon the identity of this disorder with that described by Hildenbrand.

On very many occasions, judges, jurymen, and others in attendance at courts of law have fallen victims to a similar pestilence; so frequently indeed have examples of this occurred that the epithet black has been applied to assizes, thus rendered unfortunately notorious. One black assize took place at Oxford in 1577. Another at Exeter in the year 1586. One at Dublin in 1776. Twice it has occurred in London, first in 1536, and again in 1750. We have but little record of these occurrences, other than as historical facts, excepting of the last. Of the black assize of London in 1750 Sir John Pringle<sup>1</sup> observes. “This unhappy instance is so fresh in our memories that I need not have mentioned it here, had it not been to inform such as live at a distance, or those that are to come after us. The fever<sup>2</sup> in the beginning had an inflammatory appearance, but that after large evacuations the pulse sank, and was not to be raised by blisters or cordials. I have more than once known a large bleeding sink the pulse and bring on a delirium: except by this last mark and the tremor of the hands, the disease is not easily to be distinguished in the beginning from any common

<sup>1</sup> Diseases of the Army, 2d edit. Svo. Lond. 1753, p. 246.

<sup>2</sup> Ibid. p. 292.

fever. When the fever advances fast, to the ordinary symptoms are added great lassitude, nausea, pains in the back, a more constant pain and confusion in the head, and an uncommon tremor of the hands; the pulse often varies in the same day as to strength and fulness, and sooner or later sinks, and gives then certain indication of the malignity of the disease. If the sick lie warm and have had no preceding flux, the body is generally costive, but when they lie cold a diarrhœa is a common symptom. In the most cases a flux appears in the last state, when the stools are involuntary, colliquative, ichorous, or bloody, and of a cadaverous smell. The tongue is mostly dry, and without the constant care of the nurse becomes hard and black, with deep chaps. What may be particular to this," he adds, "is that sometimes the tongue will be soft and moist to the last. The drought is sometimes great, oftener moderate; in the advanced state, the breath is always offensive. Some are never delirious, but all are under a great stupor or confusion. Few retain their senses to the last, many lose them early. They rarely sleep, and unless delirious, have more of a dejected than a feverish look. The white of the eye is generally of a reddish cast, as if inflamed. All along as the pulse sinks, the delirium and tremors increase, and in proportion to its rising, the head and spirits are relieved: frequently from the very beginning the patient grows dull of hearing." He still further confirms the similarity of this fever with the one first described, by observing, "that there are *certain spots* which are the frequent but not inseparable attendants of this fever. These are," he says, "the true *petechiæ*," a statement however, which we may fairly doubt from his further description of the eruption; for he says that they are "sometimes of a paler red, at other times of a livid colour, and that they are small and commonly distinct, but are sometimes so confluent that at a little distance the skin looks only somewhat redder than ordinary, as if the colour was uniform; but upon a nearer inspection the interstices are seen. For the most part these spots are so little conspicuous that unless looked for attentively they may escape notice. They come thickest out on the breast and back, less on the legs and arms, and I do not remember to have seen any on the face. They sometimes appear as early as the fourth or fifth day, and at other times as late as the fourteenth. They are never critical, but only concur with other circumstances to ascertain the malignity. The nearer they approach to a purple the more ominous they are.

"The length of the fever is uncertain, the time depending upon the malignity. In the hospitals we had it running from fourteen to twenty days, but some have died or recovered after four weeks' illness.

"From the time of the sinking of the pulse till death, or a favourable crisis, there is perhaps less change from day to day than in any other fever not of the malignant kind. When the course is long, it often terminates in suppurations of the parotid or axillary glands. Many upon coming out of this fever complain of a pain in their

limbs and want of rest ; and almost all of great weakness, confusion of the head, and noise in the ears."

In Sir John Pringle's account we thus find all the leading characteristics of the fever in question, and what he terms petechiæ may probably have been the rash usually seen in these cases, or perhaps a mixture of both.<sup>1</sup>

The description given by Dr. Rasori, of a disease prevalent in Genoa in 1799 and 1800, and which he calls "petechial fever," accurately resembles the typhus of Hildenbrand. Dr. Rasori had ample opportunities of seeing the disease, as he was, at the period alluded to, Professor of Clinical Medicine at the Civil and Military Hospital at Milan. The disorder, he observes, was indicated by pain in the head, by great weakness and pain in the limbs, by early and considerable wandering of mind, by vigilance, and by deafness. He remarks also, that the heat of the body was sometimes but little increased, that the pulse was somewhat accelerated, but did not usually exceed 100. That it singularly varied in the same individual even during the same day, that sometimes it could be felt in one hand, while it was not to be detected in the other. In some cases, he says, the pulse was imperceptible in both wrists. He notices the hemorrhagic tendency, and crowns the whole by allusion to the eruption which appeared on the skin. In the account, however, of the eruption he is obviously confused. He notices that petechiæ were present, and so commonly that he entitles the fever, petechial, but in describing the cutaneous affection he states that there were petechiæ, or *an eruption little differing from petechiæ*, or a miliary eruption, or both.<sup>2</sup>

Here then we have an eruptive disease, with all the genuine features of the exanthemata, not however, as we may fairly conclude belonging to any known variety, or it could not have escaped the observation of this bold and learned practitioner.

M. Louis published in 1829 his researches upon the disorder termed "gastro-enteritis, putrid, adynamic, ataxic, typhoid fever." In this account we find the description of a disease so closely resembling the fever noticed in the preceding pages, that we cannot conceive refuse our assent to place it in the same class. M. Louis paid great attention to a number of cases which were admitted into the Hôpital de la Charité in Paris, between the years 1822 and 1827, and were under the care of M. Chomel. He gives an account of 123 cases of this disorder. Few works on any subject show more devotion to science, more care and pains in tracing symptoms and recording post mortem appearances.

M. Louis, in his general description of the symptoms, says that the disorder began with shivering, accompanied by trembling, headache, lassitude, loss of appetite, thirst, pain in the abdomen, and

<sup>1</sup> Gentleman's Magazine, May, 1750.

<sup>2</sup> Storia della Febbre petecchiale di Genova negli anni 1799 ed. 1800, terza edizione, 1813.

in the larger number of the cases with liquid evacuation within the first twenty-four hours. These symptoms, he observes, indicated that the disorder had its seat in the abdomen alone. They gradually increased, others were added to them, and gave the disease its proper physiognomy. He then goes on to describe a train of symptoms which satisfy me of the identity of this disease with the one selected for reference. We find in the recital, the excessive prostration of strength, the disturbance of the brain, the ringing of the ears, the injected eye, bleeding at the nose, the eruption of a rash, rosy, lenticular mixed with sudamina, the tympanitic distention of the abdomen, the involuntary stools, the hemorrhage from the bowels, the tongue unchanged in some cases, clammy and dry, coated, cleft, red, black, or enlarged in others, put out with difficulty, and trembling when protruded. The debility, M. Louis adds, increased every day, the skin over the sacrum readily became inflamed, excoriated and gangrenous; shivering rarely took place after the commencement, except to indicate some new accession of disorder, such for instance as erysipelas. The pulse was mostly about 100, large at first, small, weak, and irregular in the course of the disease; cough when it occurred would be accompanied by ronchus and crepitation; the countenance, tumid and loaded in the beginning, lost by degrees all expression and exhibited no trace of intelligence or consciousness, or it became the fierce index of fury or wandering, according to the character of the delirium. The muscles of the lips, cheeks, and lower jaw, were observed to twitch, and similar contractions were observed in the limbs; in some cases however there would be permanent rigidity of these parts or of the neck. Death at length would arrive, sometimes unexpectedly, sometimes due to secondary lesions, or accelerated by the perforation of the intestines. He notices several varieties in the severity of the symptoms, and observes that sometimes one train, sometimes another, appeared to take the lead, and as one or another might prevail, so would the fever put on the putrid form, ataxic character, or sometimes even that of inflammatory fever. In spite, however, he adds, of the difference of aspect the affection was one and the same, indicated by one anatomical sign, a peculiar change of the glands of the mucous membrane of the elliptical patches of the small intestine. In this account, we find all the leading indications of the epidemic described by Professor Hildenbrand, and that variety appears to be described in which the gastric symptoms prevailed; this will appear more marked still, when the duration of the disease, its contagious nature, and the organic lesions in typhus come under consideration.

It would profit as little to trace the disease much further as to question the propriety of the term typhus, which has at any rate antiquity for its sanction. It was originally employed by Hippocrates not to indicate a specific disease but as including a great variety of fevers. In his chapter concerning internal diseases, he gives us five varieties of typhus. The first variety, he says, appears

in summer time, during the period when Sirius presides, and arises from excess of bile in the system. He speaks of pain in the bowels as a leading symptom and asserts that this fever is completed in a period from seven to fourteen days. Another typhus occurs at all seasons, from too great fluidity, as he thinks, of the body, which is prone to swell; the disorder, he says, intermits and the patients live twenty-four days. Another typhus originates from putrefied bile mixing with the blood. Another typhus takes place in the apple season, when people have eaten too much fruit with a thin rind; it is marked by profluvium of the belly; patients suffering under it are troubled with diarrhœa, which continues for several days, and then they are well. Another typhus of Hippocrates is certainly marked by symptoms more decidedly referable to the head, by delirium and picking of the bed clothes; but his account by no means corresponds accurately with the disorder under consideration, and it is obvious that under the term typhus very dissimilar maladies are arranged. The actual meaning of the word is stupor.<sup>1</sup>

It will not be necessary to dwell longer upon the proof of identity between all the diseases above enumerated. Many of the symptoms are found in all fevers, others again are common to what are called putrid or pestilential fevers, and a third class are peculiar to the disease in question. Each of these orders of symptoms will claim some notice at my hands, with the hope of being able to arrive at a general conclusion from particular propositions.

Typhus fever, in common with all others, exhibits in the first place all the phenomena incident to symptomatic or secondary fevers. The constitutional febrile symptoms which arise in consequence of local inflammation so closely resemble those of idiopathic fever that they cannot often be distinguished, except by the history of the case or by the local affection.<sup>2</sup>

It occasionally puts on those signs which are supposed to denote putrescence; such for instance as extreme prostration, great tendency to gangrene, fetor of the evacuations, cadaverous smell of the whole body, copious discharges of blood, and a rapid tendency to decomposition after death. Scarlet fever as is well known not unfrequently puts on this appalling character. Putrid symptoms may also come on during the progress of the measles or small-pox. These signs therefore may be called accidental, and are common to a variety of specific diseases.

It has in the third place some other symptoms essentially its own; these are rash upon the skin, the power of spreading by infection, and the certain period of duration.

*The Rash.*—To entitle typhus to rank amongst the exanthemata and to distinguish it from the other varieties of that class we must look to the character of the eruption and to the time of its appearance. Rayer defines the exanthemata to be inflammatory diseases of the

<sup>1</sup> Hippocratis opera, vol. ii. p. 246.

<sup>2</sup> Thomson on Inflammation, 8vo. Edinb. ed. 1813, p. 103.

skin, characterised externally at their acme or highest degree of development by the morbid accumulation of blood in a point, a district, or the entire surface of the integuments.<sup>1</sup> In general, however, exanthemata are considered to be cutaneous eruptions, accompanied by fever, arising from contagion, and liable to occur but once during life. All the authors who have written expressly on typhus, or who have described those diseases which appear allied to it, mention the circumstance of a rash; sometimes vaguely, sometimes erroneously.

Huxham it will be recollected says "*Papulæ rubræ floridæ copiosæ aut plurimæ pustulæ miliaris turgidæ statu morbi erumpentes bona præsagiunt.*" Sir John Pringle observes that "there are certain spots which are the frequent attendants of this fever of a paler red and so confluent that at a little distance the skin only looks somewhat redder than ordinary." Rasori states "there is eruption of petechiæ, or an eruption little differing from petechiæ." Armstrong says that "the petechiæ were sometimes so peculiarly small as to have the character of an almost anomalous rash, and sometimes so large and thick set as to make the skin almost as red as in measles or scarlet fever; for the eruptions of which indeed" he adds "I have known them occasionally mistaken."<sup>2</sup>

According to M. Chomel<sup>3</sup> there is an eruption in the majority of cases. Mons. Louis takes notice of the "*taches roses lenticulaires*" as a frequent occurrence in the disorder described by him. Bate-man remarks that in a few cases an efflorescence made its appearance resembling measles, and this is considered by Rayer to be a variety of roseola.<sup>4</sup> Sauvages describes the rash in typhus, but objects for the following reasons to place that fever amongst the exanthemata. He says "*differt a morbis exanthematicis ex eo quod exanthemata in typho, vel a regimine calidiori inducantur, vel non nisi in morbi statu superveniant, eaque ut plurimum sint maculæ, non vero tumores, etiamsi parotides quandoque subnascantur: in exanthematicis vero eruptiones miliaris, variolosæ, robeolosæ, bubonacæ, &c. ante morbi statum etiam prorumpunt.*"<sup>5</sup>

There are many circumstances which throw obstacles in the way of obtaining accurate information respecting the rash in typhus. Patients frequently delay their application to hospitals for several weeks, so that in one class of cases it will have disappeared before the disorder came under notice. In another class it will probably be overlooked, for it is often so slight as to escape any but an experienced eye. Then again it will not be perceptible on the chest or arms, where it is usually expected to be found. On one occasion where it had been sought for in vain on the front part of the body, it was perceived abundantly on the back, which was accidentally

<sup>1</sup> Rayer, Treatise on Diseases of the Skin, p. 57.

<sup>2</sup> Armstrong on Typhus, p. 223.

<sup>3</sup> Leçons de Clinique Medicale, p. 7.

<sup>4</sup> Rayer on Diseases of the Skin, 2d. Ed. Lond. 1835, p. 193.

<sup>5</sup> Sauvages Nosolog. Method. oct. Amstel. 1763, vol. ii. p. 252.

examined, owing to the necessity of confining the patient in a straight waistcoat. Little can be learned on this subject, from the patients themselves; when asked if they have any eruption on the skin, they almost invariably say no, and even should it be fully out, are seldom aware of it. Treatment may in some degree interfere with its appearance. Many cases have occurred in which no rash could be detected, after the adoption of active measures at the commencement, especially if emetics were administered on the first symptoms declaring themselves. Independent however of all these circumstances, it appears in the larger number of cases. According to Louis it is seen in two out of three, nay more, in fifteen out of sixteen; Chomel says, it appeared in thirty-two out of fifty-four. By reference to my note book, I find that the rash is recorded in 70 out of 100 cases promiscuously taken, no mention being made of it in the remaining 30: again, out of 100, all of whom had the rash, it was present in 86 on their admission, and showed itself subsequently in the rest.

The rash then may fairly be considered as one of the characteristics of this fever, and the assertion of Sauvages, that it arises from an over-exciting treatment is sufficiently contradicted by modern experience. For the rash in this as in other eruptive fevers seems to be exhibited more fully, since the general introduction of a cooling regimen has been adopted and sedulously enforced. To Sauvages' objection against placing typhus among the exanthemata, on account of the lateness at which the rash appears, we may oppose the fact that it is constantly perceived on the third or fourth day.

The eruption itself is of a red colour, the shades of which are various, in some cases bright and vivid, more generally however, dusky, and undertoned: if the rash is fully developed the cuticle is slightly elevated, and when the vessels are very turgid the eruption is perceptible to the touch. It is most commonly found on the chest, trunk and limbs; sometimes on the face, and was noticed in a recent case to have reached and occupied the scalp; nor is it confined to the outer surface of the body, but extends itself to the lips and lining membrane of the mouth.

It appears in spots or patches circular in form, and varying in size from the diameter of a pin's head to that of a pea. No itching attends its presence on the skin, nor is desquamation of the cuticle an ordinary consequence. From the appearance of the patients in the eruptive stage, the term spotted is not inappropriate to this fever; and its existence in London in 1750 may be presumed from the fact that the bills of mortality for that year, besides the ordinary eruptive disorders as measles, small-pox and scarlatina, announce as prevalent "malignant fever, spotted fever, and purples." We learn from the same source that in the above mentioned year the mortality from these causes was very considerable; 1229 persons died from small-pox, 321 from measles, and 4294 from fever. In the following year the number of deaths were proportionately small, 998 from small-pox, 31 from measles, and 3219 from fever. A decrease in the



number of deaths from these causes alone of nearly sixteen hundred.

The duration of the rash in typhus, according to M. Chomel, is from three to four days; should any mottling of the skin appear after this period he attributes it to a fresh eruption; and remarks that the exanthema disappears occasionally on the second day after it has shown itself. It may here be observed that in some cases, when the rash could not be perceived, but in which it was deemed advisable to bleed the patient, and a ligature was applied for that purpose to the arm, the eruption appeared below the tape. Acting upon this idea, I have at other times been able to exhibit it by artificial congestion of the vessels.

A few cases may now be quoted in illustration of the different periods at which the rash appears; of its occasional absence or unusual prolongation.

*CASE I.—In which the eruption was visible on the third day.*

George Ward, aged 11, was admitted into St. Bartholomew's Hospital on the 14th of July, 1837. The account obtained of his illness was that he had been seized two days previously with shivering and pain in the head, followed by ordinary febrile symptoms. On the next day he had in addition some pain in the chest. When taken into the hospital he complained much of headache, his pulse was frequent, his skin was hot, dry and spotted with a rash, appearing in points or small patches of a dusky red colour. Upon auscultation some crepitation was detected in the chest. But short notes were taken of this case as the symptoms were comparatively mild, and the disease yielded readily to treatment. He was discharged well on the 1st of August.

*CASE II.—Showing the leading features of the epidemic of 1831, in which the rash appeared on the fourth day.*

Richard Barclay, aged 23, was attacked on the 20th of May, 1831, by headache and nausea; his tongue was clean, his bowels confined. On the third day he was reported as extremely weak, and vomited on taking food; on the fourth day a copious eruption of dusky red spots appeared on the trunk and limbs. As he was unable to pass his water, it was necessary to draw it off by the catheter. He continued for some time in a low weak state, his tongue became dry and brown, but he had no delirium, and was pronounced convalescent on the 8th of June.

This case was watched from the commencement. The patient had been admitted into the seaman's hospital for an affection of the trachea, of which he had quite recovered, and was engaged as nurse to attend the fever patients on board. He had acted for a fortnight in this capacity when he was taken ill as described.

CASE III.—*Exhibiting the usual symptoms of the epidemic of 1838 in a more aggravated degree, and in which the rash appeared on the fourth day.*

Martha Chandley, aged 48, one of the nurses at St. Bartholomew's Hospital, and lately occupied in attending to fever cases, was attacked on the 2d of March, 1838, with alternations of chills and flushes, with great languor and lassitude, and with pain in the head and limbs. She continued at her work two days, when she was herself obliged to become a patient. When the case was taken on the third day her aspect was heavy, her countenance rather pale, there was no suffusion of the eyes but a slight intolerance of light, she felt sick, but had not vomited, there was no tenderness of the abdomen, she complained chiefly of pain in the head; there was but little increase of temperature; the chest sounded well on percussion, no unnatural sound could be detected on auscultation, but the air did not enter freely into the base of the right lung.

Next day the temperature of the body had increased, the countenance was anxious, the face flushed, the tongue dry and brown, with intense thirst. A spotted eruption was very evident on the face, neck, and other parts of the body. Percussion and auscultation detected nothing morbid in the chest.

The following night was passed without sleep, she was continually moaning or talking incoherently, her tongue continued dry and brown, her teeth became coated with a dark secretion, she brought up some mucus tinged with blood, crepitation was heard at the base of the right lung, and there was some slight tenderness of the abdomen.

The report of the next day, the 7th of March, was that she had had no sleep, she moaned and rambled all night, her evacuations all passed in the bed, her lips and teeth were covered with sordes, she was very thirsty, and her expectoration contained some blood. She remained for several days in a state of apparent insensibility; when roused, however, she gave collected but reluctant answers to questions, and quickly again sank into forgetfulness. Her tongue continued dry and black, her pulse above 100 and very weak, her evacuations passing unconsciously. The abdomen then became tympanitic.

On the 12th however she was reported to have had rather a better night, and her aspect was improved; and her tongue began to be a little moist at the edges.

From this time she continued to mend, and was eventually discharged quite well.

CASE IV.—*In which the rash appeared on the fifth day.*

William Brittle, aged 19, was received into St. Bartholomew's Hospital on the 2d of June, 1837. He had been seized the day before with cold chills and other signs of fever. On admission his

eyes were suffused, his pulse accelerated, he was deaf, with pain in all his limbs and abdomen. On the 4th the last symptom was relieved. On the 5th, he complained of some sore throat; his chest and arms were spotted with a dusky rash. On the 10th he was delirious. On the 12th he was much better, and on the 18th had recovered from his attack of fever, but was not discharged till the 4th of July, owing to the continuance of debility.

CASE V.—*In which the rash was perceived on the skin on the sixth day.*

Eliza Simpson, aged 21, a servant, admitted into St. Bartholomew's Hospital for hysteria on the 8th of February, 1838, became feverish on the 26th, with pain in the head, tongue furred and dry, pulse quick and full, urine high-coloured.

27th. Perspiring; tongue furred, moist, pulse quick, much pain in the head.

28th. Still complains of pain in the head.

March 1st. Perspiring, tongue moist, pain in the head continues, some inflammation of the posterior fauces and throat.

3d. But little sleep, pain in the head diminished, subsultus of the tendons of the hand, tremors of the lower jaw.

4th. Night very restless, skin spotted with a rash.

5th. Better, eruption vivid, less nervous excitement and confusion of the head.

7th. Much better, slept composedly last night, skin cool and moist, less appearance of the rash, diarrhœa.

14th. From the time of the last report she continued to improve rapidly, and is now convalescent though very weak.

In this case the treatment may have had something to do with the delay; an emetic was administered on the first appearance of the symptoms, this provoked vomiting, which was urgent, and continued the greater part of the night. In several other instances where the fever commenced in the hospital and the same treatment was adopted, no rash could be discovered.

CASE VI.—*In which all the signs of typhus were present upon admission into the Seaman's Hospital except the rash, this however appeared as soon as the patient was in bed.*

Richard Tracey, aged 18, admitted on board the floating hospital on the 18th of April, 1831. The words of the case as taken at the time are "giddiness, pains in the head and limbs, tongue dry and brown, skin hot, pulse 120 small and weak, bronchitis, skin covered with red spots, in a constant state of tremor. Ill six days. There was no appearance of rash when he was admitted in the early part of the afternoon, but in the evening when seen in bed, he was covered with it."

April 19. Next day, still great pain in the head, with giddiness and flushed face.

22. Strabismus.

23. Eyes recovered their proper axis of vision.

30. Had rigors this afternoon. Crepitation on the left side of the chest.

May 15th. Discharged well.

CASE VII.—*In which no eruption appeared.*

Catherine Mandy, aged 25, a servant, was an inmate of St. Bartholomew's Hospital for a purely local affection when the beds were almost all filled with fever cases. After having been in three weeks she had an attack of diarrhœa, this was on the 4th of January.

5th. She was feverish, with violent pain in the head and loins, with great thirst and dryness of the skin.

6th. The febrile symptoms diminished yesterday after the action of an emetic, but she passed a restless night; tongue clean and moist, severe pain in the head, pulse 90, rather full.

8th. Very restless last night, violent pain in the head.

9th. Pain in the head was relieved by leeches, but she slept badly; face less flushed, pulse 124, feeble, there is no rash on the skin.

10th. Pale and anxious, tongue moist and less furred, skin cooler, troubled with a short irritating cough, pain in the epigastrium with relaxation of the bowels, pulse 120.

11th. Passed a bad night, nevertheless is better, cough still troublesome, but there is no injury in the chest appreciable by auscultation or percussion, tongue moist and clean.

12th. Passed a better night, pulse weak and small, 100, bowels confined, no rash on the skin.

13th. Tongue dry, pulse 130.

14th. Flushed and feverish last night, better to-day, tongue moist.

The rest of the notes refer to slight appearances of amendment, and on the 22d she was pronounced convalescent.

This patient was suffering from an irritable tumour growing from the mucous membrane of the urethra; her case was surgical, but as she had been some short time in my ward before the real cause of her ailment was detected, she begged to be allowed to remain.

The eruption is not unfrequently prolonged; of this a case may be quoted.

CASE VIII.—*In which the traces of the rash had not entirely disappeared a month after the first attack.*

Jemima Halley, aged 35, was admitted into St. Bartholomew's Hospital on the 26th of February, 1838. Her state on admission was as follows: countenance flushed, teeth covered with sordes, skin dry and hot, thickly spotted with the rash, tongue dry and

brown in the centre, severe pain in the head and bowels, cough, without expectoration, respirations twenty, ronchus with large crepitation throughout both lungs posteriorly. She has been ill twelve days. Feb. 27, passed a bad night, rash very vivid; 28, wandering during the night, skin cooler, the rash still existing. March 4, evacuations are passed involuntarily, the rash is less distinct; 7, improving, sleeps quietly at night, skin less distinctly marked; 14, the rash on the skin has almost disappeared.

This patient was convalescent at the time that some traces of the affection of the skin were still visible. The cases are generally severe in which this retardation occurs, and it seems to be often occasioned by some deep seated mischief.

The rash then may appear at various periods, it may be prolonged some weeks, or it may not appear at all, and I have seen it recede after having been out for a few hours only. We are at no loss for analogous effects in other exanthematous disorders. If M. Rayer's work should be consulted, it will there appear that the eruption in measles will sometimes show itself earlier than usual; for instance on the third day, and even sooner.<sup>1</sup> The same author gives us examples on the other hand of its retardation to the fifth or sixth.

During the epidemic measles of 1800 several children were attacked with morbillary fever without eruption.<sup>2</sup> M. Rayer adds that he is unable to state whether these morbillary catarrhs, as he terms measles without the rash, are infectious or not.

The disappearance of the eruption in measles on the second day is by no means uncommon, arising either from exposure to cold, from the employment of purgatives,<sup>3</sup> or from causes which cannot be ascertained; and practitioners well know the urgent constitutional symptoms which then are liable to occur.

Scarlet fever exhibits the same phenomena, the efflorescence in the malignant form may, according to M. Rayer, "appear and disappear once and again."<sup>4</sup> It is well known that the eruption in this form is later in its appearance.<sup>5</sup> It moreover may be prolonged or renewed; Rayer observes that after the decline of the rash in simple scarlatina a remarkable phenomenon presents itself, which he calls "reversio," a febrile paroxysm occurs, and then the skin is covered anew with a rash composed of red spots less numerous than the first and of smaller size.<sup>6</sup> The rash again may be prolonged beyond the ordinary period of a week.<sup>7</sup>

It cannot be necessary to quote examples of the absence of the rash in scarlet fever, we have in truth as a variety "scarlatina sine exanthemate:" and very many references are made by M. Rayer to such occurrences. The scarlet fever of 1766, observed by Fothergill and Huxham, was of this character; so was that of 1788, which occurred in Buckinghamshire.<sup>8</sup>

In truth there is no peculiarity or anomaly in typhus which may not be found exemplified in scarlet fever, measles, or small-pox.

<sup>1</sup> Rayer, p. 145. <sup>2</sup> 150. <sup>3</sup> 156. <sup>4</sup> 169. <sup>5</sup> 146. <sup>6</sup> 167. <sup>7</sup> 168. <sup>8</sup> 170.

The rash cannot be mistaken for variola, as it never assumes a pustular form; from roseola it is to be distinguished by the following signs, the patch is smaller, it appears later, and there is no itching.

It cannot be confounded with simple erythema, as that is not accompanied by fever; but from measles it is not in its mere aspect to be distinguished, and indeed it may fairly be conjectured that that epidemic, which Sydenham describes as being measles of an anomalous and malignant form, was real typhus. The measles, he says, of 1674, deviated from rule, did not preserve their type, the eruption came out irregularly, was often confined to the neck and shoulders, the bran-like desquamation did not result, peripneumonia more frequently took place, and in some cases the fever would last 14 days and more.<sup>1</sup>

This disease differs from measles in many respects; its duration is longer, it is wanting in the usual precursory affection of the eyes and sneezing; the rash is more irregular in form, it does not pass progressively from the head or trunk to the extremities, and those who have had the measles are not free from an attack of this disorder.

The rash of typhus again differs from scarlatina in being less vivid, the redness is not so diffused, there is more tendency to moisture on the skin, there is usually no sore throat, nor is typhus in my experience ever followed by anasarca.

Monsieur Chomel, in alluding to the typhoid malady, says that sudamina appear more frequently in this than in any other fever. They are little vesicles, transparent, of a quarter of a line in diameter, and often escape observation, as they are not seen if viewed perpendicularly to their axes. They are usually met with at the end of the second week.<sup>2</sup>

In other cases papulæ appear mixed with the other eruption. Both the occurrence of sudamina and papulæ are common in the other exanthemata, for example in scarlatina.

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#### THE POWER OF SPREADING BY INFECTION.

Our next object of inquiry, and an important one in establishing the specific nature of typhus, is whether or not it is capable of being communicated by infection. Into this I shall now enter, and shall at the same time allude to some other points which can be most conveniently treated of here, such as the supposed cause of the disease, its protecting influence against future attacks, and the age most liable to it. In this country the majority of practitioners will allow that it may thus extend itself. Still many even here may be sceptical, or may not have been able to satisfy themselves on this point; and on the continent great doubts are entertained upon it. The

<sup>1</sup> Sydenhami Opera, p. 232.

<sup>2</sup> Chomel, 25.

prevailing opinion indeed abroad is very much against any such property in the disease in question. We are informed by M. Chomel, that in France the majority of physicians are opposed to the doctrine of infection, and that not above one in two hundred considers that typhus is capable of being thus extended.<sup>1</sup> He himself admits, doubtingly, its infectious nature, and adds, "if it be so it is only in a slight degree, and from a concurrence of circumstances not yet determined." It is undoubtedly a matter of great difficulty to prove whether the spread of an epidemic arises from one atmospheric cause, affecting all simultaneously, or whether in a crowded community the poison is propagated from one individual to another. This can only be inferred by the circumstances and the mode of its diffusion.

Dr. Gooch, in speaking of the tests of infection, remarks, "First, that those persons are most liable to the disease who approach the infected, and that their risk is in proportion to the nearness of the approach. Secondly, those who avoid an interview with persons infected, generally or always escape it, and that in proportion to the care with which they avoid them. Thirdly, an infectious disease is communicable by inoculation."

Accident alone would give us the opportunity of observing the effects of typhus by inoculation upon the human frame, but we can make the experiment on animals, and we learn some interesting particulars on this head from M. Gendrin. He ascertained, 1st. that healthy human blood occasions no injury when thrown into the veins of animals. He then injected the blood of persons labouring under various specific fevers, and found that a fatal result ensued. Applied to the cellular tissue, similar consequences followed. An ounce of blood drawn from a person labouring under putrid fever was injected into the cellular membrane of the groin of a cat; copious vomiting, dyspnœa, with a small frequent irregular pulse, a dry brown tongue, great prostration and slight convulsion followed, and death took place in seven hours.<sup>2</sup>

Hence we must confine our observations to the two other tests, viz. what occurs when persons are secluded, and by tracing accurately the spread of a disorder by communication with, or on approach of the sick.

Instances of the appearance of infectious diseases occasionally take place, under circumstances which render it difficult to conceive how they could by possibility have arisen, and make it problematical whether by any seclusion the subtle agent of infection can be effectually shut out. Quarantine may diminish the chances of the extension of any infectious disease, but cannot absolutely preclude its entrance. It may completely put a stop to the spread of such maladies as are communicable by the touch alone, but cannot arrest the passage of those which are conveyed from place to place by the atmosphere. And it is by no means difficult to

<sup>1</sup> Leçons de Clin. Med. p. 318, 339, 539.

<sup>2</sup> Andral, *Precis d'Anat. Pat.* vol. i, p. 538.

imagine that such a subtle agent as infectious matter can be readily conveyed through the air, when we see grosser particles of matter, manifest to our senses, thus transported to enormous distances. During the volcanic irruption at Sumbawa in 1815,<sup>1</sup> ashes were carried by the wind in such quantity to the island of Java, a distance of 300 miles, that the darkness during the day was more profound than ever had been witnessed in the most obscure night. Other examples of impurities borne by the atmosphere to places remote from their source might easily be quoted. Dr. Prout, in his *Bridgewater Treatise*, alludes to the share which the atmosphere has in disseminating disease, and gives us various instances of foreign matters being suspended or dissolved in this fluid. Passing by the overcharge of moisture and electricity, indicated by the gloom, the mists, the halos of a stormy sky, the restlessness and clamour of animals, we find that minute plants of a red colour have been so thickly present in the air that descending with rain or snow they have given rise to the popular notion of showers of blood. Dr. Prout also gives an account of the remarkable haze which appeared in 1782, which was of a pale blue colour, and occasionally yielded a strong and peculiar odour, during the continuance of which, epidemic diseases prevailed;<sup>2</sup> the same author noticed an alteration in the weight of the atmosphere before the appearance of cholera in 1832, and explains it by the supposition that a gaseous body considerably heavier than the air occupied its place, and this body he considers as a variety of malaria. Not vegetables only but minute animals are said to be thus occasionally suspended. Should this be true, we can understand that by the decomposition of such bodies, disorders may be generated. My object, however, is not to find a source of disease, but to show how easily and how far infectious matters may be conveyed by this medium. The following incidents may serve as practical illustrations of the above assertion. Sir Gilbert Blane mentions that an isolated case of scarlet fever occurred amongst a ship's crew at sea, long separated from intercourse with the land. Again the children at the Foundling Hospital have no communication with others, from one year's end to another; yet measles, and small-pox appear from time to time among them. The most complete example however of the insidious means by which contagious effluvia may find admission, is related by Dr. Heberden, an example which shows that all our attempts to exclude it may be set at defiance, and all our endeavours to prevent it by separation be frustrated. For it were perhaps scarcely conceivable to effect greater seclusion, than takes place when a person is imprisoned in solitary confinement; yet we are informed by the accomplished physician last alluded to, that a man who had been several months in the penitentiary at Millbank, having no commu-

<sup>1</sup> On the Connection of the Physical Sciences, by Mary Somerville. London, 2d ed. p. 272.

<sup>2</sup> *Bridgewater Treatise on Digestion*, pp. 346, 355.



nication personally, by letter, or by clothing, with any one except the persons belonging to the establishment, who were all free from small-pox,<sup>1</sup> was attacked by that complaint, which however at the time was prevalent in the neighbourhood.

Our chief reasoning then must be founded on the facts which we observe when persons in health approach those who are infected, or when disease appears in a healthy situation, immediately upon the arrival of an infected person; hence in the first place we should look for the propagation of a disease to those in attendance on the sick, and should expect to find that nurses and medical practitioners, would be the greatest sufferers. The events of this year have too conclusively verified this expectation, as many deaths are reported to have taken place from this cause among members of our profession. No fewer than five<sup>2</sup> can readily be summed up, and others without doubt might be added to the number. Many practitioners were attacked but survived. Numerous examples of infection may be found amongst those employed in the study of their profession, and here, alas! diligence was requited by pestilence, and assiduity led the way to destruction. At St. Bartholomew's Hospital alone six pupils were attacked during the last session, and about as many during the one immediately preceding.

Among the nurses in attendance upon the sick in that establishment infection was almost universal. Two of the superintendents in one of the medical wards, in quick succession, were attacked and died. Others were seized, but recovered. Of the whole number of the inferior nurses who were taken ill, I am not exactly certain, but seven were under my own charge. Still it may be argued that in all these cases the same cause was in operation, that patients and nurses contracted the disease from a common source, and not from each other. Numberless instances however might be quoted in which the fever appeared indisputably to be conveyed by the sick. One only I will relate, which satisfied me that the epidemic fever of 1831 was infectious, where in three distinct situations the disease broke out and spread after the arrival of infected persons.

During the winter of 1830 and the spring of 1831, great distress prevailed among the lower classes of maritime men. For the alleviation of which a refuge was established on the north side of the river Thames. It was immediately beset with supplicants for relief, several hundreds of whom obtained nightly food and lodging. By the rules of this institution the inmates were dismissed on the

<sup>1</sup> Med. Gaz. vol. x. p. 172.

<sup>2</sup> Mr. Cook, Dr. Fergus, Dr. John Home, Dr. Johnson, Dr. Sims. Times for April 9th, May 12th, July 21st. Last year, Mr. Staples, apothecary to the Aldersgate street Dispensary, and his assistant, were attacked in turn, and died; a third in succession took the fever, and very narrowly escaped sharing their fate. Mr. Stocker, apothecary to Guy's Hospital, and the assistant apothecary to St. Thomas, were seized with this disorder, but recovered. Mr. Berkley, House Surgeon to St. George's, fell a victim to its ravages.

following morning. It was soon discovered that many were too ill from fever to quit the refuge at the appointed time. In order to separate the healthy from the sick, a room adjoining that in which the merely destitute were received, was converted into an infirmary. Crowds still flocked to this refuge, which now was pregnant with evil. Many of those who were quite well on their admission, were next day too weak to stand, with all the precursory indications of fever, which it may be presumed they had contracted by infection. The number of the sick increased to such an extent that it was necessary to remove them to other institutions, and they were sent by boat loads at the time to the floating hospital. Almost all the beds in the medical wards were rapidly occupied by persons infected with a fever, which obviously was specific in its nature. Now although previously to the arrival of these individuals there were cases of fever on board, yet they were of an ordinary character, and did not present the peculiarities exhibited by those received from the refuge. The disorder thus imported soon spread itself over the ship, patients admitted for surgical and other complaints were attacked, the residents on board suffered from fever of a similar kind, and the immediate attendants were severely visited. There were seven nurses employed in the medical wards, whose duty it was to attend on the fever patients, and who returned home when off duty to their families on the south bank of the river. Six of these nurses were attacked with fever of this new type, which a third time made its appearance in a fresh situation, viz. in their houses on shore. The symptoms were the same in each of these different places, and the disease in all was to be distinguished by the characteristic rash. Other circumstances too, both positive and negative, may be mentioned which confirm my belief that this disease spread by infection. All the attendants at the refuge, both medical and others, were more or less severely affected by it. Again there was no such disorder in vessels moored near the floating hospital. Nor was there any such fever on the south bank of the river before it appeared in the hospital ship, as I was informed by Dr. Sutton, the physician to the Kent Dispensary, and by other practitioners in the neighbourhood.

The records of the fever hospital afford a melancholy proof of the increased risk to which medical officers and others are exposed who are attached to institutions solely appropriated to the reception of fever patients.

In Dr. Tweedie's Clinical Illustrations of Fever, it is stated that "every physician, with the exception of Dr. Bateman, who has been connected with the fever hospital has been attacked with fever during his attendance, and three out of eight physicians have died. The resident medical officers, matrons, porters, domestic servants, and nurses, have one and all invariably been the subjects of fever, and the laundresses whose duty it is to wash the patients' clothes are so invariably and frequently attacked that few women will undertake this duty. The resident medical officer was attacked with fever,

and it became necessary to appoint some one to perform his duties; the first person who thus officiated took the precaution of sleeping at home, yet his duties were soon interrupted by an attack of fever which confined him a considerable time. He was succeeded by an individual in robust health, a disbeliever in the doctrine of contagion. He performed his duty only ten days, when symptoms of severe fever appeared.<sup>1</sup>

This statement furnishes us with a powerful argument against the propriety of appropriating hospitals exclusively to the reception of fever cases; such an atmosphere must be injurious to the patients themselves, and militate against their recovery as well as endanger the safety of the attendants.

Some doubts entered my mind as to the discretion of alluding to the circumstances stated by Morgagni, that the dead body of a person who has died of fever is capable of spreading the disease. But it behoves all to endeavour to establish truth, and especially does it concern those who are connected with our medical schools to investigate a subject which, if true, would involve in a great measure the safety of pupils who resort to our theatres for anatomical knowledge. The facts, however, observed in the dissecting rooms attached to St. Bartholomew's Hospital go a great way to refute the assertion of Morgagni. He says, "I have not so many observations to communicate on this subject of fever as on others, because there is some hazard in dissecting persons who die from this cause. This, indeed, has been disputed by authors, but it is unquestionable that fatal consequences have resulted in this theatre; a young man of a robust habit had partly dissected the body of a man who died of petechial fever, he was seized with the same affection and died. In 1717 Vulpus opened the body of a woman who died of apoplexy, which came on during the progress of malignant fever, and I stood by to demonstrate the situation of the viscera to the auditors. The body was just cold, and though when the abdomen was opened no very unpleasant odour ascended, nor was there any disease except an entangled state of the intestines, yet I immediately felt an unusual degree of languor, bordering upon syncope, and we had scarcely returned home when both of us were seized with febrile shuddering and feverishness, succeeded by a hot skin."<sup>2</sup>

The facts observed at St. Bartholomew's Hospital which bear upon this assertion are the following. During the last session, seventeen bodies of persons who had died of fever were submitted to dissection. Upon an average eight pupils were engaged with each. There were one hundred and thirty-six thus occupied. Six of the whole body of the students were attacked with the fever, but of these six, two only devoted their time to dissection. We cannot therefore consider that the assertion of Morgagni is borne out by experience, as with us the proportion of those attacked was only

<sup>1</sup> Cyclop. Prac. Med. vol. i. p. 400.

<sup>2</sup> Cook's Morgagni, vol. ii. p. 592.

one in sixty-eight, and this calculation is made without including many pupils who were lookers on, and therefore exposed to infection if there was any; and without counting the bodies of persons reported to have died of fever, and which were sent to the rooms from various sources. The two gentlemen who were taken ill while dissecting, were moreover exposed to the infection of the living body in the wards of the hospital, and the other four were in close and constant attendance on the patients, as they were acting at the period of their seizure as clinical clerks.

The legitimate inference to be drawn from these facts is, that typhus, readily communicable during life, ceases to be so to any serious degree afterwards.

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#### CAUSE OF TYPHUS.

From the mode of extension when once produced, our ideas naturally pass to the causes of its production. The notion is generally entertained that under certain conditions the poison of typhus can always be generated. Most authors consider that simple exposure to a close atmosphere is sufficient for this purpose. Such an opinion has been expressed by Dr. Thomson in his valuable lectures on inflammation, and is laid down with all the clearness of that admirable writer; he observes that typhus fever, small-pox, measles, hooping cough, scarlatina and hospital gangrene, are communicated, not only by actual contact, but also by the transmission of an effluvium from the fomes or original source of infection through the medium of the air. Some of these diseases are never generated *de novo*—others again as typhus fever and probably hospital gangrene, seem capable of being produced in certain circumstances where the individuals affected by them have not been exposed to infection.<sup>1</sup>

Hildenbrand in speaking of original typhus says, that the miasma which produces this can arise at all times, that air overcharged with human exhalations is the cause: and that then it has the power of self extension, and adds, that every fever, whether intermittent, continued, inflammatory, gastric, exanthematic, nervous or putrid, may pass to the state of typhus. An opinion also entertained, it will be remembered, by Dr. Copland and the experienced author of the article Fever, in the *Cyclopædia of Practical Medicine*.

Sir Gilbert Blane says, that air contaminated by foul and stagnant exhalations, particularly those from the living human body, is the ascertained cause of typhus fever, known also by the name of the jail, hospital, and ship fever, which has been a more grievous and general source of sickness and mortality in the navy than even the scurvy. This is also the notion of Sir John Pringle, and is repeatedly expressed in his works—"When the hospitals of an army" he says "are crowded with sick, or when the distempers are of a

<sup>1</sup> Thomson's Lectures, p. 487.

putrid nature, or at any time when the air is confined, especially in hot weather, a fever of a malignant kind is produced, one which is very mortal. I have observed the same sort to arise in full and crowded barracks, and in transport ships when filled beyond a due number, and detained long by contrary winds, or when the men have been detained long under close hatches in stormy weather. As soon as I became acquainted," he continues, "with this fever in the hospitals abroad, I suspected it to be the same with what is called here the jail distemper. This disorder is incident to every place ill-aired and kept dirty, that is filled with animal steams from foul or diseased bodies."<sup>1</sup> He seems to consider that any contamination of the atmosphere may produce it, and on one occasion referred its origin to the fetor of a mortified limb.

This disorder has often been considered as originating in jails, and certainly, as I have already mentioned, this fever has often broken out amongst those whose duty calls them into crowded courts, and has proved extensively fatal. The custom still kept up of strewing the courts with various herbs is founded no doubt upon this belief, though much more efficient preventives might be suggested. Lord Bacon says, "the most pernicious infection next to the plague is the smell of the jail when prisoners have been long and close and nastily kept, whereof we have had in our time experience twice or thrice, when both the judges that sat upon the jail, and numbers of those that attended the business, or were present, sickened upon it and died. Therefore," he observes, "it were good wisdom, that in such cases the jail were aired before they be brought forth."<sup>2</sup> The black assize of 1750 was commonly attributed to this cause; for we find that on the 22d of May, 1750,<sup>3</sup> a "messenger from Lord Chief Justice Lee attended the Court of Aldermen to acquaint them of the necessity of new regulations for Newgate Jail, or that it would be dangerous for persons to attend the business of the sessions at the Old Bailey. To the message was annexed a list of twenty persons that were present at the last sessions, and who had since died, as thought, from the noisome stench of the prisoners."

It has been observed, however, that upon several of these occasions, no particular disorder has appeared among the prisoners themselves, so that it is by no means clear that the disease arose from them; and the simple fact of a fever breaking out amongst officers or others attending the court, will not prove that it was caused by any one class of persons then present. The situation might certainly have something to do with its extension, inasmuch as a large number of persons of all ranks is collected together on such occasions, some of whom no doubt would be infected, if there should happen to be at the time any epidemic disease among the community. There was no such disorder amongst the prisoners at

<sup>1</sup> Sir John Pringle, p. 287.

<sup>2</sup> Bacon's Works, London. Svo. vol. ii. p. 49, 1803.

<sup>3</sup> Gentleman's Magazine, 1750.

Oxford when the black assize was held there in 1577,<sup>1</sup> on which occasion judges, gentry, and almost all who were present perished to the number of three hundred; the persons in the jail alone, we are told, were not injured by it. Passing over the improbability of prisoners giving rise to a disease under which they did not themselves labour, it appears that a malignant fever was at the time prevalent in Oxford, to which we are told that "two hundred more persons of note fell victims, besides numbers of lower degree." Again we are informed that in 1750,<sup>1</sup> when the two judges, the lord mayor, one of the aldermen, one sheriff, two or three of the counsel, several of the jury and above forty more died, no uncommon sickness was observed among the prisoners who came to the bar or were in Newgate. Now it seems clear that a very severe fever, if not this very disorder, was then prevalent in London, for in the *Old England Journal* for June 2d, 1750, in allusion to the mortality amongst the persons attending the Old Bailey, we find this statement: "If we should allow that the mortality was the effect only of the jail distemper, yet it can't be denied that there is a very malignant fever so rife about the town as to have carried off a great many people in a short time. The town is filled with consternation, many families are retired into the country, and near 1200 houses empty."

That fever can be produced by unhealthy exhalations from the animal body, as well as from decaying vegetable matter, few will be willing to deny. It has been established that injury results from the inhalations of an atmosphere loaded with poisonous gases, such as sulphuretted and carburetted hydrogen, and carbonic acid. Majendie indeed has indisputably<sup>2</sup> proved that animal matter in a state of putrefaction, inhaled or injected into the blood, will produce death with what are called putrid symptoms; but the question is, whether they produce the exanthematous disease designated typhus, and whether, when typhus breaks out in retreating armies, or those harassed by defeat and ill-furnished with provisions, it is always spontaneously produced. Such assertions seem far too general and sweeping. That vitiated air, bad food, and all debilitating causes will predispose the system to receive infection—that the influence of such causes will lead to the extension of any disease propagated by such infection, no one will think of denying, but very many striking instances may be quoted in opposition to the idea that such causes are alone capable of producing an infectious malady; a fact, indeed, well proved by Dr. Elliotson, who observes when speaking of typhus, that the greatest filth and closeness will not originate the disease. He reminds us that the *Kamschadales* live for seven months continuously in holes under ground, crowded together in the most disgusting state of filth, and devour in a state of putrefaction their provisions, which are kept in the same apartment with themselves; yet this people does not suffer from typhus. The same may be said

<sup>1</sup> Gentleman's Magazine, 1750, p. 235.

<sup>2</sup> Gentleman's Magazine, May, 1750, p. 235.

<sup>3</sup> Journ. de Physiol.

of Greenlanders, Esquimaux and Russians, yet without the occurrence of putrid diseases or fever.<sup>1</sup> Dr. Elliotson goes on to quote Dr. Lind, who remarks that in the crowded slave ships during their voyage across the Atlantic, no infection appears, yet they are crammed even to suffocation. He notices the well-known instance of the black hole in Calcutta, where 123 persons out of 146 died, yet that no fever resulted. He multiplies examples illustrative of the same fact in the prisons of Venice, of Naples, of St. Petersburg, and of Moscow, where vitiated air, close confinement and depressing feelings conspired to injure the health, but failed to produce any specific disease. Thus we find that typhus fever is not present on numerous occasions when all its supposed causes are in operation. Sir Gilbert Blane notices an interesting fact, namely, that it prevailed on board the *Diamond* upon a cruise in the West Indies,<sup>2</sup> when none of the circumstances, as he himself remarks, were present which commonly produce it. All then that we can strictly infer is, that debility will predispose to the disease, but as it exists in those previously in robust health, and as when debilitating causes are present it is not always occasioned, we must look for some active, special and specific virus. The germ of this disorder will not, I believe, be often wanting; for in some of its various forms it seems to be almost always in activity in some portion or other of the world, and amongst all civilised communities of whose disorders we have any accurate account. And when we consider how readily the poison may be conveyed either by the atmosphere, or goods, and the minute particles which may excite the disorder in those susceptible of its influence, we may more properly consider the disease as extended by a virus in actual operation, than suppose it to be recently generated on every fresh outbreak; and in allusion to the supposed origin in the jail when it proved so fatal in 1750, there are more reasons to believe that it originated with the community where it was, than with the prisoners where it was not. Having been once produced, it may of course be so again; entirely new diseases may for any thing that we can conjecture, be generated; but seeing as we do the great conformity of the symptoms of many disorders, and that they preserve their type for ages, it is more simple and more consistent with analogy to consider that typhus depends upon a certain definite poison, which is always more or less in operation, than to suppose it generated anew by crowding, on the occasions referred to; occasions, be it observed, which have occurred thousands of times and passed off without any such consequence.

Dr. Cheyne refers to a mental emotion as the cause of a fever which is described in the *Cyclopædia of Practical Medicine*, as of not unfrequent occurrence, but somewhat peculiar form.<sup>3</sup> This

<sup>1</sup> *Medical Gazette*, vol. x. p. 146.

<sup>2</sup> Sir Gilbert Blane, p. 216.

<sup>3</sup> *Dublin Hospital Reports*, vol. iv.—*Cyclopædia Prac. Med.* p. 194.

certainly bears the aspect of typhus fever, the symptoms of which developed themselves at the moment of a powerful mental impression—perhaps were hastened by it; for we cannot imagine that they would be occasioned by any such cause; and the circumstance is referred to rather with the view of speaking of the importance generally attached to the supposed cause of a malady. Fatigue, privations, and cold, have a long catalogue of ills attributed to them which they help indeed to propagate, but only indirectly by the debility which they occasion.

It is impossible to avoid alluding to the opinions of M. Broussais and M. Louis on the cause and origin of typhus. Both these distinguished pathologists consider an alteration of the mucous membranes to be the cause of the symptoms. The great point of dispute between them is with reference to the portion of the lining membrane of the intestinal canal which is primarily affected. M. Broussais defines typhus to be a gastro-enteritis of such intensity as to produce the modification of the cerebro-spinal system, which occasions the group of typhoid symptoms.<sup>1</sup> The great prostration he considers indicates excess of irritation transmitted to the brain.

The cause of typhus, he asserts to be an alteration of the mucous membrane of the intestinal canal at its upper portion, every thing announcing the irritation of the stomach at the commencement of the disease.<sup>2</sup> This, he says, he has shown to be inflammation, and that he can prevent it reaching the typhoid point; he extends his theory to all those fevers called essential, which, with him, are nothing but gastro-enteritis. He maintains that, in many of the cases related by M. Louis, the disease began in the stomach, and not in the small intestines; and he considers that a brown tongue, black secretion on the lips, a dusky colour of the skin, with or without petechiæ, and miliary eruption, prostration of muscular force, somnolency or delirium of various kinds, convulsive movements of the lips, arms and whole body, are the symptoms of gastro-enteritis.<sup>3</sup> The head symptoms, he maintains, arise not from increased flow of blood, but from consecutive irritation. The brain may however become inflamed; but he adds, that he is sure to discover inflammation of the intestinal canal in all essential fevers, and that gastritis exists at their commencement.<sup>4</sup>

Valuable as are the observations of this distinguished pathologist, upon the consequences of inflammation occurring in different portions of the intestinal canal, yet, as I shall afterwards show, all the constitutional symptoms which he considers to be the consequence of inflammation of the intestinal canal may, and often do, exist without the occurrence of that morbid change.

M. Louis, on the other hand, claims for the small intestines priority of lesion in typhus; and maintains that in this portion of

<sup>1</sup> Broussais sur l'Anat. Pathol. du Doct. Louis. 448.

<sup>2</sup> Broussais Examen de Doct. Med. Paris, 1834, tom. 4. p. 457.

<sup>3</sup> Examen. 425.

<sup>4</sup> 426.



the alimentary canal those morbid changes are to be found which constitute the essence of the disease; to this I shall again refer in alluding to the alterations of structure discovered in post mortem observations.

#### IMMUNITY FROM A SECOND ATTACK.

It would be a strong point in favour of the specific nature of typhus, if I could show that after one attack the system was free from any recurrence: no prospect however of complete immunity can be held out to those who have already suffered from this fever. Hildenbrand considers that for a certain time<sup>1</sup> the disease is not liable to recur, but that this protection does not last during the whole life: and records a case which proved fatal in the last of three attacks which followed one another in rapid succession. A very distinguished member of our profession has suffered on seven distinct occasions, and another has had three attacks, as I have been informed on good authority.

These occurrences are not however conclusive against placing typhus amongst the exanthemata. For exceptions to the protective power of a first attack are common both in measles, scarlet fever, and small-pox, and examples will probably multiply as our knowledge becomes more perfect and our diagnosis more precise.

A passage from M. Rayer may be quoted to this effect. "Tozetti, Schack, de Haen and Meza inform us that they have seen measles affecting the same individual again and again. Genovese states that during the continuance of the universally prevalent measles of 1787, he had examined 46 persons, children as well as adults, affected with measles, although they had already gone through the disease some years before. Duboscq had occasion to treat several children in 1777, whom he had attended in 1773." And M. Rayer adds, "since the publication of the first edition of the present work, I have seen three remarkable cases of the recurrence of measles."<sup>2</sup>

Dr. Baillie gives an account of five children, whom he twice attended for measles.<sup>3</sup> The first attack occurred in May, the second in November, so that all the circumstances were quite fresh in his memory, and he pronounces the symptoms to have been on each occasion well marked.

Every one must be acquainted with examples of a second attack of small-pox. I knew one instance in which it occurred three times, and the late Dr. Maton met with a case in which the system seemed to derive no protecting power from the repeated attacks of small-pox; a lady, the mother of a large family, always exhibited undoubted symptoms of the disorder when her children were inoculated, and this took place on seven separate occasions.

While we are yet uncertain how far one attack of typhus may be a protection against a second, it appears that the prevailing notions

<sup>1</sup> P. 147.

<sup>2</sup> On Diseases of the Skin, p. 148.

<sup>3</sup> Works of Dr. Baillie, p. 78, vol. i.

of the future immunity after an attack of measles and small-pox are too positive, and scarlet fever appears less of a prophylactic than either.

#### IMMUNITY FROM AGE.

It is convenient to allude here to the supposed immunity afforded by age in typhus; M. Chomel says,<sup>1</sup> it has been well proved that typhus never occurs in aged persons. When, he adds, typhoid symptoms do occur in old age, they are due to inflammation of internal organs, and not to typhus; because, the peculiar change of glands is never seen, and he observes further that old age is an effectual security against typhus;<sup>2</sup> he goes on to state that it occurs usually from 18 to 30, very rarely after 40, and that no case has been met with after 55, that children under 10 are rarely affected, and that from 20 to 25 is the age most susceptible. M. Chomel adds, that young persons but rarely perish. M. Louis goes further and states that the extremes of age are 13 and 35,<sup>3</sup> never 40.

It may be conjectured that the reason why M. Louis and M. Chomel have formed the conclusion that children are incapable of receiving this disease, is the fact that in them the disorder is much modified, and although the leading symptoms are well marked, yet they have it much more mildly, and the bowels are hardly ever affected. This mildness of the disease in children has been noticed both by Dr. Percival, and by Dr. Bateman.

In the year 1831 children were noticed to suffer little. In the epidemic of 1836<sup>4</sup> we are told that every one who was attacked died within 40 hours, except women and children. I subjoin a few cases which appear to throw some doubt as to the period of life considered by these high authorities to confer exemption from a recurrence of this complaint.

#### CASE IX.—*Of a child three years old.*

Mary Donnaway, aged 3 years, was admitted into St. Bartholomew's Hospital on the 22d June, 1837, with fever, her father being at the time a patient with the same disease. She had been suddenly attacked on the 20th with vomiting, and pain in the head, succeeded by febrile symptoms, with loss of appetite and languor. When admitted, her countenance was heavy, she had much pain in the head, constipated bowels, and a hot and dry skin; the pulse was 134, the respiration 44 in a minute; but no affection of the chest could be detected by auscultation.

23. Skin hot and dry; no eruption.

24. Less pain in the head, pulse 150, no cough, but a slight ronchus was diffused over both lungs.

25. Slept well in the night, a spotted rash very distinct.

<sup>1</sup> Chomel, 304.

<sup>2</sup> Ibid 305, 311, 427, 427.

<sup>3</sup> Louis, tom. ii. p. 428.

<sup>4</sup> Sir John Pringle.

26. More fretful, pulse 148.  
 28. Skin cool, pulse 120, tongue moist and furred.  
 29. Appetite returning, pulse 112.  
 Next report there was no ailment.

CASE X.—*Of a child three years old.*

Julia Higgins, aged 3 years, was admitted into St. Bartholomew's Hospital on the 14th of September, 1837. When brought into the ward she had the ordinary signs of fever, not however in any great degree. She was covered with a spotted rash, which appeared, as the mother informed me, on the sixth day of her illness, and had been out two days. The chief of the early symptoms had been pain in the head, with constipated bowels. The case proceeded rapidly and favourably, and she was discharged well a week after her admission.

No patient under three years of age has been admitted into the hospital labouring under typhus; very young children may be less susceptible; still it may be supposed from the following statement that infancy is not absolutely exempt. The mother of a boy admitted into St. Bartholomew's Hospital with all the characteristic signs of typhus, informed me that she had had ten children, that she had recently lost her husband with the same fever as that under which her son was then labouring, that nine of her children had caught it, and amongst them the youngest, seven months old; she said that the infant had a great deal of fever, accompanied by fits, but that it ultimately recovered.

CASE XI.—*Of a man 53 years of age.*

J—— J——, aged 53, formerly in good circumstances, was admitted into St. Bartholomew's Hospital August 9, 1838. He had been ill seven days. The symptoms on admission were the following: flushed face, skin hot and dry, dotted with petechiæ, tongue dry, brown, and tremulous, bowels confined, pulse 112 full, respiration 24, eyes suffused, pain in the head. He was reported to have had a rash on his skin. The remark on the 10th was that he had rambled much during the night. On the 11th he complained greatly of his head, and talked incoherently, his pulse was irregular and unequal, respiration 30; a great deal of twitching of the muscles, evacuations passed in bed. He improved in some respects, losing in a great degree the tremors of the muscles, but some cause not clearly definable retarded his convalescence. On the 24th some sore throat came on, with increased vascularity at the back of the fauces, which was followed by erysipelas. This gradually involved the whole face, the greater portion of the head and neck, there was great puffiness of the eyelids, and swelling beneath the jaw on the right side. He continued very delirious. The erysipelas reached its height in about a week, and on the 3d of September it had nearly

left the face. Some matter was discharged from the right eyelid, but a hard swelling remained in the situation of the submaxillary gland, tongue clean, and getting moist.

This case, after the formation of the matter, advanced favourably, and recovery might confidently have been anticipated when secondary lesion of the lungs came on, which proved fatal.

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#### A CERTAIN PERIOD OF DURATION.

Another argument in support of the specific nature of typhus may be derived from the length of time occupied by the disease in its progress. The average duration of the epidemic in 1821 was a little beyond 20 days. Sir John Pringle says that the disorder of 1750 lasted three weeks. M. Chomel divides the time requisite for the full development of the disease into three periods, each of which comprises a week, and remarks that the majority of the cases tended to amelioration from the 17th to the 20th day.<sup>1</sup> Dr. Bateman<sup>2</sup> observes, that the epidemic disease usually goes on to the third week. M. Louis considers the duration of the disease described by him to be 25 days, but the great frequency of abdominal complication in the cases under his care may perhaps explain a little delay in their recovery. He observes that the disorder occupied a space from eight to forty days, and remarks that in those who died, the characteristic symptoms ceased some time before death; and that in those who recovered, there was a remarkable rapidity of amelioration. So common is it for this complaint to run its course in a definite time, that the familiar appellation of the one-and-twenty day fever has been applied to it. Very cursory observations of typhus fever will satisfy all that there are peculiar changes at certain periods. Signs of amendment are indicated no less by the general aspect and improvement in the symptoms, than by the feelings of the patients, who will often express themselves as confident of recovery when the change is favourable, as they were inclined to despond in the earlier stages. A relapse in my experience is a very rare occurrence, and when amendment once commences, it usually is progressive and uninterrupted.

Hildenbrand says that the disease lasts 14 days, but very many cases which I have seen clearly prove to me that it may terminate at a still earlier period. All the essential processes may indeed be gone through within a week; and should they be prolonged to the third week it by no means follows as a necessary consequence that typhoid symptoms, as they are called, should be exhibited. The following instances may serve as examples.

<sup>1</sup> Chomel, p. 44.

<sup>2</sup> On Epidemic Disease, p. 31.

CASE XII.—*In which all symptoms of fever were at an end within a week.*

John Moore, aged 22, was admitted into the Seaman's Hospital on the 20th of May, 1831. When he presented himself his aspect was dull and heavy, he complained of headache and pain in all the limbs. His skin was covered with a spotted rash, and he had the ordinary febrile symptoms under which he had been labouring for two days. He was brought directly from the asylum for the destitute, where the fever was prevalent. On the 23d he was reported nearly well, and on the 26th weakness alone remained.

CASE XIII.—*With rash, fever subsiding in a week.*

James Bent, aged 23, was received into the Seaman's Hospital on the 18th of March, 1831. He had been ill five days, was feverish, pulse 108, skin hot and dry, and mottled with a rash in small distinct round patches.

No further note is taken of this case, as it was slight, until the 22d, when fever was reported to have subsided, and the appetite to have returned, and the week after the patient was discharged quite well.

CASE XIV.—*In which the symptoms terminated in three weeks without any blackness of the tongue, subsultus tendinum or low delirium.*

James Forecast, aged 18, a weaver, was admitted into St. Bartholomew's Hospital on the 28th of December, 1837. A week previously he had been attacked with shivering and great loss of strength. He stated that he had been attending on his father and mother, both of whom had been ill with fever. When taken in his eyes were suffused with redness, his skin was dusky and spotted with a rash, his pulse was very feeble and 96, he had no appetite, his bowels had been confined for two days. His tongue was moist and furred in the centre. He did not complain of his head, he had no pain in the abdomen, nor in the chest, but his respirations were 36 in the minute, and there was some slight sibilus detected by auscultation. No urgent symptoms came on, and on the 19th day from the commencement of his illness he was declared convalescent.

These cases are quoted with a view of showing the termination of typhus at different periods, and its simplest form. The symptoms in them all were mild, still they may be considered as exhibiting those features which are essential to the disease.

Many cases presented themselves during the prevalence of typhus, still slighter in degree, and occupying even a less extended period, but in which no eruption appeared, and which therefore could not be positively pronounced to be the disorder now under considera-

tion; little doubt however can be entertained that they depended upon the same cause, and were slighter effects of the same virus. In such cases we may consider that the disease was not fully developed. A few examples may be cited in corroboration of this opinion, and as showing some of the different aspects which typhus may assume.

*CASE XV.—Occurring during the prevalence of epidemic typhus in 1831, in which the usual symptoms of the commencement of the disease were present, but subsided within a week, no rash being visible.*

George Main, aged 25, had been in one of the asylums for the destitute, where fever was prevalent, and was admitted into the Seaman's Hospital on the 2d of April, 1831. He had frequent rigors, with pain in the head, back, and limbs, his sleep at night was disturbed, his skin was somewhat warmer than natural, but his pulse was quiet, and there was morbid appearance on the tongue. He had been ill two days. The fever quickly subsided, and on the 6th he was pronounced convalescent.

*CASE XVI.—Occurring during the prevalence of epidemic typhus.*

John Clarke, on admission into the Seaman's Hospital, March 4th, 1831, stated that he had been for some time in the asylum for the destitute. He complained of frequent chills, with pain in the limbs, and cough. His tongue was clean, pulse 70, weak, skin cool, bowels loose. The headache continued for a few days, with confusion of intellect and slowness in answering questions; after which all completely subsided in a short time. He was declared convalescent on the 8th of March.

These are some of a vast number of instances which, from the general outline of the symptoms, and from the circumstances under which they occurred, justify the inference that they arose from some specific cause. The disturbance of the head, the character of the pulse, the state of the tongue, and the condition of the skin, were not such as would be produced by the accession of simple fever: but such as might arise from the modified virus of some specific disorder, such as typhus.

In referring to the histories of other exanthemata similar occurrences are met with. Dr. Rush observes, in his *Medical Inquiries and Observations*, that during the raging of the scarlatina anginosa in 1783 at Philadelphia, many hundred persons suffered from sore throat, without any other symptoms of indisposition, general or local.<sup>1</sup>

During the prevalence of measles, slighter symptoms arise in some cases, in which the chest is affected, but no eruption appears

<sup>1</sup> Willan, 347.

on the skin. We may thus explain the early termination of typhus, by supposing that the natural processes are checked in their course, or that the ordinary actions are interfered with, either by some natural cause or by treatment.

The inferences which may be drawn from the examples already given are :

That typhus may cease at certain stages or periods of its course, and exhibit comparatively mild symptoms ; that the constitutional effects may be apparent ; and that the rash may be distinct so as clearly to identify it ; yet that there may be no blackness of teeth or lips, no muttering delirium, no tremors of the limbs, no subsultus tendinum nor local inflammation.

It cannot be necessary for me to cite instances showing that these are common symptoms of the disease, the descriptions which I here give of it by Hildenbrand and others, as well as the cases which have been already related, sufficiently testify to them ; but there are still further complications of a serious nature which deserve consideration. Of these occurrences an example or two may be cited, such as of hemorrhage, erysipelas, abscesses, or suppuration and gangrene. The opportunity will afterwards be afforded me of making a few remarks concerning these phenomena, and of noticing some further peculiarities of this fever, such as the character of inflammation set up during its progress, the state of the pulse, and of the nervous system.

Hemorrhage may take place either beneath the skin, from mucous or serous surfaces, and even in muscular structure. When beneath the skin, it assumes the form of vibices or petechiæ ; which sometimes present themselves in conjunction with the rash, at other times appear as it were instead of it.

The following cases will serve as examples.

#### CASE XVII.—*Petechiæ and rash intermixed.*

Stephen Berwick, aged 15, an errand boy, was admitted into St. Bartholomew's Hospital on the 12th of April, 1838, his countenance was dusky, his eye suffused, his skin thickly sprinkled with a rash on the trunk and extremities, intermixed with small petechiæ ; he complained of headache, bad cough, with sonorous ronchus in the chest, his pulse was 130, and his bowels were constipated. He was seized with headache and rigors in the commencement, and stated that the rash appeared on the 5th day of his illness. These symptoms were succeeded by pain in the abdomen, muttering, a tremulous condition of the limbs, dryness of the tongue, and great disinclination to move, but they all finally subsided, and he was discharged well on the 11th of May.

CASE XVIII.—*Typhus with the eruption of petechiæ on the third day—no rash.*

Angelo Cercan, aged 21, was sent from the asylum for the destitute to the Seaman's Hospital on the 30th of March, 1831, with headache, pain all over him, tongue furred and moist; he had been ill three days, and was covered with petechiæ.

31. Headache gone.

April 8. Convalescent.

CASE XIX.—*With petechiæ appearing on the third day—no rash.*

George Platt, aged 17, was received into the Seaman's Hospital on the 23d of April, 1831, with a flushed face, pain in the head and limbs, weakness, loss of appetite, his lower limbs covered with small petechiæ, his bowels confined, he had been ill three days. On the 24th his bowels were much relaxed. On the 25th he was better, but had a peculiar wildness in his look. On the 27th he was reported delirious, and still flushed in the face. On the 30th he was deaf. On the 3d of May he was better, and on the 17th he was well except that he continued deaf, and that there was some alteration and strangeness in his manner of speaking.

CASE XX.—*In which petechiæ came on in the second week.*

Sarah Smith, aged 40, a nurse at St. Bartholomew's Hospital, was attacked by fever on the 20th of June, 1837. The disease commenced with alternate chills and flushes, followed by pain in the head, back, and limbs; on the sixth day of her illness the rash appeared, at which time she was placed under my charge; her symptoms at that time were the following: great prostration of strength, suffusion of the conjunctiva, heaviness of the countenance, skin hot and dry, the tongue dry and furred, pulse 104 and weak, tremors of the limbs, and cough, but no morbid sounds could be detected in the chest by auscultation: she was occasionally delirious. On the 28th she was reported to have been restless and wandering during the night, and to have become very cold at five in the morning; her headache continued, and the tremors of the limbs increased, the tongue was brown as well as dry, the pulse with less power. 29th. Petechiæ appeared on the trunk and lower extremities, she took no notice of anything, but was still sensible when roused. On the 30th she was much worse, the coma increased, her abdomen became tympanitic, the pulse scarcely perceptible, 150, and she died in the evening of this day.

Petechiæ are spoken of by most authors as common in typhus, but it should be remarked that two very different conditions of the cutaneous tissues are to be found under this head. One of them is



the effusion of blood beneath the cuticle, the other is the peculiar rash. In the *Dictionnaire de Medecine, de Chirurgie, &c.* under the head of *Petechiæ*, we find that authors have applied this term to the exanthema in typhus; but it is there also observed that this application of the word is a perversion of its right meaning.

Real *petechiæ* frequently do occur, and their appearance is rather formidable though far from being a fatal sign. They are in fact visible in most cases. In 1832 the cases admitted into the London Fever Hospital almost invariably presented this feature.<sup>1</sup> Dr. Stokes of Dublin states that out of 540 patients 368 had *petechiæ*. Their conversion into the rash is spoken of by some authors as a common occurrence, and we might *à priori* consider it as likely to be the case, for we should certainly expect that effusions of blood would more readily take place from injected than from other parts. But this by no means appears to be a common case, the rash and *petechiæ* are generally quite distinct in their situation, although they seem to be different results from the same processes. It is almost superfluous to state to medical men the difference or modes of distinction between the two. The aspect alone is generally sufficient to decide the question, or it may more certainly be settled by gentle pressure, which in the case of a rash renders the skin pale by emptying the vessels, while no pressure can obliterate the marks of effused blood which causes the appearance of *petechiæ*.

It is well known that the eruption of small-pox, scarlet fever and measles, occasionally assumes what is termed the *petechial* form, in which case there is a tendency to effusion beneath the epidermis, when this occurs in small-pox, instead of matter blood is poured out into the pustule, which when universal throughout the body, almost invariably precedes a fatal result. We find then an analogous *petechial* state in other exanthemata, and in eruptive diseases: not so frequently perhaps as in typhus, but apparently obeying the same laws and in all probability depending upon the same cause for their production. This is one form of hemorrhage, a very constant symptom both in typhus and other epidemics. Another very frequently met with is *epistaxis*, so commonly indeed as to be fairly considered one of the peculiarities of this fever; and discharges of blood from all the mucous membranes, either of the lungs, bowels, kidneys or uterus, very often takes place. Hemoptysis and *epistaxis* are mostly seen early in the disease, while hemorrhage from the bowels comes on at a later period. Bronchitis also is constantly noticed in typhus, and the secretion poured forth from the inflamed membrane often contains streaks of blood, even in cases where the disorder does not require either general or local depletion. Immediately connected with this subject is the fact which I noticed in the fever of 1831, that the hemorrhage from leech bites was extremely profuse, and often very difficult to be stopped; a fact important to be borne in mind practically, as the

<sup>1</sup> *Cyclop. of Practical Medicine*, vol. ii. 176.

bleeding from a few leeches will very frequently greatly depress the system, and more blood will escape than was at first intended, or rendered desirable by the state of the patient.

Hemorrhage is perpetually ascribed to an altered condition of the blood, and there are good grounds for believing, as will hereafter be shown, that it is indeed one of its causes, but in passing I would advert to the fact, that hemorrhage takes place at one of two distinct periods, the first on or about the third day from the attack, the second upon the fourteenth day or later. It may also be mentioned, although perhaps a little out of place, that the condition of the vessels themselves in typhus and other eruptive fevers deserves more attention and notice than it has as yet received, admitting, as all are ready to do, that the vascular system performs a most essential part in all fevers and inflammations. It will be suggested in the following pages, that a morbid condition may be produced in this important tissue, fully capable of giving rise to many of the phenomena of this fever.

That the blood itself is in some cases so constituted as to have a tendency to escape from the vessels, owing to a deficiency of certain natural changes is proved by the fact, that in the morbus cæruleus there is with other signs of diminished vigour in the system a tendency to hemorrhage even to a fatal extent.<sup>1</sup>

It would be an interesting subject of inquiry to ascertain whether there is any unhealthy character in the blood of those persons in whom this disposition appears constitutional, or whether that unfortunate tendency arises from the state of the vessels alone. To the last cause Mr. Mayo refers this idiosyncrasy, and in speaking of this subject observes, "that there are persons in danger of bleeding to death from the slightest wound, and that cases are on record where the extraction of a tooth has been fatal. In such instances," he remarks, "the minute vessels instead of closing continue open," and also that "this tendency results from the indisposition of the small vessels to contract: they want or have less than usual of their proper irritability."<sup>2</sup>

A few examples may be given of the different forms of hemorrhage in typhus.

CASE XXI.—*Exhibiting signs of the epidemic of 1831, with profuse epistaxis.*

James Taylor was received on board the Seaman's Hospital on the 19th of March, 1831. His tongue was dry and brown, his pulse was weak, and intermitted every third beat, he complained of severe pain in the head, and was constantly delirious, he had pain in the abdomen, increased by pressure. The skin was hot, and the legs and thighs were mottled with large blue patches of ecchymosis, intermixed with smaller red spots. There was profuse hemorrhage

<sup>1</sup> Muller, 140.

<sup>2</sup> Mayo, *Outlines of Pathology*. Lond. 1836, p. 144.

from the left nostril, which had continued for two days. This bleeding was restrained by cold and other means, but returned on the 20th, the day after his admission. It then became necessary to plug the nostril, which plan was effectual in stopping the flow of blood, all the bad signs, however, continued, the pulse being feeble and intermittent; he gradually sank, and died on the 4th of April.

CASE XXII.—*In which there was copious discharge of blood from the bowels.*

William Hatfield, aged 32, was admitted into the Seaman's Hospital on the 5th of March, 1831. From the confused state of his intellect, few particulars of his illness previous to his admission could be learned. But it was ascertained that he had had fever for five days. His aspect was heavy and dull, his manner was agitated, as of one labouring under alarm, yet he maintained that he ailed nothing. His skin was covered with petechiæ, and he was suffering under general febrile symptoms. Four days after his admission, he passed suddenly by stool three pints of fluid blood, on the following day a smaller quantity was evacuated. This case, however, proceeded favourably, convalescence was marked by the formation of an abscess beneath the left ear, which was the only peculiarity in its course besides the hemorrhage.

CASE XXIII.—*With hemorrhage from the uterus.*

Sarah Barrett, aged 23, married, came into St. Bartholomew's Hospital with pain in the head and abdomen, a dull heavy countenance, injected conjunctiva of the eye, confused ideas, her teeth and lips covered with sordes, great thirst, her skin spotted with a rash, constant vigilance at night, and profuse hemorrhage from the uterus: she had been ill twelve days. Her attack commenced with pain in the back and limbs, headache, and horripilation; she became heavy, drowsy, or rather she remained in a state of stupor, lying flat on the back with extreme prostration of strength, and petechiæ appeared intermingled with the rash.

The case appeared almost hopeless for some time, but a favourable change took place and she was discharged well a month after the commencement of her illness.

In several cases there has occurred hemorrhage into the structure of muscles as well as into other parts. The following case illustrates general hemorrhagic tendency combined with fever, the symptoms of which appeared to be of a typhoid character.

CASE XXIV.—*Ecchymosis of the skin, liver, spleen, lungs. Effusion of blood into the brain, the sheath of the spinal chord, and into the right pectoral muscle. Suppuration of the inguinal glands.*

John Michael, aged 16, was brought to the Seaman's Hospital on the 14th of January, 1832, in a state bordering upon insensibility; he was constantly throwing about his limbs, his face was pale, the pupil of the eye was dilated, his breathing was oppressed, he had cough with expectoration of blood, and shrank as if he felt pain when pressure was made on the abdomen; the surface of the body was covered with petechiæ. All that could be ascertained about him was that he had had fever, with great pain in the head, and that he had been delirious for a week.

He died very soon after his admission into the hospital. It was observed that the body retained its warmth twenty-four hours after death. It was covered with purple spots, which were almost entirely confined to the anterior portion of the body.

The liver was greatly enlarged and pale. The spleen was soft and larger than natural. The lungs were healthy in structure, and with the liver and spleen were dotted with petechiæ.

Blood had been effused into the left side of the brain at the lower and back part; the upper portion of the spinal chord was surrounded with blood; there was effusion of blood also into the substance of the left pectoral muscle.

The inguinal glands were enlarged and red, and when cut into yielded blood mixed with a purulent fluid.

Hemorrhage then in the various forms of ecchymosis, epistaxis, &c. is a common addition to the milder symptoms of typhus.

The question whether the alteration in the blood precedes the morbid change in the vessels will be better considered in taking a review of the different events in this fever and their order. For the present I shall only call attention to one interesting and important fact that the hemorrhage which occurs in typhus appears very nearly allied to inflammation, or in other words, that we see inflammatory action readily produced in those parts which are the seat of hemorrhage, either coexistent with it or coming on afterwards; and it seems that in many cases but slight causes are sufficient to decide the point, which of the two should be produced.

During the prevalence of the epidemic in various years, idiopathic erysipelas has been a very common and a very serious addition to other complaints in persons exposed from their situation in hospitals and elsewhere to the vicinity and infection of typhus, and so common was it in the progress of the fever during the present year, as well as during that of 1831, that no doubt could be entertained that it was essentially connected with and incident to this disorder. Dr. Bateman noticed it in the House of Recovery, and considers it an accessory disease. M. Louis observes, that shivering

rarely took place in the course of the disease except to usher in some new calamity, such as erysipelas. It seems to arise at two periods, of which one is within the first week, usurping as it were the place of the ordinary rash. It prevails at the same time as typhus, is preceded by the same symptoms, and arises amongst nurses or those in attendance upon the patients ill with that fever.

Rust considers erysipelas rather as an exanthematous fever<sup>1</sup> than as a simple inflammatory condition of the skin; to this M. Rayer in part accedes. It shows itself occasionally as an epidemic, and is decidedly infectious in certain forms. Its appearance frequently seems beneficial in the later stages of typhus, for on its irruption a train of anomalous symptoms will frequently at once disappear. Patients often remain in a precarious state, yet without any obvious ailment, their progress is retarded, or their convalescence checked, but all again advances when this local action has been established. Erysipelas then is met with in some instances, as an early feature, although sometimes not till the second week. It occurs in cases where there has been the rash as well as in others in which this symptom is wanting.

Cases illustrative of these remarks may readily be found.

CASE XXV.—*Erysipelas, after apparent convalescence, where there had been no rash.*

Henry Course, aged 29, was admitted on board the Seaman's Hospital, March 4th, 1831. The rough notes taken at the time describe him as "half stupid, and quite helpless, unable to stand, denies that he is ill, but says his head aches. His chest, arms, and back, are covered with large blue petechiæ. His pulse when lying down is full and soft, but in the upright posture it becomes small and weak, he maintains that his bowels are confined, but it appears that all his evacuations pass unconsciously." Two days afterwards he was described as more conscious. After another interval of two days he was still less confused, but his tongue was dry; this became moist, and he appeared to be convalescent fourteen days after his admission. Erysipelas, however, then came on, which lasted a week, but with very little constitutional disturbance. He was discharged cured on the 18th of April.

CASE XXVI.—*Erysipelas, apparently salutary.*

James Watson, aged 29, was admitted into the Seaman's Hospital, January 17th, 1831, with pain in the head, flushed face, suffused conjunctiva of the eye, and slight tenderness of the abdomen. Three days afterwards he was reported to be stupid, drowsy and deaf, his eyes were still suffused, and his face flushed. Again, in three days more, deafness, drowsiness, and stupor increased, the

<sup>1</sup> Gaz. Med. 4to. 1833, p. 16; 1831, p. 334. Rayer, 138.

stools were now passed involuntarily. After two days he was much better, the fever appeared to have left him. On the 12th, however, from his admission, he was not so well, the tongue became dry and brown. Erysipelas then appeared, which lasted for a week, and he was reported free from ailment on the twenty-second day after his admission.

CASE XXVII.—*Rash on the skin, with erysipelas.*

Stephen Saunderson was admitted into St. Bartholomew's Hospital on the 12th of April, 1838. If his own account was to be relied on, he had been ill with fever for a fortnight. When he presented himself his eyes were suffused, his appearance heavy and stupid, a spotted rash was abundantly out on the trunk and extremities, his tongue was white and moist, he had bronchitis on the right side, pneumonia on the left, felt faint on the loss of eight ounces of blood, which was neither cupped nor buffed, but separated into serum and crassamentum, his tongue became afterwards dry and brown, his limbs tremulous, and he was furiously delirious. Erysipelas showed itself on the face, there was a swelling of the arm above the spot where the incision for bleeding had been made in the vein, which freely discharged pus. His nights were much disturbed. The constitutional symptoms, however, gradually subsided, and he eventually though tardily recovered.

CASE XXVIII.—*Erysipelas of the face and head, the patient having attended another who had been ill with fever, but without erysipelas.*

Daniel Buttley was received into St. Bartholomew's Hospital on the 16th of July, 1838, labouring under erysipelas of the face and head. The most urgent period of the disease had passed, as there was desquamation of the cuticle of the face. The whole scalp was puffy, the tongue dry and brown, with urgent thirst, pulse 100. The history which he gave of his illness was, that he had caught a fever from a person living in the same house, whom he had been in the habit of visiting during an attack of fever, as nearly as could be ascertained of the prevailing type, but in which there had been no erysipelas; that he himself had been taken ill six weeks previously with pain in the limbs, giddiness, and thirst; that a fortnight afterwards a swelling appeared on the right side of his face, and had gradually extended itself to the head. On the 17th a collection of matter was let out from the upper eyelids. On the 18th he was delirious, during the night of the 24th matter collected in the eyelids, which were again punctured. Pneumonia was detected on the right side. On the 25th three ounces of pus were let out from beneath the scalp. On the 27th it was more distended than ever, and extensively detached from the head. On an incision being made, six ounces of matter flowed out. On the 2d of August,

three ounces of pus were let out from the scalp. The pneumonia had now advanced to hepatisation. On the 16th the lung had recovered. The patient then rapidly gained strength, and was discharged well on the 21st.

CASE XXIX.—*Erysipelas of the face in a man who had been in close attendance upon a patient suffering under this affection coming on after fever.*

Thomas Clarke, a smith, aged 23, was admitted into St. Bartholomew's Hospital on the 28th of June, 1838, for rheumatic pains, of which he had been relieved, and on the 23d of July, when about to leave, was attacked by shivering and pain in the head. On the 24th he had sore throat with difficulty of breathing and of deglutition; the posterior fauces were greatly swollen. On the 25th his face was flushed and swelled, his tongue was covered with a brownish fur, he had great difficulty in swallowing, his pulse was 130. On the 26th he was in a state of great distress from inability to get down either food or drink. Suffocation was threatened from the enormous tumefaction of the tongue and throat, he could not breathe through the nose. The swelling of the face had much increased, and the erysipelas extended to the neck. On the 27th his eyes were completely closed. The swelling reached the head, and was of a very deep and dusky red colour. On the 30th he wandered during the night, and was at times furious. On the 31st, however, there was decided amendment, he was less delirious, and the inflammation of the face had in some degree subsided. On the 3d of August he was rational, but was quite ignorant of all that had occurred during his recent illness. The cuticle of the face now peeled off, matter formed beneath the scalp, under the eyes, and beneath the chin. He continued to improve from this time, and was discharged well on the 3d of September.

This patient occupied the next bed but one to that into which Daniel Buttey, whose case was last related, was placed. Clarke was nearly well, he obligingly rendered many services to his neighbour who was ill with erysipelas, and constantly attended to him. He was attacked as will be seen by the date a week after he had been thus occupied.

The inflammation in typhus frequently terminates in suppuration. Collections of pus form in various parts, especially about the face, neck, and head, and still more frequently in the ear. The cases of erysipelas already cited will show how readily that disease put on the phlegmonous character in this fever.

CASE XXX.—*Matter discharged from both ears.*

John Hurley, aged 17, was admitted into the Seaman's Hospital on the 16th of March, 1831. He complained of headache, and described himself as seeing fire in his eyes. The conjunctiva were

suffused, the pulse 108, irregular in force, and very compressible ; he had been ill six days. The report of that case is as follows:— March 17th, says his head is splitting to pieces ; 22d, lies in a half stupid state, still feverish ; 31st, serous discharge from the left ear ; April 12th, discharge from the ear is purulent, the patient continues in a drowsy heavy state ; 19th, still remains in a sleepy condition ; great discharge from both ears. He finally recovered, but was not discharged until the 4th of July, in consequence of a tardy convalescence and long continued debility.

CASE XXXI.—*Large abscess beneath the integuments of the right side.*

Anne Vickery, aged 32, one of the nurses of St. Bartholomew's Hospital, was made a patient on the 30th of April, 1837, having been ill a week with pain in the head, giddiness, heat of skin, thirst, and loss of appetite, a full pulse, and a furred tongue. Cough came on, with crepitation in the left lung. A large abscess formed on the right side, from which, when opened, about a quart of pus was discharged ; the left leg then began to swell. The abscess in the side filled again, and about two pints of pus were discharged by an opening ; four days afterwards it was opened again, and a large quantity of pus was evacuated, the wound did not close afterwards, but continued to discharge for a week, when it healed. The patient gained strength, all bad signs gradually disappeared, and she was discharged well, but not until two months had elapsed after her admission.

CASE XXXII.—*Suppuration of the parotid gland.*

Elizabeth Anderson, aged 20, a servant, was taken into the hospital on the 1st of June, 1836. All the symptoms of the disorder were present in this case, the pain in the head and disturbance of the sensorium, the subsultus tendinum, and the injected conjunctiva ; as the disorder advanced, her nights were sleepless, she was delirious, her evacuations were passed involuntarily, the chest became affected, and she spat blood. The pains in the limbs were very severe, the bowels became irritable, and crepitation was heard in the lungs. Such was her state for a fortnight after her admission, and five weeks after the commencement of her attack. She now began to improve, when the left parotid gland became hard and very painful, erysipelas then commenced in that situation, and extended over the face. On suppuration taking place in the gland, the erysipelas stopped, matter was discharged, and she entirely recovered, so as to be able to leave the house on the 5th of July.

CASE XXXIII.—*Erysipelas and abscess.*

Margaret Carney, aged 21, was admitted into St. Bartholomew's Hospital, on the 17th of November, 1837 ; she said that her mother



had died of fever ten weeks before, that she herself had been ill for six days, and that her attack commenced with pain in the head, chilliness and rigors, succeeded by a sense of heat and perspiration. When admitted her state was as follows—countenance flushed, look anxious, skin warm and moist, respirations frequent, teeth and lips covered with sordes, tongue dry and brown. She complained also of pain in the chest and cough, pain in the head and limbs, which were tremulous. She was very restless, and muttered frequently to herself, her pulse was 120, and easily compressible. Diarrhœa with pain in the bowels came on. In a few days more some crepitation was detected in the lungs. For ten days after her admission she continued in a very perilous state, was very weak, with a dry brown tongue, teeth covered with sordes, and tremors in the limbs. Some slight amendment was then perceptible. On the 2d of December, fourteen days after her admission, and on the twentieth day of her illness, erysipelas commenced on the left side of the nates, and in three days extended over a great portion of the trunk. On the 13th it had nearly faded. On the 27th a large abscess formed on the right side of the nates, from which a vast quantity of pus was discharged. She was declared convalescent on the 11th of February, and was eventually discharged quite well.

CASE XXXIV.—*Abscess in the breast.*

Elizabeth Mallet, aged 30, was admitted into St. Bartholomew's Hospital, on the 2d of January, 1838. She stated that a fortnight previously she had been attacked by shivering, followed by ordinary febrile symptoms, which had continued up to the time of her admission; her countenance was pale, dusky, and anxious, the skin of the trunk was hot and dry, while her extremities were cold; she had nausea and giddiness, her pulse was very weak, and above 100, and her tongue was dry and chapped. She remained feverish, with occasional flushings during the remainder of the month of January. There was in her case little to call for active measures. No local inflammation could be detected, excepting in the mucous membrane of the trachea, which however was slight, and not sufficient to explain the symptoms. On the 2d of February inflammation appeared in the glands of the neck, but it yielded readily to treatment; she still, however, remained in a feverish and doubtful state, with a feeble pulse, varying in frequency from 80 to 90. On the 15th of this month the right mamma became hard and painful. The inflammation here speedily went on to suppuration, and a series of abscesses formed, which discharged a large quantity of matter. She improved very much after this, but the abscesses were still secreting pus when she left the hospital on the 14th of March.

This patient, it should be observed, was in the fourth month of pregnancy when she was seized with fever, which from its character and progress appeared of the prevailing type.

CASE XXXV.—*Great intestinal irritation and copious discharges by stool of purulent looking matter.*

Anne Clanny, aged 28, having been ill three weeks, was admitted into St. Bartholomew's Hospital, on the 9th of December, 1837, with a flushed and dusky countenance, pains in the limbs, violent pain in the head, with throbbing of the temples, uneasiness in the abdomen, increased on pressure, urgent diarrhœa, a dry brown tongue, and teeth covered with sordes. The spotted rash was present, was marked and distinct. The chief peculiarity in this case was the urgency of the symptoms referable to the abdomen and the character of the evacuations. The abdomen was much distended, extremely painful, there was constant diarrhœa, and the stomach was so irritable that neither medicine nor nourishment could be retained. The discharges from the bowels, which were copious, consisted of yellow purulent matter of a fetid odour. Her recovery was extremely problematical for more than a week. She was extremely feeble, yet could not be kept in bed without force, and then talked wildly. Her countenance became livid, her extremities cold, her skin clammy, her pulse mounted up to 140. The fur on her tongue became black, the muscles of the face were convulsed, her eye looked glassy, the evacuations from the bowels still appeared purulent, and with the urine were passed unconsciously. A change for the better took place on the 17th of December. She slowly recovered, and left the hospital on the 26th of January.

The inflammation which is produced in typhus is by way of distinction called erysipelatous, and, as I have already observed, has been stated by many writers to differ in some degree from that which is called inflammatory. There is also a peculiarity in it to which allusion has very frequently been made. Dr. Heberden, in his commentaries in treating of erysipelas observed, "*natura hujus morbi videtur esse plerumque maligna potius quam inflammatoria.*"<sup>21</sup> John Hunter unites under one head the erysipelatous, the carbuncular, and that inflammation which immediately precedes mortification. He says, in speaking of carbuncular inflammation, that it produces a suppuration but not an abscess, somewhat similar to the erysipelatous when the inflammation passes into the cellular membrane; for as there are no adhesions, the matter lies in the cells where it was formed. He then goes on to add his suspicion that the inflammation, which produces mortification or death in the part inflamed, and which commonly takes place in old people who have become very much debilitated, is somewhat similar to the carbuncle. It occurs, he adds, in those diseases that have debility

as a principle, and are commonly called putrid fevers; such inflammations have little of the adhesive tumefaction in them but more of the œdematous; and are not clear or transparent in colour but rather of a dusky red. M. Rayer observes,<sup>1</sup> that the gangrenous inflammations of the skin are specific in their origin, and he includes among these typhoid gangrene with the malignant pustule, and carbuncle.

Dr. Thomson remarks<sup>2</sup> "that a disposition in inflamed parts to mortify, manifests itself in many inflammatory affections, and in those constitutional diseases, where peculiar states of the system seem to exist. The incipient stage of gangrene which follows inflammation, particularly when it attacks cutaneous tissue, often resembles the disease, described under the name erysipelas, and so completely as to render it impossible, but by the history of the complaint, to distinguish these two affections from each other."<sup>3</sup> The constitutional symptoms," he adds, "which appear in gangrene, whether succeeding immediately to active inflammation, or occurring as an original idiopathic disease, are not very different in their appearance from those which accompany the different kinds of inflammation. They form fevers which partake, in individual cases, more or less of an inflammatory, typhoid, or bilious character, and vary greatly in degree; but the skin is usually hot and dry at the commencement of the attack, the tongue is without moisture, brown and hard, and the pulse is quicker and less strong than in inflammation;<sup>4</sup> the pulse in these cases is often attended by fluttering intermissions and a considerable degree of subsultus tendinum. The fever has in general more of the asthenic than of the sthenic character; or it is more of the typhoid than of the inflammatory type. The fever in gangrenous affections is often accompanied by great uneasiness and restlessness, dejection of spirits, wildness of the looks; and, in severe cases, with almost always more or less delirium."

The consequences noticed in this fever fully justify the conclusion, that these different results of inflammation are in some way connected. Carbuncle, or a state allied to it, has repeatedly occurred in the epidemic of this spring, and mortification of the cutaneous tissue in various degrees is constantly perceived. The following cases will serve as examples.

CASE XXXVI.—*A hard tumour on the nates, painful to the touch, but little discoloured, apparently allied to carbuncle, and relieved by a crucial incision.*

Mary Burnett, aged 18, was admitted into St. Bartholomew's Hospital on the 1st of February, 1838, labouring under the following symptoms:—Countenance anxious, face flushed, skin hot, tongue

<sup>1</sup> Rayer, 561.

<sup>2</sup> Lectures on Inflammation, p. 503.

<sup>3</sup> Lect. on Inflamm. p. 506-508.

<sup>4</sup> Ibid. p. 510.

dry and brown in the centre, teeth coated with sordes, tremors of the limbs, pulse 100, small and weak, pain in the head, intense thirst, hurried breathing, ronchus in the chest. No history could be learnt from her, as she was not sufficiently collected to answer questions rationally. It was understood that she had been ill a fortnight. Next day, the report says, she had no sleep, her evacuations had been all passed unconsciously. In the progress of the case crepitation in the lungs came on, which together with the nervous symptoms had greatly subsided. On the twentieth day of the disease, however, a small slough was noticed on the nates, the nervous symptoms reappeared, the slough on the nates continued to extend, and was found to be based on a hard brawny tumour into which a crucial incision was made, and exit was afforded to a collection of matter diffused in a quantity of sloughing cellular tissue. All the bad symptoms quickly abated after this, and she was discharged well.

*CASE XXXVII.—Inflammation of the parotid gland; a hard, brawny, flat induration of the skin and cellular tissue of the nates, of a dusky red colour and ulcerated at its surface.*

Spencer Leake, aged 46, a publican of intemperate habits, was admitted into St. Bartholomew's Hospital on the 26th of October, 1837, the tenth day of his disease. He was covered with a spotted rash, his complexion was dusky, he complained of great pain in his head with intense thirst and loss of appetite, he had pain in the abdomen with constipated bowels, oppression in the chest with viscid expectoration tinged with blood, slight crepitation at the base of both lungs, respiration increased in frequency, and a dry, brown and glazed tongue; the bowels became tympanitic, and the evacuations passed unconsciously. As he appeared to express uneasiness by frequently putting his hand to the nates, they were examined, and a large carbuncular formation was found on the left side; an incision was made into it, and exit was afforded to a small quantity of highly offensive gas and blood in a state apparently of decomposition mixed with pus. He passed a restless night with low murmuring and delirium, and he sank on the week after his admission. Previously to his death, however, the parotid gland on the right side became swelled, inflamed and ulcerated.

Two or three examples of gangrene will next be given. This termination of the inflammatory process is a very common incident to typhus, especially in that class of the community who seek an asylum at the hand of charity—the needy, the dissolute, the aged and the infirm. Mortification or sloughing to a small extent perpetually results where pressure is exerted upon irritated or inflamed parts of which examples are of daily occurrence. When the destruction involves only a small portion of the skin and the patient is advancing to convalescence, by removing pressure and employing small means, the injury is repaired without serious consequence.

Gangrene from pressure is seen on the back of the head, on the integuments, on the prominence of the spine, hips or nates; but the mortification in typhus is by no means confined to these situations, the anterior as well as the posterior parts of the body are liable to its attacks, the extremities as well as the trunk. One of the hospital nurses, of whose case I have no record as she was not under my charge, exhibited this appalling symptom in a remarkable manner. While yet conscious, keenly alive indeed to her sufferings, all her extremities were dead; every finger, every toe, the ears and nose alike had ceased to exist, and the advance of death was easily traced, as he stealthily but visibly encroached upon the life of his submissive victim. We shall see reason by and by for separating the gangrenous inflammation from the erysipelatous with which it usually is associated, but I pass on to my narrative of cases of sloughing.

CASE XXXVIII.—*With sloughing in both feet.*

J. P. Bull, aged 30, was admitted into the Seaman's Hospital on the 2d of March, 1831, labouring under headache, cough, pain in the chest, great thirst, with a dry brown tongue; his pulse was irregular and almost imperceptible.

On the 5th, increased vascularity appeared about the ancles; sloughing resulted, and he lost by mortification several toes of the left foot, and the great and second toe of the right. Healthy processes of reparation were set up, the dead parts were thrown off, and he left the hospital quite recovered in bodily health on the 21st of May, suffering less inconvenience from the mutilation of the foot than could have been anticipated.

CASE XXXIX.—*Sloughing of the integuments over the knees—and of all the soft parts of both lower extremities—amputation of the bones of both legs below the knee—recovery.*

James Davis, aged 25, a watchmaker, was received into St. Bartholomew's Hospital on the 31st of May, 1838. When brought there his aspect was anxious, his countenance pale and cachectic, his breathing quick, he had cough with expectoration of blood, his voice was querulous and expressive of despondency, his chest and limbs were dotted with minute petechiæ, he was unable to walk owing to the condition of his lower extremities, which presented a hideous spectacle, his feet and legs as high as the calf being black, mottled with green; cold as ice, and insensible to the touch, they exhaled a horribly offensive odour, and the cuticle was elevated in many places into blobs or bullæ; the patient on looking at them was overwhelmed with his situation and wept.

No connected account of the early symptoms of his case could be procured from him as his memory was quite confused. He stated, however, that he had always lived well but moderately, that

he had resided with his father, his brother, his sister and his brother-in-law, in the Hackney Road. His father had been attacked with fever and died. Shortly afterwards all the rest of the family were taken ill. The only fact he recollected about the commencement of his illness was his inability one morning to work, and he thought it was owing to headache. His sister, who was also ill with fever, but retained her senses, informed me that her brother very soon after his attack began to sing, and continued calling out loudly and singing for several days, but did not attempt to get out of bed nor did he require restraint. She informed me further that they had been badly off for assistance, as the neighbours were alarmed at the circumstance of their all being ill, and that their only attendant was a young girl who fearlessly braved the danger and ministered to their wants undismayed by the ravings of delirium, and who appeared almost miraculously to escape the general infection. On the 1st of June, the day following this patient's admission, he was reported to have passed a sleepless night, his tongue was dry and disposed to become brown, his expectoration still contained blood, his pulse was 140 with a sharp jerk. The note on the 2d of June was to the following effect:—The blood drawn yesterday formed a jelly, without any separation into crassamentum and serum, the red particles had descended to the bottom and coloured that portion of the mass, the upper part resembled size. On the 3d he was reported to have slept well, tongue was cleaner, pulse softer; in all respects easier. On the 4th he stated that he felt pain in the soles of the feet and at the proximate end of the toes, his expectoration contained less blood, but he was very low. On the 5th he looked pale and anxious, and complained of great pain in the legs, with a sensation resembling that which would be produced by a hot ring round the leg at the junction of the sound with the mortified parts. On the 6th there was increase of pain in the knees, with a healthy line of ulceration bordering the gangrenous parts, both in the legs and at the knees. On the 9th, expectoration ceased, his mind very much disquieted about the fate of his extremities, countenance pale, pulse 140, the mortified parts rapidly separating. On the 16th as much pain was produced by the weight of the dead parts, the integuments being detached and the muscles forming an offensive mass, loose and hanging in shreds, it was resolved to amputate the limbs: accordingly the gangrenous parts of the left leg were divided and the bones sawn through about six inches below the head of the tibia. As circulation through the soft parts had completely ceased, no blood flowed on their division; but the vessels of the bone were pervious and a quantity of blood was thus lost which made him alarmingly faint, and rendered it necessary to postpone the removal of the other leg. On the 19th, however, the right limb was amputated; some bleeding took place, arterial blood flowing in a jet from the bone, but no large quantity was lost. On the 29th he was reported to have gone on favourably, healthy granulations covering the end of the stumps. On the 3d of September

there was no untoward symptom; the extremities of the bones were still denuded; these will be thrown off by necrosis, but he might then be considered as well.

CASE XL.—*With sloughing phagedæna.*

Emma Smith, aged 21, was admitted into St. Bartholomew's Hospital on the 8th of November, 1837. Her countenance was flushed, her skin hot, she swallowed with difficulty, and there was increased vascularity of the soft palate and tonsils, with delirium at night. The history given of her previous state was, that she had been ill for three weeks with fever accompanied by a rash, that sore throat began on its disappearance. On the 11th erysipelas of the face came on. On the 24th a small slough was noticed on the nates. This rapidly increased and put on the peculiar characters of sloughing phagedæna, viz. great pain, rapid increase without any tendency to heal, with the peculiar look and fetor indicative of that complaint. The disorder yielded readily to treatment, and she was discharged well on the 7th of December.

This case, which is one of several that have occurred in this fever, is here mentioned because there seems to be some affinity between the state of the vessels in typhus and in sloughing phagedæna. Dr. Thomson in his Lectures on Inflammation often associates them together: thus at page 487 he observes, that "typhus fever and probably hospital gangrene seem capable of being produced in certain circumstances where the individuals affected by them have not been obviously exposed to infection." Again at page 495, when speaking of opium in the treatment of hospital gangrene, he says "given in an early stage I think I have as in typhus fever repeatedly seen it do harm." He further connects sloughing phagedæna or hospital gangrene with erysipelas and carbuncle. Thus at page 559, he observes that "It is said that in erysipelas, carbuncle, hospital gangrene, &c. patients can seldom bear with impunity any considerable loss of blood." Further at page 577 he continues "In the less acute and more chronic cases of gangrenous inflammation, as in malignant erysipelas and carbuncle, in the gangrene of the toes of old people, in the sphacelating state of hospital gangrene, the emollient poultice may have the addition of the unguentum resinosum, &c." More quotations from the above author might be found bearing on the point, but these will be enough to show all that at present I propose; namely, a sort of connection between the local affection consequent on typhus fever and hospital gangrene.

Although the inflammation excited in typhus most frequently involves the mucous membranes and cellular tissue, and has a great tendency to suppuration or gangrene, yet this is by no means invariably the case. The serous membranes are often implicated, and the ordinary products of increased action in those parts are not

unfrequently produced, forming complications of peritonitis, pleuritis and meningitis. A great many examples might be given, but it will be sufficient to cite a few only to illustrate this statement.

CASE XLI.— *With peritonitis.*

Susan Neale, aged 26, a dress-maker, was exposed to wet on the afternoon of the 28th of October, 1837. In the course of the night she was attacked with shivering followed by thirst and fever. On the following day severe pain in the limbs and abdomen came on. I saw her on the next day, the third from the commencement of her illness. Her countenance then was anxious and flushed, she complained of pain in the head, limbs, and in the larger joints, but her chief uneasiness was in the abdomen, where urgent pain was felt, increased by pressure, and inspiration, in doing which she employed the muscles of the thorax alone. The pain forced her to lie with her knees drawn up. The bowels were constipated, her tongue was coated with a thick yellowish fur, her pulse was 100 with power. The pain did not readily subside, and very energetic measures were found to be necessary; in about a week however the abdominal symptoms were controlled. She had afterwards sore throat with diarrhœa. These ailments were all subdued in turn, but it was six weeks from the time of her attack, before she was able to leave the hospital. I should observe that in this case the rash upon the body was very vivid and abundant.

CASE XLII.— *With peritonitis, ulceration of the intestines, and pus in the fallopian tubes.*

Martha Dean, aged 20, was admitted into St. Bartholomew's Hospital on the 4th of January, 1838.

She had been ill a week. Her illness commenced with pain in the limbs, epigastrium and chest; purging of dark-coloured matter, with thirst, loss of appetite and great heat of skin. Menstruation had been suppressed for three months; she was not enceinte. Her symptoms on admission were pain in the chest and epigastrium, coldness of the extremities, swelling of the right leg, tongue coated in the centre with a brown fur, bowels relaxed, evacuations dark, no pain in the head, no unnatural sound to be detected by auscultation in the chest, pulse 128 and very compressible. There was in this case a mixture of the rash with petechiæ. On the 5th, menstruation appeared. On the 6th she was reported to have slept well, there had been no evacuation from the bowels, the pain in the epigastrium was less. She continued to improve until the 13th, when she was attacked by shivering followed by pain in the abdomen; the pain was increased by pressure and deprived her of all rest; her pulse was 130 and very feeble, her tongue dry and brown, breathing was performed by the respiratory muscles alone. No relief was obtained, and she sank on the 14th.



On examination post mortem the abdomen was found to contain a considerable quantity of turbid fluid mixed with flakes of lymph, and the intestines were coated with a layer of recent lymph which glued them slightly together.

There were several patches of ulceration in the ascending portion of the large intestines.

The other viscera were sound, with the exception of the fallopian tubes, which were observed to be filled with pus.

No perforation of any portion of the intestinal canal had taken place.

There were no morbid appearances either in the chest or head.

CASE XLIII.—*Effusion into the head, indicated by opening of the sutures—recovery.*

Stephen Clarke, aged 19, was admitted into the Seaman's Hospital on the 6th of June, 1831. At that time his face was flushed, his eyes suffused, and his skin covered with small red spots, and he was perspiring profusely. He complained of pain in all his limbs, and in the right side of the chest on coughing, or on inspiring deeply; his pulse was 120, weak and small, but still with sharpness, tongue thickly coated with a dirty fur. He was exceedingly depressed in spirits. On auscultation, fine crepitation was heard at the base of the right lung posteriorly. On the following day he was better, but the pain in the head continued. Much of the activity of the attack was overcome by the measures resorted to, but still the pain in the head remained very severe, and lasted throughout the whole of the month of June; towards the middle of July his hair fell off. On the 21st of that month it was observed that the frontal suture gaped, and he stated that his head was several inches larger in circumference than before his illness. This was proved by the fact that his hat, previously too large, was now infinitely too small. His head measured on the 21st, one foot eleven inches in circumference, and on the 27th was one quarter of an inch larger. The headache was relieved by the opening of the sutures, which took place to such an extent that the finger could be laid between the frontal and parietal bones. August and September passed away, and he still continued much the same; a le to go about, but occasionally suffering severe pain in the head. In November the head was still more enlarged. In December the pain diminished, and the head was found to have returned to its former dimensions, and he was eventually discharged quite well. He called on me this spring, 1838, making no complaints of his former attack.

CASE XLIV.—*With effusion of serum and lymph on the brain and into the ventricles.*

Edward Jones, supposed to be 40 from his aspect, was admitted into the Seaman's Hospital on the 15th of April, 1831. He could give no rational account of himself, being in a state of furious delirium. He complained of no pain, his tongue was clammy, pulse 120 and very weak, he had cough with some crepitation at the posterior part of the right lung, his bowels were constipated, and his limbs were spotted with the rash mixed with true petechiæ. He sank in four days. On examination lymph and serum were copiously effused into the ventricles, and a layer of lymph fully a line in thickness was found on the surface of the hemispheres. The other viscera were healthy except a few very minute ossific deposits around the left auriculo-ventricular opening.

CASE XLV.—*Effusion of bloody serum into the spinal sheath.*

David Smith was admitted into the Seaman's Hospital on the 1st of August, 1831, complaining of great debility and depression of spirits, with headache, giddiness and sore throat. His skin was hot, his tongue coated with a dirty white fur, his bowels were constipated, his skin was covered with red spots; furious delirium came on with strabismus; his face was flushed and his eyes suffused; his pulse became very rapid; it was found necessary to confine him by force. He sank on the 5th, four days after his admission.

On examination there was great vascularity of the pia mater, especially at the base of the brain. The arachnoid membrane was slightly opaque, and there was a bloody fluid effused into the theca of the spine.

The small intestines presented an ecchymosed appearance but without ulceration or much vascularity; the viscera of the thorax were healthy.

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When the inflammation attacks the mucous membrane of the bowels, it readily passes into ulceration, implicating first the glandular portion, as has been observed by M. Chomel. A case or two in confirmation of this statement can very easily be found.

CASE XLVI.—*With effusion of bloody serum in the spinal sheath; hepatisation of the lungs; ulceration of the intestines; enlarged glands of the intestines and mesentery.*

Thomas Bampffield, aged 25, was admitted on board the Seaman's Hospital on the 28th of August, 1831. When taken in his complexion was dusky, he was deaf, complained of headache, was delirious and had cough with crepitation in both lungs, his pulse

was 120, very small and weak. He had been ill a fortnight and sank two days after his admission. On examination the following changes were found:—hepatisation of the lung on both sides in the lower lobes posteriorly; numerous ulcers in the lower third of the ileum, circular with raised edges; the glands of the intestines enlarged, and the glands of the corresponding portion of the mesentery also enlarged and indurated; the ventricles of the brain contained serous effusion, and a large quantity of bloody fluid filled the spinal sheath.

The following case occurred during the prevalence of typhus, and although not marked by the rash, yet appeared allied in symptoms to the prevailing epidemic, and exhibited in an instructive manner the connection of cerebral symptoms with irritation of the intestinal canal.

CASE XLVII.—*With ulceration of the intestines—Opisthotonos.*

Carl Hay, a German, was brought on board the Seaman's Hospital on the 10th of November, 1830. When visited, he was lying in a half comatose state; his abdomen tense, but he did not appear to suffer when pressure was made upon it; his bowels were confined, his skin cold, his pulse was very small and weak, his tongue dry and brown and chapped; he had low muttering delirium, and was reported by the persons who brought him to have been ill five days. On the 12th he was still in the same sort of half insensible condition, but he expressed pain on pressure being made on the abdomen; the bowels were confined. On the 13th he seemed better, but was still feverish with a dry tongue.

14th. He was seized with convulsions which gradually increased in severity and became very violent; the muscles of the back were contracted so as to produce complete opisthotonos. He died that evening. Examination of the body was made twelve hours after. Nothing unnatural was observed in the cranium.

The lungs were healthy though somewhat gorged with blood.

The intestines were of a dark colour throughout, exhibiting when laid open, several small patches of ulceration, especially at the lower part of the ileum; and in the centre of one ulcerated portion a large lumbricus teres was found.

Inflammation of the parenchyma not unfrequently occurs, especially in the lungs; this may take place early in the attack, or may show itself at a later period.

Two cases of alteration in the structure of the lungs will be quoted to illustrate this point; one of them to show the nature of the change, the other to prove, how even after a considerable period, perfect restoration may take place. These cases are selected out of many which have served to convince me, that the inflammation in this and probably in other specific fevers is peculiar, less formidable in its nature, more readily yielding to treatment, and within the

reach of medicine for a much longer period than in pure inflammatory fever.

CASE XLVIII.—*With hepatisation of the lung.*

John Hobs, aged 29, a sawyer, was admitted into St. Bartholomew's Hospital, November 27, 1837. He had been attending his wife who was ill with fever, and was attacked himself five days before his application. His countenance was dusky, his eyes were suffused, he was thirsty, had no appetite; there was a spotted rash upon the skin, cough, with expectoration, and some crepitus in the lungs; his tongue was dry and furred. On the 4th of December his countenance was more dusky, eyes more suffused, pulse 130 and feeble, tongue dry and brown, abdomen tympanitic; there was subsultus tendinum, muttering delirium, his skin was cold, his bladder distended by urine, and he had great pain in the abdomen.

On the 5th, subsultus much increased; passed his fæces involuntarily; restless. Died on the 6th.

On a post mortem examination, the abdominal viscera were found healthy; the membranes of the brain were congested; the chief organic change, indeed the only appreciable alteration of structure, was found in the lungs, which were partially hepatised.

CASE XLIX.—*Pneumonia lasting many weeks, but eventually completely subsiding.*

Sarah Nail, aged 36, married, had three children, was living in the month of May, 1837, in the same house with others who were suffering from fever. On the 4th of that month she was exposed to cold, after having been heated by exercise while menstruating; the secretion from the uterus was suddenly stopped, rigors came on, followed by pain in the back, head and extremities; heat of skin succeeded, with thirst, loss of appetite, and feeling of weakness. When I saw her on the 11th of May, she complained of pain in the head, back, and extremities, with thirst and loss of appetite, the skin was hot and dry, and was covered with a dusky rash, the conjunctivæ were injected, but there was no delirium, she had no cough, and neither by auscultation nor percussion could any derangement in the chest be detected. The disease proceeded as usual in severe cases. Disturbance of the intellect came on, with a dry and brown tongue; her position was flat on the back, her evacuations from the bowels passed unconsciously. On the 18th of May, the report of her case was that she slept well at night, had no delirium, pulse 112, tongue moist, skin still covered with the rash, appetite returning; the urine dribbled away, but on the introduction of the catheter a large quantity was drawn off; she continued to improve till the 10th of June, when pain with cough came on, and all the symptoms of pleurisy with pneumonia were present. Complete dulness succeeded crepitation. A month afterwards she left the house with

cough, dyspnœa, and all the signs of consolidation of the lung, which it was feared would remain permanent.

The case was attended to out of the hospital, the patient steadily persisting in the plan recommended for her relief. By degrees the cough abated, the breathing became less laboured, her expectoration ceased, the lung had returned to its natural state, perfectly good respiration being heard in the situation formerly dull, but not until several months had elapsed from the time of her original seizure.

It has been observed that the pulse in this disease presents various morbid indications. The action of the heart has been noticed as irregular, the flow of blood through the artery as unequal. In several of the cases referred to, for instance in the 11th and 21st, disturbance of the circulation was one of the symptoms. According to Rasori, the pulse will vary singularly in the same day, and sometimes cannot be felt in one or either wrist. Whoever has watched cases of typhus will readily bear testimony to the alteration which slight causes will occasion in the power of the circulation. I will mention briefly the particulars of one case in which the pulse could not be felt during a week, and one or two others in which the irregularity in it came on simultaneously with local disturbance, by which we may in some degree infer the cause. The character of the pulse in the fever this year, it may be allowed me to add, differed in some respects from that in the epidemic of 1831, being then generally slower, and exhibiting more frequently the other deviations from the healthy condition, namely, irregularity and intermission. It remains imperceptible for a considerable time, sometimes in one, sometimes in both wrists, as will be now shown, and it is occasionally remarkably slow.

CASE L.—*Pulsations of the radial artery imperceptible during a week—death.*

Anne Taylor, aged 48, was admitted into St. Bartholomew's Hospital on the 26th of April, 1838. At that time her countenance was dusky and heavy, her breathing was hurried, skin covered with a spotted rash, mixed with petechiæ, her position was supine, she talked unconnectedly, there was considerable subsultus of the limbs, her abdomen was tympanitic, her urine passed unconsciously, her pulse was 120, and very feeble. She could give no account of her illness. She lived nine days, during which time the pulse may be said to have been suspected rather than felt.

The appearances observed post mortem indicated effusion into the brain, under the arachnoid and into the ventricles.

No ulceration or inflammation of the intestines was detected.

CASE LI.—*Irregularity of the pulse coming on at the same time with an affection of the bowels and chest.*

Michael Welsh, aged 15, was admitted into St. Bartholomew's Hospital on the 9th of January, 1837, with pain in the forehead, suffusion of the eyes, great prostration of strength, constipated bowels, tongue moist and white, a spotted rash on the skin, a feeble but regular pulse, 108, and slight cough, but without morbid respiratory sounds. He had been ill a week, and stated headache to have been the first symptom of an attack which he ascribed to cold.

10th. Was reported to have slept badly; pulse 130 and full.

12th. Diarrhœa came on.

13th. Pulse was reported irregular, diarrhœa continued.

14th. Large crepitation heard in the chest, pulse irregular and intermittent.

16th. Better in all respects, pulse regular, but 120.

17th. Pulse 104, tongue moist and clean.

20th. Pulse down to 80.

22d. Was reported convalescent.

CASE LII.—*Irregularity of the pulse showing itself at the same time as pneumonia.*

Mary Toomey, aged 22, a servant, came into St. Bartholomew's Hospital on the 5th of June, 1837. She had then pain in the head, oppression in the chest, with cough, dulness of the countenance, suffusion of the eyes, fetid breath, thirst, heat of skin, a dusky spotted rash on the extremities, a furred and dry tongue, and a weak but not irregular pulse. She had been ill five days before her admission, and considered that she had caught the fever from a female with whom she lived, and who at the time was a patient in the hospital. On the 6th of June, the pain in the head was less. On the 8th, although it was stated that she had passed a restless night, yet the pain in the head had still further diminished, and her cough was less troublesome; her pulse was weak, but no irregularity was perceptible. On the 12th, it was observed that when she breathed there was less expansion of the chest on the right than on the left side, and then for the first time it was discovered that the pulse was irregular; no crepitation could be detected in the chest by auscultation at this time; on the 14th, however, crepitation was very distinct. On the 21st, all morbid sounds had disappeared from the chest, and the pulse had for several days lost its irregularity. Debility was now her chief complaint, and she was discharged well on the 10th of July.

CASE LIII.—*Irregularity of the pulse, which ceased whilst the other symptoms continued.*

Mary Hyde, aged 19, was received into St. Bartholomew's Hospital on the 5th of October, 1837. At that time she had pain in the head and limbs, thirst, loss of strength and appetite, great debility, sleeplessness, heat and dryness of the skin, 45 respirations in a minute, sibilus on auscultation in the lungs at the upper portion both anteriorly and posteriorly, pulse very rapid, 150, sharpish and irregular, distention and tenderness of the abdomen, with constipation of the bowels. She stated that she had been ill for a fortnight; her first symptoms was pain in the head. Six days after the first commencement of her attack the chest became affected, and eleven days afterwards the abdominal symptoms were perceived. On the 6th of October, the day following that of her admission, the pain in the head continued, but the irregularity of the pulse had ceased, the abdomen was still tympanitic, and the bowels continued costive. On the 9th she complained of great pain in the head, deafness, cough; the respirations were 48, the pulse 102 and regular. On the 13th she was much better, the pulse was reduced to 80. On the 19th the fever had entirely left her, but deafness continued. On the 6th of November she left the hospital quite recovered.

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If we now take a retrospective view of the features exhibited by this disease, we shall see that it may terminate at the end of a week, even when presence of the exanthema proves incontestibly that the fever has been typhus. Loss of appetite, debility, thirst, pain in the head and limbs, with the rash, comprising all the symptoms that show themselves.

Again it has been seen by several cases quoted above, that the disorder may be prolonged through a second week, and how in this stage greater constitutional derangement is excited, owing to more extensive affection of the system. But even under these circumstances the tongue often remains moist, with but little indication of any serious organic change. Should however the disease be aggravated to a third degree, a more formidable train of symptoms present themselves, such as blackness and dryness of the tongue, subsultus tendinum, tremors of the limbs, local inflammation, erysipelas, gangrene, sloughing, low muttering delirium, which are too frequently the forerunners of death. If then typhus can and often does exist without exhibiting these last mentioned exaggerations of its features, we are justified in considering them as something superadded, or as an aggravation of a disease which may be confined to a much more limited course. And here we may obtain important instruction as to the cause and treatment of these symptoms from collateral knowledge about the same phenomena, already familiar to us from their presence in other diseases.

It is asserted by M. Chomel<sup>1</sup> that all the appearances observed in typhus fever are met with in other complaints, indeed it is a matter of common belief that most fevers may have this termination; in other words, that fevers simple at first may eventually be converted into typhus. Cullen expressly defines synochus to be a fever of a simple inflammatory character at its commencement, but which in its progress and towards its close becomes typhus—his definition is the following: *Synochus. Morbus contagiosus, febris ex synochâ et typho composita, initio synochâ, progressu et versus finem typhus.*<sup>2</sup>

Here then it may be fitting to make a few remarks upon the leading features in typhus; for by searching into the varied and complicated phenomena of this disease, and by considering them both individually and collectively, we may hope at last to arrive at as complete a knowledge of the parts primarily affected, and of the reason of the subsequent alterations of structure, as we are now well acquainted with the consecutive organic changes developed in the course of the complaint. I shall first then speak of the typhoid symptoms.

#### TYPHOID SYMPTOMS.

After venesection, parturition, or injury of any part of the body, there follows more or less constitutional excitement, with a tendency to the formation of pus, accompanied by a dry and hot skin, black tongue, muttering delirium, subsultus tendinum, stupor, and many of those formidable symptoms that characterise severe attacks of typhus. These symptoms are now properly referred to inflammation of the inner lining of the veins, and it seems therefore a fair inference to be drawn, that although the cause in the two cases may be different, yet that the effect in both is the same; and that both in typhus and the peculiar form of typhoid fever which results from injuries, inflammation of the vessels, and the consequent admixture of morbid secretions from the inner membrane with the blood, is the cause of the serious and alarming symptoms which arise, as well as of the secondary lesions.

Mr. Hunter was one of the earliest to notice the frequency and ill consequence of inflammation in the veins, and the great constitutional disturbances to which it gives rise. In a paper read on the 6th of February, 1784, he remarked, that the inside of veins, like other parts of the body, is often the seat of inflammation and abscess, that he had seen this after death from amputation, compound fractures and mortifications. He observes that many of the consequences erroneously referred to the injury of a nerve after venesection really spring from inflammation of the veins. In his

<sup>1</sup> Chomel, 402. <sup>2</sup> Culleni Synopsis. Nosol. Method. vol. i. p. 78.



paper he does not much dwell on the effects produced upon the constitution, but considers that when inflammation of the veins runs high or is considerably extended, implication of the whole system is to be expected, and that where no adhesions of the sides of the veins are formed, pus passing into the circulation may add to the general disorder, or even render it fatal.<sup>1</sup>

The following remarks upon this subject are taken from the work of Mr. Hodgson:<sup>2</sup>—"The veins," he says, "are liable to all those morbid changes which are common to soft parts in general, but the membranous lining of these vessels is peculiarly susceptible of inflammation. When a vein is wounded, the inflammation which is the effect of the injury sometimes extends along the lining of the vessel into the principal venous trunks, and in some instances even to the membranes which line the cavities of the heart. This inflammation sometimes produces an effusion of coagulating lymph, by which the opposite sides of the vein are united so as to obliterate the tube: in this manner a great extent of the vessel is occasionally converted into a solid cord. In some instances the secretion of pus into the cavity of the vessel is the consequence of inflammation of the membranous lining of a vein; under these circumstances the matter is either mixed with the circulating blood, or the inflammation having produced adhesion of the sides at certain intervals, boundaries are formed to the collections of pus, which in this manner form a chain of abscesses in the course of the vessel. When the inflammation is not very extensive, its symptoms are the same as those of local inflammation in general, but where the inflammation extends into the principal venous trunks and pus is secreted into the vessel, it is accompanied with a high degree of constitutional irritation, with symptoms which have a striking resemblance to those of typhus fever."

The following symptoms are said by Mr. Arnott to result from attacks of phlebitis—prostration of strength, depression of spirits, great restlessness and anxiety, general pain in the limbs, oppressed and hurried breathing, frequent and severe rigors, vomiting, incoherent muttering, secondary inflammation of a violent character, terminating in effusion of pus or lymph, great exhaustion, dry brown or black tongue, teeth and lips covered with sordes, and low delirium.<sup>3</sup>

The dependence of phlegmasia dolens on phlebitis was pointed out by Dr. Davis in 1823; three years afterwards Mr. Dance attributed the typhoid form of puerperal fever to this cause, and called attention to the close connection between venous inflammation and suppuration in the neighbouring parts.

Mr. Mayo, in his valuable work on Pathology, says that "acute

<sup>1</sup> Med. Trans. of a Society for the Improvement of Med. and Chi. Knowledge, p. 26.

<sup>2</sup> On Diseases of the Arteries and Veins.

<sup>3</sup> Arnott on Secondary Effects of Inflammation in the Veins, XV. vol. Med. Chirurg. Trans. page 53.

phlebitis is liable to occur after dislocations, compound fractures and amputations, in puerperal fever, in malignant disease of the uterus, and in consequence of the injury of single venous trunks; for example after venesection, or tying vessels that are varicose." The same author further observes that "acute inflammation of the veins has a very severe character, the greater part of the vein or veins attacked by phlebitis is found plugged up with coagulum, but at other parts inflammatory products are present, lymph coating the inflamed membranous lining, and pus either diffused or secreted in a chamber circumscribed by lymph and coagulated blood: the attendant fever," he adds, "is of a typhoid character."

There are many other causes which will produce inflammation of the veins, and these are well worth alluding to, as they explain how typhoid symptoms, as they are called, may come on in any fever, and do very often occasion anomalies in the progress of other diseases. Dr. Robert Lee has remarked, that "inflammation of the veins rarely takes place in any part of the body where it cannot be referred to a wound or to some specific cause externally applied to the coats of the vessels. The inflammation in uterine phlebitis cannot it is true be traced in all cases to the semilunar shaped orifices in the lining membrane of the uterus which communicate with the sinuses where the placenta had adhered; yet it scarcely admits of a doubt that the frequent occurrence of the disease arises from the orifices of these veins in the lining membrane of the uterus being left open after the separation of the placenta, by which a direct communication is established between the cavities of these veins and the atmospheric air, in a manner somewhat analogous to what takes place in amputation, and other extensive wounds; generally the inflammation attacks the spermatic veins alone, owing to their being invariably connected with the placenta."<sup>2</sup> He further observes, "that in the unimpregnated female it arises from obstructed menstruation, malignant diseases, &c. It comes on also in the male from irritation commencing in the hemorrhoidal, vesical, or some other branch of the internal iliac veins, in consequence of organic mischief in the pelvic viscera; or more frequently from inflammation being excited in the superficial veins of the leg. External injuries, ulcers, exposure to cold and moisture, are the most frequent causes of inflammation in the saphœna veins. A similar occurrence has taken place in phtthis where there has been ulceration in the intestinal canal; and the same has been observed both in cases of dysentery, and where injury has been done to the prostate gland."

Sir Henry Hallford has recorded a celebrated instance of phlebitis arising from exposure to cold, in the case of the late Lord Liverpool, who for many years preceding his death suffered much from this painful disease. The attack was induced by attendance

<sup>1</sup> Mayo's Pathology, 434.

<sup>2</sup> Cyclop. Pract. Med. art. Phlegm. dolens. vol. iii. p. 343.

at some state ceremonial, where his lordship had to remain for a considerable time in a current of cold air. The left thigh, groin, and leg, were affected. Leeches and the other usual antiphlogistic remedies were employed in the acute stage of the complaint: he subsequently died of some affection of the brain, but a post mortem examination of the body showed changes of structure in the left iliac, femoral, and saphœna veins, analogous to those which occur in puerperal crural phlebitis.<sup>1</sup>

The references already made to numerous authors contain a catalogue, sufficiently long, of the causes which produce phlebitis; others indeed are not wanting,<sup>2</sup> but what have been given are unequivocal and sufficient.

Examinations post mortem indicating the exact seat and nature of the injury, place beyond a doubt the organic source of the symptoms, and account for their appearance. Thus we see that inflammation of a vein, and admixture of morbid secretions from the inflamed part with the blood, causes on ordinary occasions typhoid symptoms, and gives rise to a fever attended by subsultus tendinum, low muttering delirium, and a black tongue. The similarity of the symptoms in phlebitis, and in one stage or period of typhus, gives reasonable ground for belief that the corresponding appearances in the two diseases arise from a not dissimilar cause, and hence we see an explanation of one great train of effects in typhus, and learn how typhoid symptoms appearing in various diseases, both chronic and acute, may easily and naturally be confounded with real typhus. Hence also we see how readily what is called spontaneous typhus can be generated. This disease is said always to accompany an army, but phlebitis exhibiting urgent constitutional symptoms may probably have been mistaken for it; and we can well understand, that inflammation of the veins would be especially formidable when produced in military hospitals, crowded, ill supplied, and badly ventilated, as they must often of necessity be, during campaigns where troops are in active service, harassed by forced marches, and especially in disastrous retreats. This justifies our admitting, with M. Chomel, that any fever may assume

<sup>1</sup> Cyclop. Pract. Med. art. Phlegm. dolens. vol. iii. p. 348.

<sup>2</sup> An exception may be made in favour of the infection of typhus: abundant authority can be quoted for considering this as one source of the puerperal form of phlebitis. Dr. Cusack, in a paper on puerperal fever, has expressed himself favourable to this opinion. Dr. H. McAdam in the article "Peritonitis," in the Cyclopaedia of Practical Medicine, says the same, and quotes Dr. Armstrong in confirmation of this statement, who observes in his Morbid Anatomy, p. 96, that "puerperal fever is sometimes genuine typhus, occurring in the puerperal state." Dr. Stokes thinks the same. M. Gase, the translator of Hildenbrand, is equally convinced of this fact, and Dr. Marsh makes the following very important communication on the authority of Dr. Johnson, Professor of Medicine at the College of Surgeons, Dublin. "That the ward-maids of the lying-in hospital caught typhus fever from the patients affected with puerperal fever." Dublin Hospital Reports, vol. iv. p. 521.

the features of typhus, and has led no doubt to the belief in the conversion of one into another, and that an essential difference may exist in the species of a disease at the commencement and termination of its course; but such an adventitious occurrence of typhoid symptoms no more deserves the name of typhus, than spasm of the larynx arising from fits in children merits the appellation of hydrophobia.

### HEMORRHAGE.

Cases have been detailed exhibiting this symptom.<sup>1</sup> That it is a very common one appears by the statement of M. Louis, who found it present in the form of epistaxis alone in seven tenths of a series of cases noted by him. It takes place from serous as well as mucous surfaces,<sup>2</sup> its most frequent seat is beneath the cuticle in the shape of petechiæ, and from the nose as epistaxis, its most rare situation is the muscular structure. Before venturing to offer any remarks upon the cause of this feature in typhus, it is important to ascertain the facts concerning it which are already established. M. Andral, in his work on pathological anatomy, has noticed the tendency to effusion of blood in typhus, and observes, that in this disease, as well as in scurvy, by studying their causes, and by inspecting the blood, we can assure ourselves that this fluid is disordered, and that to this we must refer the circumstance.<sup>3</sup>

Dr. Watson, in his excellent lectures on this subject, observes, "that hemorrhage from the bowels is frequently present in that most fatal form of continued fever which is usually attended towards its close by what have been called *putrid* symptoms, such as petechiæ, vibices, bleeding from various parts of the body and an extreme depression of the vital powers. In these symptoms," he adds, "the hemorrhage is strictly of the passive kind, and it is a symptom of the worst omen. It appears to be connected with an altered quality of the fluids of the body, and to be analogous to those effusions of blood from the same parts which occur in scurvy or purpura."<sup>4</sup> That the blood has undergone some alteration in its consistency is apparent from its very aspect, and on some occasions when drawn from a vein it will not separate into the usual division of crassamentum and serum; or if it should do so the coagulum will be loose and sizy; sometimes the red particles separate at once and fall to the bottom, the whole fluid forming a jelly, and the tendency to coagulate being impaired or retarded. Dr. Cheyne found that the blood was sizy in nearly one half the patients bled for the epidemic fever in 1816, in which epidemic bleeding appeared

<sup>1</sup> Cases from 17 to 24.

<sup>2</sup> Case 24, p. 87.

<sup>3</sup> Andral, vol. i. p. 339.

<sup>4</sup> Med. Gaz. vol. x. p. 472.

eminently useful, and was practised in three hundred cases.<sup>1</sup> Mons. Louis has remarked that the blood often will not cup or buff, and he adds, that out of twelve patients whom he bled it was buffed in five only, and that in the others it was soft, greenish, and gelatinous. Mons. Chomel confirms this statement, stating as the result of his observation, that in twenty out of thirty instances the blood did not buff; he also notices that when it was buffed it had not the aspect of that in simple inflammation, and that in some cases this fluid would be completely diffluent.<sup>2</sup> Sir John Pringle, and many others afford us similar testimony.

Fully coinciding in the belief that a morbid condition exists, which is one great predisposing cause of hemorrhage, and quite willing to confirm the statement, that blood when drawn early in the disease, does not in many instances correspond with the other febrile symptoms, as it does not buff and cup; yet this, I would observe, is by no means invariably the case. Hildenbrand, indeed, maintains the contrary during the inflammatory period, so that it is not essential to the disease that the ordinary febrile condition of blood should be absent in the earlier stages; a doubt may then be expressed concerning the hemorrhage in the beginning of the fever having its sole dependence at any rate on the unhealthy condition of the circulating fluids. This fact is further strengthened by considering that the hemorrhage occurs at two periods, one early and the other late. The bleeding, moreover, takes place from the nose and beneath the skin in the one case, from the bowels, kidneys, and internal organs in the other; here we find another point of discrepancy. Again in the earlier period when hemorrhage occurs in the form of petechiæ they are seen most abundantly upon the trunk and upper limbs, when late on the dependent parts or lower extremities. The symptoms with which the hemorrhage is associated are also to be considered as illustrating the condition which gives rise to it. When then we call to mind that hemorrhage appears within a few days after the commencement of an acute febrile attack—when we consider that that attack is one of a decidedly inflammatory nature—when we reflect that the hemorrhage appears even remote from the centre of the circulation or propelling force, and that it is the companion of an exanthematous rash, or other index of inflammatory action, and takes place precisely in those parts or the neighbourhood of those parts which are chiefly the seats of local determination, namely the head and skin—when we see all the proofs of excited action, of which we know hemorrhage to be one consequence, need we hesitate in allowing to the increased activity of the vessels a large share in the production of this phenomenon, which cannot be too carefully separated in our ideas from the large passive bleedings from the bowels which occur in the later stages of the disease. By referring to cases of purpura hemorrhagica, we find two forms of it as distinctly marked, and as

<sup>1</sup> Dublin Hosp. Reports, vol. i. p. 17.

<sup>2</sup> Chomel, 51.

opposite in their character, as I believe those of hemorrhage to be in the different periods of typhus.

Several cases of purpura occurred some years ago at St. Bartholomew's Hospital, which afforded a complete illustration of the nature of one form. In these instances the skin was studded with small spots, obviously owing to the effusion of blood beneath the cuticle; the cause of this was evident, for on examining the veins of the limbs so affected they were found to be painful, and hard on pressure, conveying the sensation of a cord beneath the finger, which state was due no doubt to inflammation of the veins in an incipient stage. Depletion by venesection at once arrested, and on repetition cured the disease. The advantage of bleeding in one variety of purpura is shown in a case related by Dr. Latham, in the first volume of the Medical Gazette, and is often illustrated in his practice, as I have frequently had the opportunity of witnessing. Why the bleeding in typhus should take place, more especially from the skin and nose, as so often occurs, must be explained by the fact, that these or the neighbouring parts are especially congested in the earlier stages, and that the coats of the vessels are thin, so as readily to allow the passage of blood. That a great predisposition to hemorrhage from leech bites or other wounds should exist in parts where vessels are dilated or obstructed may naturally be expected, and such is found to be the case; any obstacle to the return of blood must act virtually as a ligature upon the vessel, and force its contents outwards.

In the earlier stages then of typhus, we see that the minuter vessels are excited, by which the first phenomena receive an easy explanation. And the simple resolution of inflammation without further progress will explain the shortest and slightest cases of this disease.

The analogy between typhus and other eruptive diseases is complete with respect to the hemorrhagic tendency. The scarlet fever, described by Dr. Fothergill, in 1747, was attended with bleeding from the mucous membrane of the nose, mouth, ears, and from the uterus. Willan observes that such discharges of blood take place in every variety of scarlatina.<sup>1</sup> Epistaxis occurring at the moment of the eruption in that disease is, according to M. Rayer,<sup>2</sup> reckoned a favourable symptom.

In small-pox there is occasionally a hemorrhagic tendency, the pustules, instead of suppurating, are flaccid, become filled with bloody serum, assume a livid hue, and petechiæ and large phlyctenæ are to be seen in the intervening spaces; this tendency frequently shows itself before the appearance of the pustule.<sup>3</sup> I have seen profuse flooding take place during the premonitory symptoms, and have learnt to regard it as not unfavourable. The wound inflicted by the bite of a leech has been known to occasion great and

<sup>1</sup> Willan on Cutaneous Diseases, p. 320.

<sup>2</sup> Rayer, p. 177.

<sup>3</sup> Rayer, p. 380.

alarming hemorrhage in small-pox.<sup>1</sup> Both M. Gendrin and M. Rayer caution us about the application of leeches in measles,<sup>2</sup> for fear the bleeding should be too copious. The earlier symptoms then in typhus appear to resemble those in other eruptive complaints, and are associated with an excited or inflammatory state of the minuter vessels; in which those actions are first set up which are so various in their effects, and so formidable in their consequences. It is to this condition of the vessels that allusion has previously been made; and to which, in my belief, hemorrhage in the earlier stages of typhus is in a great measure to be ascribed.

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### ERYSIPELAS.

The next subject which claims our attention is the connection of erysipelas with typhus. This occurs very frequently, so frequently indeed that it cannot be regarded as a fortuitous event. It appeared in one seventh of the cases under my care in 1831, and quite as often in the later epidemics, nor was the proportion less among the cases recorded by M. Chomel. It is remarked by Dr. Tweedie, that in the "London Fever Hospital, as well as in general hospitals, erysipelas is by no means uncommon. Of protracted cases of malignant fever especially, it is a frequent and a dangerous consequence."<sup>3</sup> In one case that has been quoted,<sup>4</sup> a man suffering from erysipelas communicated it to a fellow patient who was attending upon him; nor are other examples wanting to me where both medical men and hospital nurses have been attacked after similar exposure. Sometimes, indeed, when produced by the typhoid poison, erysipelas appears as the primary affection, in which case its origin is not unlikely to be overlooked, and the disease to be considered as an idiopathic form of erysipelas. It most commonly, however, shows itself in the third week of typhus, and often earlier even when signs of amendment have declared themselves. If it does not show itself spontaneously, the slightest cause induces its appearance. Commencing usually in the form of a red band across the nose, it quickly extends itself over the rest of the face, then upwards to the head and scalp; the eyes are closed; vesication takes place; and matter is frequently formed in the subcutaneous cellular tissue. When thus produced, it seldom extends beyond the face and head, and varies in its attack from mildness to extreme severity. When it takes its rise from parts previously or recently irritated, as by cupping or other causes, or from excoriations, especially those about the nates, it extends over a wider space, involving sometimes the whole trunk; but in whatever situation it may appear, or however excited, it almost always becomes

<sup>1</sup> Rayer, p. 401.

<sup>2</sup> Ibid. p. 154.

<sup>3</sup> Cyclop. Prac. Med. vol. ii. p. 108.

<sup>4</sup> Case 28.

phlegmonous, terminating in the formation of pus. The appearance of erysipelas cannot but be considered salutary in some cases, as headaches will often disappear and convalescence proceeds rapidly afterwards, in others again it is the immediate cause of death. No doubt can, I think, be entertained that this form of erysipelas is contagious: it seems, indeed, to be one of the shapes that typhus can assume, and the conjecture may be allowed that this is the epidemic form of the disease; for it is notorious that those seasons which give rise to typhus, generate also erysipelas.

I have cited a case to show that typhus can produce erysipelas, but as yet have been unable to satisfy myself of the possibility of one person contracting typhus from another labouring simply under erysipelas,<sup>1</sup> as I have previously said when speaking of typhus and puerperal fever. Some explanation of the condition which produces erysipelas in fever may be found by an inquiry into the circumstances under which it arises in other diseases. Mr. Lawrence informs us, in his masterly treatise on erysipelas, that "the phlegmonous is more commonly idiopathic than the simple form, that it supervenes on the wound of venesection, on injuries of the superficial bursæ, as those of the patella and olecranon, on incised and lacerated wounds, and compound fractures; that an inflamed state of ulcers, especially in the lower extremities, is a common cause of it, and that it has often been produced by wounds received in dissection." He forcibly describes the constitutional disturbance which results from an occurrence of this kind, and observes, that "an inflammation of such extent and violence cannot fail to excite the most serious sympathetic affections, among which may be mentioned disturbance of the nervous system, causing symptoms of typhoid character, inflammation of the lungs or pleuræ, of the intestinal mucous membrane, producing diarrhœa, or of the peritoneum and inflammation or suppuration of other organs."<sup>2</sup>

Phlegmonous erysipelas is thus shown to arise under circumstances which have already been proved to give origin to phlebitis, it is therefore allowable to surmise that they are in some way connected. Erysipelas of the phlegmonous form has been noticed by M. Rayer to result from the application of certain animal poisons to the living body, by which the malignant pustule or anthracion is generated. He also connects this disease with the presence of pus in the circulation; remarking, that anthracion takes place very frequently among persons employed in handling animal substances, such as those who manipulate leather, &c. which persons are frequently the subjects of phlegmono-erysipelatous inflammation, and that when the whole constitution is affected, unequivocal symptoms of an altered state of the blood, or of absorption of pus into the system, are observed: and he quotes a case from M. Littré,

<sup>1</sup> Such an accident is mentioned by Mr. Ingleby, in a paper presently to be referred to.

<sup>2</sup> Med. Chir. Trans. vol. 14. p. 39.



presenting all the features of anthracion, in which pus was found in the veins.<sup>1</sup>

The occurrence then of erysipelas in no way weakens, but on the contrary, tends to confirm the idea that many of the symptoms in typhus are occasioned by inflammation of the vessels, which, we are told by a high authority, is the very essence of erysipelas. Many continental writers indeed consider erysipelas to be caused by an inflammatory condition of the lining membrane of the veins. M. Ribes observes, that both in simple and phlegmonous erysipelas he has found the veins, red, thick, and coated internally with a false membrane; and that the small veins of the integuments are the vessels principally affected, the ramuli of the arteries being less inflamed.<sup>2</sup> M. Cruveilhier goes further, and thinks that where irritation is set up, or inflammation excited in any part, the venous tissue is the seat of the chief phenomena.<sup>3</sup> M. Rayer examined several cases of erysipelas, as he informs us, without finding any inflammation of the veins in the neighbouring parts; his investigations however were limited to the larger vessels, in consequence, as he states, of the difficulty of duly ascertaining the condition of the smaller ones. His inquiries would therefore lead to the inference that inflammation, if excited in the veins, does not reach the larger branches: but they leave untouched the statements of MM. Ribes and Cruveilhier.

Some connection appears clearly to exist between erysipelas and several eruptive diseases. After inoculation, both variolous and vaccine, an erysipelatous inflammation occasionally shows itself, and sometimes proves fatal; several cases of this sort are related by Willan.<sup>4</sup> Dr. G. Gregory has described this result in small-pox; he states that, "the secondary fever of small pox (that accession namely of febrile symptoms which takes place on the ninth or tenth day) is accompanied with some form of inflammatory action on the surface; trails of erythematous redness appear in several parts, or a genuine erysipelas attacks the head, trunk, or limbs;" he goes on to detail some further consequences, and adds, "it is not uncommon to find even the milder cases attacked, during apparent convalescence, with fever, sore throat, and erysipelas of the face or extremities."<sup>5</sup>

Erysipelas appears also to be allied in some way with scarlatina. Rayer observes, that "whatever the form under which scarlatina shows itself, the eruption may be complicated with other inflammatory affections of the skin," and amongst these he enumerates erysipelas.<sup>6</sup> A very interesting illustration of this alliance presented itself to me last year; I was desired to see a gentleman labouring under scarlet fever; the symptoms were well marked,

<sup>1</sup> Rayer, p. 561.

<sup>2</sup> Andral, Précis d' Anat. Path. tom. ii. p. 406.

<sup>3</sup> Andral, p. 392.

<sup>4</sup> Willan, p. 510.

<sup>5</sup> Cyclop. Prac. Med. art. Small-pox, vol. iii. p. 741.

Rayer, p. 170.

and the disease severe, but it proceeded favourably; during his convalescence traces of erysipelas showed themselves on the face; his sister, who had been his constant companion and nurse in the earlier period of the disorder, was now attacked by scarlet fever; a brother, who on this became the chief attendant, was also taken ill in a few days, not however with scarlatina, but with erysipelas of the face and head; all three were invalids at the same time, in all the symptoms were urgent, but the disorder in each terminated favourably. The connection of typhus with puerperal fever has been shown; its connection also with erysipelas is ably contended for in a paper by Mr. Ingleby of Birmingham, in the *Edinburgh Medical and Surgical Journal*.<sup>1</sup> Allusion only can be made to this branch of my present topic, though highly interesting, as it has already perhaps been dwelt upon too long; and I will merely pause to hazard a suggestion that the frequent appearance of erysipelas across the face, when the vessels of the brain are excited, and the affection of the head when erysipelas of the face has come on, are owing to the connection of two parts, which are united as well by continuity of tissue as by sympathy.

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#### SUPPURATION.

Whether it is right or wrong to refer a certain series of the symptoms in typhus to inflammation of the vessels, and circulation of pus, may possibly be questioned; that there is in this disease frequent secretion of purulent matter, and often to a great extent in different parts, cannot be denied; no part indeed can be considered free from a liability to such formation, "*convalescentes*," we read, "*sæpe habent apostemata aurium*," and numerous other instances have been given in the cases already cited as illustrative of suppuration in typhus. The parotid, the submaxillary, and other glands swell and discharge pus, it is readily produced by erysipelas, inflammation of the lungs not unfrequently assumes the purulent form, pus is found deposited upon the brain, even in its very substance, abscesses form beneath the pectoral muscle, and also in other situations.

A tendency to the secretion of matter is seen in a certain condition of the system, when inflammation has been excited by introduction of animal poisons into the circulation, as well as after inflammation of the veins from wounds, &c. Mr. Rose's paper<sup>2</sup> on large collections of pus in various parts of the body, especially after injuries of the head, is very universally known; he gives as the result of his experience, that these abscesses usually form at the end of the second or fifth week after the accident, which gave rise to them; these he refers to constitutional excitement arising from

<sup>1</sup> Vol. 58. no. cxxxv. April, 1838.

<sup>2</sup> *Med. Chir. Trans.* vol. xiv.

local injuries, and thinks them striking illustrations of the irregular action in the vascular system, which such irritation occasions. A more simple explanation may perhaps be found in the state of the fluids arising from an inflammatory condition of vessels. Between the extensive suppurations in typhus, variola, and charbon we find a correspondence which shows, that if large formations of matter be not absolutely incident to inflammation excited by animal poisons, they are at least very easily occasioned by them. It has been observed by M. Gendrin that blood drawn from patients during suppuration in small-pox, not only exhibits the inflammatory crust, which is not the case previously to the formation of matter, but also that its aspect is peculiar, being more diaphanous and softer than ordinary buff, and its colour a dirty white; these appearances he imagines to arise from the presence of pus in the circulating fluid: this, and the known fact, that pus when injected into the veins produces rapid and abundant suppuration, is considered by the last cited author as sufficient to account for those phlegmonous attacks and abscesses which so frequently prove serious in variola.

Dr. Gregory confirms the frequency of purulent depositions in small-pox, and observes that in some cases the secondary fever is accompanied by cutaneous and cellular inflammation, but more circumscribed than in the cases lately quoted, leading to the formation of abscesses of great extent, of boils and carbuncles. In some cases the scalp is the part which receives the violence of the fever, or a diffuse cellular inflammation takes place, which is followed by purulent infiltration. He further remarks, that the destructive effects of the secondary fever are by no means confined to the surface of the body. It frequently happens that without any obvious cause some internal organ receives the violence of the febrile shock. Acute inflammation is set up, and the result is in almost all cases suppuration. Variolous pleurisy comes on about the eleventh or twelfth days, for the most part very suddenly, and proceeds rapidly to empyema. We have seen it, he observes, prove fatal in thirty-six hours.<sup>1</sup>

Typhus then shares with other eruptive disorders a tendency to the formation of pus, should the disease not be checked in its early period; this formation appears sometimes to be a desirable event, for instance in erysipelas; as when matter is detected, and pus let out, the disorder seems to have reached its acme, and then declines.

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#### GANGRENE.

We admit that gangrene is one of the terminations of inflammation, and such undoubtedly it is, but our admission is perhaps made

<sup>1</sup> Cyclop. Pract. Med. vol. iii. p. 741.

without considering what is the character or seat of the inflammation which leads to such a consequence. Gangrene or sphacelation, to a greater or less extent, is a very common incident in typhus, but it is not the most intense inflammation which tends to produce this result; if indeed we consider that inflammation to be the most intense, which exhibits deep redness, considerable swelling, occupies a large space, and produces urgent constitutional symptoms; and if we understand by gangrene or mortification, the cold, black, fetid mass which animal matter exhibits when deprived of vitality. An illustration of this statement is afforded by erysipelas, which exhibits occasionally the most intense degree of inflammation, and assumes the most virulent character, without any tendency to slough. I have seen the face swelled to double its natural size, and of a deep red colour, the eyes closed, the nose stopped, the lips protruded, greatly enlarged and hideously disfiguring the countenance, the tongue so swollen as to impede deglutition, local symptoms of the most formidable kind, accompanied too by furious delirium, yet all has ended favourably without any appearance of gangrene. In the most marked cases of mortification which it has happened to me to meet with, the death of the part has succeeded quickly to previous symptoms of inflammation, which has shown but little tendency to any other result, such as the effusion of serum or the formation of pus. Gangrene is constantly considered to result from the weight of the body pressing upon affected parts: but pressure cannot be the cause in many cases of typhus. I have already quoted instances in which the feet sloughed, as also the skin of the knees, the integuments of the anterior part of the trunk, the extremities of the fingers and even the nose, which was not subject to the contact, much less to the pressure of the bed clothes. It is regarded as a proof of great debility, but if we look attentively at what takes place in the immediate contiguity of mortified parts, we shall see that in most cases healthy ulceration is set up, and the dead parts naturally separate, showing no want of constitutional vigour; in others, however, it must be admitted, there is but little attempt at reparation.

If we search for an explanation of the phenomena in the ordinary circumstances under which gangrene is produced, we find that it arises from extremes of temperature, from various mechanical and chemical injuries, and from all causes which produce complete obstruction of the vessels. The cause of obstruction may be in the veins, when the pressure of blood in the arteries would excite inflammation, as Mr. Carswell has represented in his plate to illustrate this subject. Again, the fault may be on the side of the arteries, although M. Bichat maintains that "gangrene never occurs from simple inflammation of the internal membrane of arteries."<sup>1</sup> This, however, is not supported by the opinion of M. Dupuytren, who observes, in treating of symptomatic gangrene, in his *Leçons*

<sup>1</sup> *Anat. Gen.* par Beclard, tom. ii. p. 159.

Orales de Clinique Chirurgicale, that the senile dry gangrene arises from inflammation of the principal arteries in the affected part, the result of which is to occasion the complete obstruction of the vessels, and to cause a total stagnation of blood," he also points out the fact, "that this gangrene will attack children of ten years of age, adults, those in the prime of life, as well as the aged. The ossification found in some cases is simply a coincidence, for ossification often exists without gangrene. The cause is the obliteration of the arteries and the stoppage of the circulation in the canals. Gangrene is mostly preceded by pain in the limbs, and other signs of inflammation, but they are by no means invariably present." "The symptoms," he adds, "are sometimes extremely perplexing, there being no external lesion, no derangement of external organs, the breathing and circulation remain regular, and the brain and digestive organs exercise their functions as in health." He then traces the progress of the disease, and notices the extreme degree of cold which characterises the mortified part, which he says is even below that of a dead body or limb; and observes that the thermometer sinks lower when in contact with a mortified part than when exposed to the air, or even when plunged into a stream of running water.

When the gangrene is dry and black, it proves, according to Mr. W. Chevalier, that both sets of vessels are obliterated, whereas, when it is pale or white, the obstruction is in the arteries alone. All these circumstances connected with the subject are of great interest, and many highly obscure, yet not being unfrequently met with, attention need only be called to them, that opportunities of gaining instruction may not be lost when means of investigation occur.

It is probable that in typhus we have mixed phenomena, and an intricate combination of circumstances, to which some elucidation may perhaps be afforded by improved knowledge as to the state of the vessels in those cases where gangrene arises from improper food, such for instance as rye, when ergotted, which gives rise to a disease, very common in countries where that corn is much used as food, and where, as in typhus, there appears to be brought about a disordered state of the circulating fluids combined with vascular irritation.

The above leads us naturally to consider whether the arteries may not in all instances be implicated, and their circulation checked by inflammation: this I am not prepared to maintain, but it is highly probable that such is in many cases the fact, while the condition of the fluids may be chiefly instrumental to this process in others, for it takes place late in the disease, when there is a decided alteration in their character, accompanied by symptoms of extreme debility and a general proneness to decomposition.

Scarlet fever exhibits the tendency to mortification in a remarkable degree. We well know, indeed, that it constitutes a prominent feature in the malignant form of that disease. Inflammation of the

throat puts on this character in the variety called *anginosa*, but the disposition to *sphacelus* is also shown where inflammation arises elsewhere. In a description of the epidemic scarlet fever prevalent in Cornwall in 1749, among other alarming signs were pustules in the groin, which threatened mortification even in the beginning.<sup>1</sup> Reference to more authors for confirmation of this complication of gangrene with *scarlatina* can scarcely be necessary. It was noticed in that attack which committed such havoc in Sicily during the years 1575-76; for this, although described as a pestilent and contagious disease by Ingrassia, was no doubt a most malignant form of *scarlatina*,<sup>2</sup> and when we read the accounts of older authors upon the subject of the different plagues which are represented as depopulating villages, and devastating whole countries, it is quite clear that they refer in very many instances to occasional attacks of infectious eruptive diseases; the apprehension created by the appearance of which, was heightened by the limited knowledge of practitioners in those days as to their nature; and the mortality was increased by the erroneous notions then prevalent as to their treatment, and by the absence of proper measures to prevent their extension.

#### PECULIARITY OF THE INFLAMMATION IN TYPHUS.

Hunter, Heberden, with many other sound and accurate observers, have noticed that certain circumstances alter and modify inflammation: to one of its many forms the title *erysipelatous* has been applied, but even this varies, being slight, erratic, diffuse, and comparatively trivial in some cases, but in others it is firmly established, involves deeply seated parts, is phlegmonous, and truly formidable; but whether phlegmonous or erratic, its peculiar character remains invariably the same. The inflammation which occurs in putrid fevers is said to have but little of the "adhesive tumefaction in it, but more of "the œdematous." In typhus and in the exanthemata we find all the consequences of excitement of the vessels, we have increased temperature, redness, dilatation of calibre in the minute vessels, secretion of serum, lymph, and pus, but with respect to these two last secretions, there is a peculiarity in these diseases; they have, to use again Mr. Hunter's phrase, but little of the adhesive tumefaction in them. The circumstances under which pus and lymph are produced may give some insight into the processes of the fever now under consideration. We know that the existence of suppuration and the effusion of coagulable matter at one and the same point is

<sup>1</sup> Willan, p. 332-328.

<sup>2</sup> *Informatione del pestifero et contagioso morbo il quale affligge et have afflitto questa città di Palermo et molte altre città et terre di questo regno di Sicilia nell' anno 1575-76, par Ingrassia. Palermo, 4to. 1576.*

impossible, the presence of the one invariably precluding the appearance of the other. Suppuration is a secondary stage in the process of reparation, and takes place, when healing by adhesive inflammation is retarded or prevented: without entering into the theories about the formation of pus, without stopping to inquire whether it be a secretion, as Mr. Hunter supposed, or an altered condition of the blood itself, as Muller<sup>1</sup> seems more correctly to regard it, but merely mentioning that M. Gendrin<sup>2</sup> maintains that it may be seen actually circulating in the vessels; I pass on to a fact mentioned by Mr. Mayo, explanatory of the peculiarity before alluded to. He tells us that "in persons labouring under typhus, the character of the excitement is peculiar: serum and lymph appear so sparingly poured out that consolidation and organisation of new parts takes place very slowly, if at all, and there is no escape of fibrine, though frequently of pus from the vessels."<sup>3</sup> This fact is very important, as tending to explain the diffuse character of the suppuration occurring in typhus, diffuse because it is not retained in its situation by secretion of fibrine, which occasions the adhesive tumefaction. This deficiency of fibrine enables us to see why recovery takes place most readily in parts which have been the seat of inflammation, as there is then obviously less tendency to organisation; pus, indeed, is readily poured out, this however is not susceptible of organisation at all, and the lymph of typhus is but little plastic.

The causes which induce the secretion of pus or lymph will have reference either to the condition of the part itself or to that of the circulating fluids, and whether we consider pus a secretion or a modification of the blood, in either case we must expect that the state of the circulating fluids would exert some influence upon it. Lecanu has found that the quantity of (dry) fibrine in the blood varies under different circumstances from one to seven parts in a thousand,<sup>4</sup> it is known to alter after repeated blood-lettings, is essentially diminished by any injury of the nerves, and in animals after laborious exertion,<sup>5</sup> as recently proved by M. Dupuy: its condition undergoes a positive change, when fainting is brought on by venesection. This incident well exemplifies the influence of the nervous system upon the blood: which, practitioners have observed, under these circumstances ceases either to buff and cup, even when drawn during the active stage of acute inflammation. In short, we find that whatever diminishes the nervous influence has an injurious effect upon the blood, lessening its power of coagulation, and impairing its vitality. This, with other causes, tends in my belief to produce that series of phenomena so commonly appearing both in this

<sup>1</sup> Muller, p. 435.

<sup>2</sup> Gendrin, *Hist. Anat. des Inflamm.* tom. 2, p. 456.

<sup>3</sup> Mayo, *Pathology*, 428-9.

<sup>4</sup> Muller, p. 114.

<sup>5</sup> Andral, tom. 1, p. 543-546.

and in eruptive fevers, and known by the appellation of putrid symptoms. Upon these I may now therefore appropriately offer a few remarks.

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### PUTRID SYMPTOMS.

Want of power in the blood to coagulate, utter prostration of strength, effusion of fluids from the vessels, ready mortification of parts, with a tendency to decomposition and extrication of gaseous matters, form a diathesis or state of the system, commonly denominated putrid. The presence of one or more of the above symptoms gives a fever the character of malignity. This type was marked in many cases of the typhus in 1831, and has often been seen in the more recent epidemics. A proneness to become putrid appears natural in many constitutions, in others it may be induced by particular circumstances, but typhus and the other exanthemata seem invariably to develope or generate this condition in all. Mr. Hunter takes notice of the natural tendency to putridity, and says "that different effects may be produced in two individuals by the same poison, the symptoms being in the one true inflammatory, in the other putrid. If the constitution has a susceptibility to be putrid, and small-pox attacks it, the inflammation will be the small-pox joined with the putrid mode of action."<sup>1</sup> We may infer in some measure the reason of this by considering the circumstances under which the putrid diathesis is engendered or acquired. The chief appreciable causes of this state appear to be the condition of the atmosphere and certain habits of life. It is unnecessary to dwell upon the influence of seasons, or the unusual mortality in particular years, as that will be conceded by all; but although we draw general inferences from such a fact, showing the prevalence of wet, moisture, &c. to be inductive of disease and prejudicial to life, we advance but little in explaining the results of typhus. More decided causes and more palpable effects are to be found in certain habits of life, by which I would only be understood to mean such customs as use or necessity has imposed upon society. Passing at once to the condition of that class in which a disposition to putridity is most especially shown in disease, we meet with it amongst those compelled to live in dark, ill-ventilated, and crowded apartments. We find it in persons whose limited means and hard-earned wages deny them wherewithal to allay the bare cravings of hunger, still less to guard against the inclemencies of the weather, and the vicissitudes of an ever-varying climate, and on whom, lowered by privation and exposure, despondency exerts her baneful influence. Now what effect does want of light and fresh air produce on sanguification? What causes the pale cheek and haggard look? The answer to

<sup>1</sup> Hunter on the Blood, p. 327-333.

<sup>2</sup> Willan, p. 282.



these questions is given us by M. Andral, who observes in his pathological anatomy, that there are certain morbid conditions in which before life has ceased the laws which regulate all matter overcome the resistance of vitality, and while consciousness remains and life still lingers, the system loses its power of generating heat, chemical affinities begin to exert themselves, and putrid symptoms result; these he refers to depression of nervous energy, and then goes on to notice the different modifications of external influences, which more or less are in constant operation upon our frames, such as exclusion of the sun's rays, living constantly in a damp situation, and imperfect nutrition of the body: occupancy of unhealthy places, or deficient alimentation, at once strike at the functions of the lungs and skin, the direct and indirect organs of sanguification; wasting ensues, the circulating fluids are impoverished, the blood becomes thin, watery, deficient in fibrine, and palpably disordered.<sup>1</sup>

These are the organic effects of the miseries of actual famine, or that extreme state of want bordering too closely upon it, and necessarily met with among some individuals in all large and populous communities. Thus we find a ready cause for the anxious look, the real weakness, the emaciation, the tendency to perspiration, the great dyspnœa, the disturbance of the brain, with delirium or excitement, the palpitation of the heart, accompanied by many of those symptoms, which although arising from an opposite cause, so closely resemble inflammation.

In such cases, as M. Andral has observed, we may anticipate the worst consequences from vascular excitement. We may expect effusion of blood, great prostration of strength, hemorrhage, and mortification, in short all the signs of putridity.<sup>2</sup> Nay, even without the occurrence of fever, we see the effusion of serum in the shape of dropsical swellings and of blood in that of purpura.<sup>3</sup> The effects of typhus, engrafted on such a community, are shown in the details of the various instances of famine which have occasionally devastated our land. We may then entertain the idea that if there be a constitutional tendency to what are called putrid symptoms, a condition of the blood must exist similar to that which is engendered by want and other depressing causes. It has been observed that the symptoms of typhus under all circumstances tend, unless arrested, to putridity. This fact was not unnoticed by Mr. Hunter, who observes that "there are specific irritations which do not affect a part, or the constitution as a common irritation, but affect them in a way peculiar to the irritation, altering at the same time both the parts affected, and the constitution from a healthy state to an unhealthy one of its own kind. This seems the case with the plague, perhaps with the putrid and jail distempers in a less degree; for whatever

<sup>1</sup> Andral, Précis. d'Anat. Pat. tom. 1, p. 88. 573.

<sup>2</sup> M. Andral, Précis d'Anat. Pat. tom. 1, p. 83, 84, 541.

<sup>3</sup> Ibid. tom. 2, part 1, p. 219.

be the kind of constitution which they attack, they always reduce that constitution to their own kind."<sup>1</sup>

That the condition of the nervous system is deeply implicated, appears by derangement of the intellectual faculties, by disturbance of bodily functions, and by irregularity in the pulsations of the heart. Under these circumstances it is not surprising that an essential change in the circulating fluids comes on during the course of typhus, and that a tendency to putridity is engendered.

The close analogy between typhus and the exanthemata is here shown, for it is well known that measles occasionally assume a putrid form, less frequently indeed than formerly, as our method in treating this disease, which may be said to be now thoroughly understood, has of late years been greatly improved. Dr. Fothergill wrote an account of the scarlet fever which prevailed in London in 1747-8, and put on occasionally this aspect; he remarks, that "in some cases the disease appears to be of so mild a nature, and so benign, as to require but little assistance from art. Persons even recover from it under the disadvantages of unskilful and injurious management; whilst in others the progress of the symptoms is so rapid, and the tendency to corruption so strong, that nothing seems able to oppose it. Just as it happens in the small-pox, the benign and distinct sort bears ill-treatment without injury: in the malignant flux kind, the utmost art and experience are too often insufficient to conduct the distemper to a happy issue."

I am well aware how dangerous it is to advocate a false theory, and know that any attempt to explain the phenomena of fever will justly excite the suspicion of the cautious, lest in yielding credence to notions supported by inference rather than by demonstration, they should be led away from the path of established practice into the mazes of speculative treatment. Numerous organs are implicated in typhus, and we have as numerous theories, ascribing to each all the phenomena which appear; but such have as yet been found insufficient to explain the varied aspects put on by this complicated disease; in turn has each part, though considered the chief seat of the malady, been found free from all morbid alteration; and this Proteus, still present under a new form, has continued to elude the shackles of nosologists. Those who disregard all theory, and content themselves with meeting symptoms as they arise, will confine their views to the effects of a disease; but art then alone rises into science, when besides meeting effects we search after causes; and when administering appropriate remedies, can give a reason for their use, and can explain their operation.

A theory, which ascribes the origin of typhus to the operation of a specific poison, producing a series of morbid actions, and provoking inflammation of a modified character, must at least be less injurious in practice than that doctrine which ascribes all the processes of this fever to so insufficient a cause as debility. The terms *adynamic*,

<sup>1</sup> Hunter on the Blood, p. 331.

ataxic, and asthenic, are still daily applied to typhus, and show that the erroneous doctrines which formerly obtained, still meet with supporters at this day: they are indeed specious, so deceitful is the aspect and so depressed are the feelings of a patient, that unless acquainted by experience with the consequences of acting upon this notion in the earlier periods of the disease, we are likely to fall into the fatal errors which result from the theories of Browne. A moment's reflection must satisfy all that no degree of weakness is capable of producing the symptoms of typhus. When weakness does occur it must be a consequence, and we have in our treatment to obviate its effects; but he slumbers upon a volcano who does not see in this fever the tendency to inflammatory action, and all the results of a modified condition of that state. He who attributes all to debility must refer to this alone the various processes which I have shown to arise, such as consolidation of the lungs, inflammation in every organ, ulceration of mucous membranes, adhesion of serous ones and the universal effusion of pus. The discoveries of modern pathologists, who find in most cases essential change in all important organs of the body, must alone overthrow the doctrine of mere debility. How can the advocate of this theory account for the effusion of lymph or pus upon the brain or into the pleuræ, as seen in post mortem examinations; how can he explain why the solid lung sinks in water, or why ulceration successively destroys each tunic of the intestine, and finally perforates its coats; such effects are produced by typhus, but never can arise from debility. Weakness indeed has its own peculiar characteristics, but far differing from those mentioned above. Exhaustion is not well portrayed in the fierce look and congested eye of early and furious delirium; hurried breathing, dulness of the chest on percussion, with crepitation, but badly support the theory of debility; tenderness of the abdomen, with watery or sanguineous evacuations, point out other mischief than deficient nervous energy, yet all these are constantly met with in typhus. Dr. Bateman, in treating of the epidemic fever of his day, which he considered to be the same with the putrid pestilential fever of Huxham and Sydenham, makes some excellent remarks upon this subject, and thus expresses the mode by which the conviction of the efficacy of a treatment, irreconcilable to the theory of debility, was forced upon him:—"I believe there are few physicians, who, like myself, commenced their professional career impressed with the doctrines that prevailed in the schools at the close of the past century, when the terror of debility was certainly predominant, who will not confess that their subsequent practice has been a continued struggle between the prejudices of education and the staring conviction of opposing facts, which continually force themselves upon their attention; and that they have been compelled to a gradual but material change in their views respecting the use of the lancet in fever and other diseases. I am fully conscious of the extent to which my own practice has been cramped by this prejudice, and of the reluctance with which I have admitted the

evidence of my senses, till frequent repetitions, and the sanction of other authorities, had rendered it irresistible. My testimony, therefore," he adds, "on this point, cannot be deemed the result of haste or temerity." The same author in another place observes how experience had taught him "that the supine and helpless condition of a patient, his constant and feeble mutterings when spoken to, his dark and trembling tongue, his dull and sunken eye, his starting tendons, and his involuntary evacuations, are not mere effects of general prostration, and by no means to be treated by active stimulants as the sole means of counteracting the tendency to death."<sup>1</sup> The above mentioned symptoms with local inflammation, their constant attendant, must have an exciting cause: they come on in the course of typhus, and therefore result from some hidden action in the system; and although all are not absolutely essential to this disease, yet most of them appear in its protracted and severer forms. If, then, a train of corresponding symptoms can be shown to arise from various injuries, as, from the prick of a lancet, and the more general division of parts by the amputation knife, or from other external injuries, it is not exceeding the bounds of legitimate reasoning and fair analogy to conclude that they originate in both cases from a similar cause, which in wounds has been clearly shown to be the admixture of purulent secretions with the blood. Should inflammation of the minuter vessels be admitted as an early step in typhus, an explanation will at once be afforded us of the various consequences which ensue. The phlegmonous erysipelas, the large abscesses in various parts, the extensive internal inflammations, the state like phlegmasia dolens, which I have seen in this complaint, will at once receive elucidation: the great and peculiar constitutional disturbance will no longer remain a matter of obscurity, and though the disease may still baffle our attempts at cure, we shall not be led astray by the mischievous idea of referring every thing in fever to debility of the nervous power, as if the vascular system remained perfectly quiescent, and the circulating fluids were incapable of morbid alteration.

That many of the symptoms which have hitherto rendered typhus so formidable, and which appear as the disease advances, are owing to some such cause as that above mentioned, I do not see room to doubt, it being as capable of explaining the earlier as well as the later phenomena, both of which justify my attributing much in this fever to inflammation of the minuter vessels.

It is one of my objects to show that typhus is an eruptive disease. The simple appearance of a rash proves an alteration in the natural condition of the vessels of the skin; that this condition is inflammatory, the symptoms which accompany it sufficiently attest. The seat of inflammation in measles, which is nearest in its aspect to typhus, is the reticular tissue; and M. Gendrin informs us, that in the acute stage of those inflammations of the skin, which he calls

<sup>1</sup> Bateman, p. 118.

erythemoid, the excitement occupies the superficies alone, and does not extend beyond the reticular layer.<sup>1</sup> It would therefore probably be erroneous to state, that the first affection began in the veins, especially when we see how suddenly eruptions disappear, which would sufficiently testify that the irritation is, at any rate, seated in a portion of the vascular system possessing considerable irritability. That inflammation is excited in this tissue, may be inferred from other consequences as well as from the rash. Two of the most constant occurrences will receive from this notion their easiest and most rational explanation. These two are the appearance of petechiæ and the epistaxis, both dependent upon the same cause, and both varieties of the same process, hemorrhage. Petechiæ, as I have shown, appear sometimes with, sometimes without, the rash; they show themselves at two distinct periods, and are produced by very different causes. I here allude to that crop which shows itself early, within the first few days of the attack, when every symptom indicates an excitement of the vascular system. Now hemorrhage is clearly one of the consequences of this state, the hyperemie sthenique of M. Andral; if then we find the state of vessels such as would induce active hemorrhage and the actual discharge of blood, we cannot regard them as other than cause and effect, more especially conjoined as it is with an altered state of the fluids.

Typhus may stop at an early period, having occupied in its progress a week or less, when many formidable symptoms will be wanting; but should it be prolonged, or prove extremely severe, we have precisely such a train of symptoms as we might expect from extension of inflammation in the vessels, and its known consequences. We have all those symptoms before enumerated as resulting from inflammation of the veins, and called typhoid from their resemblance to similar ones in that fever: we find the black tongue, the muttering delirium, the subsultus tendinum, a state often connected with great debility, but certainly not produced by it. It is not a matter of much moment at this time to pursue an inquiry into the niceties as to whether minute arteries or veins were the seat of inflammation, while the question itself of the inflammatory state of the vessels remains unsettled, or still may be in dispute; but I may remark, as strengthening the idea, that the venous is the system most likely to be the seat of such a change, that M. Andral has asserted, that pus is more frequently found in the veins than in the arteries. Mr. Carswell states, in his work on Pathological Anatomy, when treating of the subject of inflammation, and in allusion to suppuration resulting from injuries, wounds, &c., that pus is often found in the veins of the affected part, but never in the arteries. Dr. Armstrong was so satisfied that by some means the venous system was affected in typhus, that he named one variety of it "congestive" from this cause. In entertaining the question of inflammation of vessels being confined to one or other set, we must recollect, that the

<sup>1</sup> Gendrin, vol. i. p. 414.

point at which arteries terminate and veins commence cannot be exactly defined, the transition from one to the other is so very gradual, but we may infer that should both be equally exposed to an irritating cause, the veins would most readily take on the inflammatory action; a point well illustrated by the different effect of a ligature, which if applied to an artery produces little irritation, but a contrary result when enclosing a vein. M. Gendrin has noticed an important fact with respect to inflammation in the two series of vessels, and one which would tend in some degree to explain the extension of inflammation if excited in the veins. This diligent inquirer has observed that when inflammation attacks the arterial tube, it rarely passes the internal tunic, but when the veins are implicated, inflammation readily extends from the inner surface to the outer coats, and into the surrounding parts, which become infiltrated with pus.<sup>1</sup> Thus may we account for the great tendency to erysipelas in phlebitis, and the ready formation of abscess.

The greater facility with which inflammation spreads in veins than in arteries, is thus alluded to by Muller. "Phlebitis being excited at any point by causes capable of giving rise to inflammation, extends so rapidly that in a short space of time all the venous trunks of the limb become affected."<sup>2</sup> This is a striking contrast to the similar result in arteries, when speaking of which, this eminent physiologist remarks, "the local diseases of arteries, such as inflammation and dilatation, are in a great measure limited to the point to which their exciting cause was applied, and have no tendency to spread."<sup>3</sup> I should add, however, that the arteries are inflamed in some cases of typhoid disease: M. Gendrin found pus in the arteries of a man who had died from fever in consequence of a wound in the hand, voluntarily inflicted, with the view of thus getting a discharge from his military duties: the same author quotes a case from Portal, of a young man who died after a few days from measles, in whom the aorta was found to be inflamed. I examined one case of fever, in which there were undoubted signs of inflammation in all the larger arteries: the vasa vasorum were seen distinctly ramifying upon the aorta and its branches, to a second and third degree. This patient was admitted into St. Bartholomew's Hospital under Dr. Roberts; she was covered with petechiæ and had a dry brown tongue, delirium, subsultus tendinum, and hemorrhage from the bowels; she sank in a few days. On examination, extensive ulceration of the intestines was found, as also petechiæ on the internal serous membranes, a bloody serum was effused into the pericardium, fluid was poured into the ventricles, and, mingled with air, was deposited between the pia mater and arachnoid membrane. Air was also seen in the vessels of the brain, the substance of which appeared of a darker colour than natural.

That pus when mingled with the blood is capable of producing

<sup>1</sup> Gendrin, *Hist. des Inflamm.* tom. ii. p. 24.

<sup>2</sup> Müller, p. 755.

<sup>3</sup> *Ibid.*

great commotion in the system, has been proved by Mr. Gulliver, who has lately paid much attention to the state of the blood in inflammatory diseases, and to the effects resulting from introduction of matter into the circulation. In an important paper by him, read at a meeting of the Royal Society on the 14th of June, 1838, he detailed many experiments made on this subject, and informs us of the conclusion derived from his experience that pus can be detected "in almost every instance, either of extensive suppuration or great inflammatory swelling, without a visible deposition of it in any of the textures of the body." In several experiments made by the injection of it into the veins, the pleura, or the peritoneum of animals, a febrile state was quickly excited, proving fatal in many instances: pus, however, was found mixed with the blood in every case in which that fluid was analysed or examined. Mr. Gulliver also mentions that it is very easy to see the globules when mixed with the blood, the addition of a little water and a good microscope being all that is necessary for their detection. In his researches is contained a confirmation of the ideas previously entertained by Dance and others,<sup>1</sup> with the additional advantage, however, of having the means pointed out, by which his conclusions may be tested and verified,<sup>2</sup> but in experiments by injecting pus from the human body into the veins of dogs, the size of the globules and the irritation which must consequently arise should carefully be taken into consideration.

Should the position then be tenable, that many of the phenomena observed in typhus arise from inflammation of the minuter vessels, probably the veins, and from the consequent circulation of the different fluids secreted by such inflammation; and should the arguments from analogy to strengthen my assertions be admitted as conclusive, an important elucidation of the consequences observed in that disease is afforded; and as the progress of the exanthemata conforms in many respects with that of typhus, other fevers of the same species may derive a corresponding explanation; an inflammatory condition and an excitement of the whole system take place, which render every part of the body liable to disturbed action.

The peculiar course and different order of the symptoms observed in the various eruptive fevers show that there is some modification in the virus which produces each, as they distinctly generate their own kind; still they may have some processes in common, others they share with inflammation in general. To follow these ideas would be foreign to my present purpose, although a topic of the deepest interest; it will be enough for me to endeavour to elucidate some of those points which on the one hand connect typhus with similar diseases, and on the other render it distinct. A few words will now be said upon the circulation.

<sup>1</sup> Archives Générales de Médecine, tom. xxiii. xix.

<sup>2</sup> Phil. Mag. vol. xiii. No. 81, September, 1838, on Suppuration.

## STATE OF THE PULSE.

In many cases of typhus, the condition of the circulating system as indicated by the pulse is very remarkable, the contractions of the heart being irregular and intermittent, with something unusual and striking in the flow of blood through the arteries. Of this peculiarity notice is taken by almost all the writers to whose works upon this subject we have referred. Huxham says the pulse is *inordinatus*. Hildenbrand compares the movement of the blood to ebullition; Bateman speaks of it as fluent, and as passing like a stream under the finger. These authors, however, merely show their observation of its existence, without hazarding any suggestions as to its cause, it may therefore seem presumptuous in me to make any attempt of the kind; but without advancing any new theory, it may be instructive to see what light physiology can bring to bear on the subject, and to inquire into those conditions of the system in which similar effects have been observed.

In some cases of this disorder the number of the heart's pulsations is the same as that of persons in health, in some it is much more, in others much less; being sixty in one of my cases, in another only fifty-six, and I have met with it still lower, but it will sometimes mount up to 150 and even more—very frequently to 140. M. Chomel relates that in one instance the pulse was only forty in a minute. Dr. Bateman found it in one case, which terminated fatally, at first 190, afterwards 250; the beats, he observes, were quite distinct, and he was sure of his accuracy, as they were counted both by the apothecary in attendance and by himself. Before making any suggestion as to the cause of these symptoms, the condition of the heart itself must be first ascertained; but though the muscular structure of this organ has after protracted cases been found lax and softened like the other tissues, still it does not exhibit sufficient change to account for its disturbed and eccentric action. We next turn to the brain and spine for an explanation of the anomalies presented by the vascular system, knowing as we do the intimate sympathy between the two nervous centres and the heart: this connection is, undoubtedly, one of the means by which the circulation can be influenced, but there are also other powers which equally control it, and accelerate or retard the flow of blood. It is unnecessary to do more than merely allude to the well known facts that the brain and spine are not immediately essential to the heart's movement, the alternation of action and repose in which Mr. Mayo concludes to be natural to its fibre, or to be the immediate result of its structure.<sup>1</sup>

Dr. Wilson Philip has proved by experiment that the heart's action is independent of the brain or spinal marrow, but he remarks that he could never by chemical or mechanical agents, except by

<sup>1</sup> Mayo's *Physiol.* p. 46.



crushing the brain or spine, excite any irregularity of action in the bloodvessels; pulsation in them was indeed rendered more or less powerful, but its regularity remained always undisturbed.<sup>1</sup> He also observes, that various agents applied to the brain or spine are capable of influencing the rapidity of the circulation; this shows us how injuries of the brain may affect the pulse: pressure has been noticed by Sir B. Brodie, to render less forcible the contractions of the heart, but not to produce arterial interruption: concussion on the contrary renders the pulse intermitting, irregular, feeble, and perhaps scarcely perceptible.<sup>2</sup> Certain inflammatory conditions of the membranes are also shown, by Dr. Abercrombie, to affect materially the circulating system. Injury of the brain, therefore, may if present, be one cause of the disturbance. But it is not with the brain alone that the heart is connected by sympathy; for "not only the brain and spinal chord, but all the organs in their state of vital action react upon the sympathetic nerve through the medium of the nervous fibrils accompanying the bloodvessels."<sup>3</sup> Hence, then we see how powerful local injury in any part may at once influence the organs of circulation. I have quoted two cases<sup>4</sup> in which it became irregular at the same time that inflammation was set up in the lungs or abdomen. The sympathy between different parts must always be borne in mind in the investigation of any case of typhus, as without this it is by no means easy to affix the proper value to the symptoms exhibited by any viscus: the brain and heart are each sensitive of all that goes wrong in the system, each probably capable of being influenced separately, yet mutually dependent upon each other. From what we see of the causes which render the action of the heart irregular, (which are always injuries, or impressions of a serious nature and depressing kind,) we may conclude that in typhus a very powerful influence is in operation, an influence which seems on other occasions, as we may presume it is in this, a salutary check upon the heart's power, which if even of a natural degree, might prove injurious to the brain or other organs. I shall merely add further, in reference to the influence of the sympathetic, that Muller considers "the modifications which its minute radicles undergo from violent local disease and the reaction of these modifications on the central parts of the sympathetic system, the cardiac nerves and plexuses, as well as on the brain and spinal chord, seem to have a main share in the phenomena which we call fever."<sup>5</sup> This leads me to the last of my present topics, the state of the nervous system in typhus, first observing that an affection of the pulse analogous to that in the disease we are now considering, has been observed in some of the more formidable varieties of scarlet fever.<sup>6</sup>

<sup>1</sup> Wilson Philip, p. 82.

<sup>2</sup> Müller, p. 198.

<sup>3</sup> Müller, p. 198.

<sup>4</sup> Brodie, Med. Chi. Trans. vol. xiv. p. 375.

<sup>5</sup> No. 51, 52.

<sup>6</sup> Willan, p. 140.

## NERVOUS SYMPTOMS.

An accurate review of the state of the nervous system in typhus, would involve at the same time an investigation of all the chief diseases of the brain, as we find in the classification of Dr. Bright, that the principal causes of cerebral affections are irritation, pressure, inflammation, and inanition,<sup>1</sup> and this fever presents all the symptoms of these various disturbances. We see signs of inflammation of the meninges in its various forms, characterised by watchfulness, headache, suffusion of the eyes, or maniacal delirium, ushered in either by a sudden attack of convulsions or by loss of memory, with pain in the neck and limbs, and a peculiarity in the pulse, which at first is slow and varying, but finally extremely frequent. Congestion of the vessels, effusion of serum, lymph, and pus, the consequences of inflammatory action, appear in company with symptoms both of pressure and irritability; the former seen in headache, vertigo, lethargy, and coma, the latter in mental excitement, unattended by bodily disturbance.

We have frequently to combat with inanition coming on very late in the disease, and patients who have passed successfully through all the early stages will occasionally sink at last from the effect of mere debility. The symptoms referable to the head are some of the most urgent, constant, and important that arise; the disease, indeed, commences with more decided affection of this than of any other organ, and it is here, I believe, that the morbid changes of this most formidable malady begin. It is not, however, my intention to enter into all the alterations of the brain, but merely to investigate a few of the peculiarities in typhus, which appear to originate with the head.

Gathering illustration from the phenomena, and knowledge from the treatment, of analogous injuries in other complaints, I shall now consider the symptoms of delirium, muscular tremors, deafness, and the state like mania. The discoveries of modern pathologists warrant our coming to the conclusion that furious delirium and tremors of the limbs arise from the same cause, namely irritation in the membranes of the brain. Sir B. Brodie observes, that "there seems reason to believe that furious delirium and convulsions occur after an injury of the head, under nearly parallel circumstances. The former symptom, like the latter, may, he says, be produced by pressure on the brain, not however by such a degree of pressure as threatens completely to annihilate the functions of that organ, but by that smaller degree of pressure which operates merely as a source of irritation."<sup>2</sup> A similar state is brought on by the abuse of alcohol, nor is a source of irritation wanting in cases of typhus, namely arachnitis, or rather inflammation of the pia mater, attended

<sup>1</sup> Bright, Medical Reports, vol. ii. p. 1.

<sup>2</sup> Med. Chi. Trans. vol. xiv. p. 376.

by effusion. In the cases illustrative of Sir B. Brodie's opinion, irritation was produced by effusion of blood or spiculæ of bone. In real delirium tremens, as also in typhus, it is caused by serum, which with pus or lymph, is often poured out in the latter fever upon the outer portion of the brain. It is barely necessary to add that the excitement and its consequences show the nature of the disturbance to be that of active inflammation.

Many cases of affection of the head with coma, have been accompanied by effusion at the base of the brain, but my own experience does not warrant me in concluding that tremors and furious delirium arise solely from irritation of the hemispheres and anterior parts, or that stupor then only appears when the base is the seat of some morbid change.

Deafness is one of the most constant symptoms; it comes on in many cases early, continues for a long time, is frequently followed by suppuration, but almost always subsides on recovery. When we see so many signs in typhus, which indicate mischief in the brain, and often find on examination after death unequivocal traces of inflammation in the membranes of that organ, we might be inclined to ascribe want of hearing to some organic change within the cranium. But yet there are many circumstances which militate against such a conclusion. For cases not unfrequently occur of partial, nay even of complete deafness, whilst the head remains free from pain, the mind clear, the memory good, and the countenance intelligent. This anomaly has not been overlooked by M. Louis, who attributes it, and I think rightly, to inflammation of the meatus externus of the ear, and not to any internal alteration of organic structure.

The affection of the intellect in patients labouring under typhus, is singularly curious and almost peculiar to that fever: they get into a state of the highest nervous excitement, are full of apprehension, and suspicious of those around them, charge the attendants with intention of destroying them, and refuse to take medicine from a fear of poison: they exhibit apprehension of imaginary danger or anxiety for self-destruction, and unless carefully watched will throw themselves headlong out of a window, or find other means of accomplishing suicide. There is in most the greatest despondency, in others, however, though very rarely, an unusual degree of hilarity. In this fever, what are called the higher faculties of the mind are less affected than the lower: judgment and power of connected reasoning constantly remain when the memory has entirely gone. Hildenbrand states, that being in this condition he conversed about himself with his medical attendants, and made sensible suggestions upon the treatment of his own case; there is, indeed, a connection in the answers of typhus patients with the questions put to them, which is often extraordinary, though they afterwards have not the slightest recollection of what has passed, nor sometimes whom they have seen, though they recognised acquaintances at the time. The nervous system exhibits peculiarities as well during convalescence

as in the earlier periods of the disease ; this will appear from perusing the following illustrations.

CASE LIII.— *Where a peculiar delusion occurred during the early symptoms.*

Margaret Halley, aged 26, was admitted into St. Bartholomew's Hospital on the 8th of June, 1838. Her memory was so completely gone that no connected account of her illness could be learned from her. Her pulse was extremely feeble, her tongue furred and dry, her skin covered with small, dusky, red spots. She was reported to have been ill ten days. Although the symptoms were serious, yet her aspect was more peculiar than indicative of mortal ailment. There was a singularly fixed look about her, a strange tranquillity of manner, and an unwillingness to answer questions, which rendered her case distinct : at length the reason for her taciturnity was found out ; she believed that she was already dead, that she had been so indeed for many days, and her constant request to be buried was impressive and painful. In this condition she remained stationary for about ten days, when she began to improve. The idea of being a corpse gradually departed, and she became convalescent and well.

CASE LIV.— *With mental derangement remaining after febrile action had ceased, but gradually and completely subsiding.*

Hannah Spelman, aged 19, a servant, came into St. Bartholomew's Hospital, on the 29th of January, 1838 ; she had been ill a fortnight, her complaints began with shivering, followed by flushing, pain in the head, and vertigo. About five days before her admission she became delirious, and continued so up to the time when she was brought to the hospital. Her state was then as follows :—countenance flushed and anxious, eye bright, conjunctiva suffused, pain in the abdomen increased by pressure, bowels constipated, thirst excessive, skin hot and dry, tongue dry and furred, pulse feeble, 96. There was great nervous excitement about her, but she answered questions rationally and well. On the 29th she was so noisy and furious as to disturb the whole ward, to alarm the other patients, and to render it necessary that she should be removed to a separate room : she fancied that the nurses were bent upon doing her injury. Her answers to questions were pertinent, but she muttered and talked incoherently when her attention was not excited by being spoken to. She continued nearly in the same state for a fortnight, her evacuations during which period were passed involuntarily. After this the febrile symptoms subsided. Her skin, pulse, and tongue returned to their natural and healthy condition, but she obtained very little sleep at night ; her looks were wild, and her actions so little under the control of reason, that it was necessary to employ restraint to prevent her from doing injury

to herself or others, as also from tearing her bed-clothes. After some weeks, however, she gradually but completely recovered, so as to be able to leave the hospital free from any bodily or mental ailment.

CASE LV.—*With temporary delusion during convalescence.*

Mary Anne Collins, aged 13, whose mother and sister were both at the same time ill with typhus fever, was admitted into St. Bartholomew's Hospital, on the 24th of August, 1837. She had been unwell a week. Shivering, pain in the head, thirst, and loss of appetite had been the first symptoms of her attack; those on her admission were a heavy look, great thirst, pain in the head, suffusion of the conjunctiva of the eye, tongue moist and thickly furred, skin hot and spotted with a rash, pulse soft, 120. On the 25th the tongue was furred, dry, and brown in the centre. The pain in the head was worse, she was drowsy, and the pupil of the eye did not readily contract. On the 26th the rash was more abundant, she complained of pain in the chest, but nothing morbid could be detected by auscultation. On the 27th she was free from pain, but there was some ronchus in the lungs. She then began to improve, and on the 6th of September seemed well. A day or two afterwards, however, she appeared strange in manner, singularly calm, her countenance did not exhibit any animation, the features were fixed, and when spoken to, she answered in a few words without regarding or turning towards the person who addressed her; she fancied for several days that persons whom she knew and accurately described had been to see her, whereas no such visitors had been in the ward, nor could she by any possibility have seen them. This condition subsided in a few days, and she was discharged on the 12th of September.

CASE LVI.—*Terminating in temporary insanity.*

Ann Taylor, aged 22, the wife of a patient with typhus, was received into St. Bartholomew's Hospital, on the 19th of June, 1837, having been ill four days with pain and giddiness of the head. When admitted, she had pain in the head and back, suffusion of the eyes, dulness of the countenance, numerous small red spots on the trunk and extremities, relaxed bowels, watery evacuations, a hot dry skin, and a furred tongue.

On the 21st, hemorrhage from the uterus came on, she passed a restless night, and on the 22d complained of an increase of pain in the head; at 12 o'clock on the 23d, her mind began to wander; on the 27th she was delirious, and talked a great deal. On the 28th her pulse was 140, though with little power, but on the 30th it sank to 80, and she became calm and collected, and continued so till the 2d of July, when she was again restless, and so much disposed to violence as to require restraint, and continued in a state

of mania for the remainder of the month; she slept little, being constantly talking or singing, yet her skin, pulse and tongue were in a natural state, her aspect not unhealthy, and her appetite good: on the 30th of September she was removed by her friends, her bodily health being restored, but her mind remaining disturbed.

After leaving the hospital, this patient was removed to a lunatic asylum, where she remained some months, and then miscarried; after this she returned home convalescent, and was in perfect health on the 20th of July, 1838.

It will not be uninteresting or without its use to refer to a case or two, where, during delirium, patients have effected their own destruction. Rasori mentions one, that of a young soldier who threw himself out of window and was killed. No other explanation of the following attempt at suicide, which unfortunately proved successful, could be found, than that a sudden inclination to destroy himself had come over the patient during delirium.

#### CASE LVII.—*Self destruction during fever.*

Johan Thorberg was admitted on board the Seaman's Hospital, on the 11th of August, 1831. He was feverish, and had no appetite, pulse 100. There were but slight symptoms of ailment about him, and he was put on a simple fever plan. On the following day, without the least apparent cause, finding himself unobserved, he leaped through the hawse-hole at 9 A. M. and was drowned.

The notes of a case admitted under my care into St. Bartholomew's Hospital have unfortunately been misplaced, which refer to a man about 40 years of age, who was taken in labouring under all the well-marked signs of the prevailing typhus. When I first saw him, he was lying on his back, strapped down, being delirious, yet returning rational answers to every question that was put to him. He appeared to improve for a few days, when great tremors of the limbs came on, with disturbance of the sensorium, and tympanitis of the abdomen. He died on the sixth day from the time of his admission. The account which we received from those who brought him was, that he had thrown himself from a two-pair of stairs window into a paved yard, and was found sitting up apparently little hurt by his fall. The account of what had happened no doubt was substantially correct, as, on examination after death, his liver was discovered to have been ruptured; a large rent was found in its substance, with a considerable clot of blood in the abdomen. The case was interesting, as illustrating the comparatively slight constitutional symptoms which result when the brain is in a state of excitement, and the length of time which a person may live after a serious local injury. It will not, I think, be disputed that the circulation of the brain is disturbed in typhus, as the changes after death bear out what is indicated by the symptoms during life. Post mortem examinations disclose, in many cases, considerable vascularity of the meninges—in short, decided inflammation of the mem-

branes, but no doubt of the modified character which is met with elsewhere. This, however, must have some effect upon the circulation within the brain, must impede, or at least essentially interfere with its force and regularity. An attack of irritation of the pia mater, should the vessels be but simply enlarged, if arising on a sudden, must necessarily produce great disturbance, both directly and sympathetically. Should the irritation go on to positive inflammation, there will be still further enlargement of the diameter of the vessels, and an impediment to the passage of their contents; the heart, sympathising with the brain, will send less blood in that direction: and thus we are furnished with an explanation of two important symptoms in typhus—utter prostration of strength, and great cerebral excitement.

The head is found in all cases to be more or less the object of attack; we know indeed this to be the organ most completely disturbed in the course of the fever, and, as far as we can judge by symptoms, it is the part which is primarily affected. What pathological investigation can discover as to the exact condition of the brain in cases of disturbed function after fever has subsided, I am happy to say is unknown to me; having as yet never seen a patient who has sunk under these circumstances. We may, however, fairly presume that the excitement arises from increased vascularity, as it resembles a condition in a class of cases related by Dr. Abercrombie, which, he observes, are likely to be mistaken for mania or hysteria. There is a similar state of the brain when violent mental emotion of a depressing character is succeeded by proportionate excitement; or when cerebral disturbance comes on after parturition. When this condition arises idiopathically, it very generally proves rapidly fatal, but in all these cases post mortem examination can detect nothing but increased vascularity.<sup>1</sup>

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#### ON THE MORBID CHANGES IN TYPHUS.

Much has been said by anticipation on this part of the subject; and in quoting cases to show the consequences of the infection of typhus, as displayed in the inflammation of internal as well as external parts, in the formation of matter, and in the ulceration of mucous membranes, it may appear that this head has already been fully considered. Still some topics remain which belong appropriately to this place, and have not yet been mentioned.

It is stated by Morgagni, that "of all diseases, fever presents itself under the greatest diversity of form. In most of the cases selected from the papers of Valsalva, it may excite surprise, that, after violent febrile affections, scarcely any morbid appearance is discoverable which bears a proportion to their violence, and sometimes there has

<sup>1</sup> Abercrombie on Disease of the Brain.

been no apparent lesion."<sup>1</sup> Typhus fever is by no means an exception to this general rule, although it not unfrequently happens that there is injury to a great extent. I have met with several cases in which no morbid change was perceptible to our ordinary methods of investigation. The remarks of Morgagni are repeated by Dr. Armstrong, who says, "that in some cases of typhus the morbid appearances are not sufficient to account for the unfavourable issue; and we are almost compelled to infer that it chiefly depends upon an actual exhaustion of the vital principle, induced by the preceding excitation." And again: "Typhus undoubtedly begins and terminates without topical inflammation."

While the disorder will thus, on the one hand, run its fatal course, without leaving any obvious track to mark its progress, and as it were to prove its identity; it exhibits, on the other hand, a series of changes and disorganisations, which show but too clearly that no portion of our frame is secure from its reckless invasion. My object, however, is not to enter into a lengthened detail of morbid changes; nor to investigate minutely the appearance assumed by each in its progress. Such a recital can be neither necessary nor instructive, as many of these changes are the result of one process, have a common cause for their production, and tend to similar results, varied merely by the local circumstances; inflammation in short, is excited in different parts. My object will be to class these changes in large groups, and to treat of them generally rather than individually, arranging them under the heads of vascular system, glandular structure, membranous tissues, and parenchyma of organs.

The effect upon the vascular system is placed first in this series of changes, because here I believe is to be found the first link of that chain of events which finally becomes so entangled and so difficult to unravel, without the regular succession is clearly understood, and the dependence of one part upon the other is proved and admitted. Under the head of the vascular system I shall place the blood, as well as its vessels; and the blood will be noticed, first, with the view of ascertaining how far we are justified in concluding that the primary symptoms in typhus are due to changes in this fluid, and, secondly, as to what is the state of our knowledge with respect to its actual condition.

The poison of typhus, as I have endeavoured to prove, occasions irritation of the minute bloodvessels; and a stimulus similar in its operation, but different in itself, produces, as I imagine, the other exanthemata. The poison which excites them may enter the blood by inhalation, by absorption, or the blood may be contaminated by a wound; but this alone is not enough to give rise to typhus, or any of the eruptive diseases. Something more is required: there must be a local impression for its commencement; this must be upon the inner lining of vessels, for how else can the consequent actions be produced? such we know to be the result of other stimulants, and

<sup>1</sup> Cooke's Morgagni, Lond. 8vo, vol. ii. p. 581.



the consequences are all confirmatory of such a beginning. We see this illustrated in inoculation, in vaccination, and we know by the action induced whether the disease has taken or not. Many at the present day are disposed to consider alteration in the fluids as the sole cause of the phenomena witnessed in disease; by others, on the contrary, the fluids are still looked upon as nearly inert. M. Broussais indeed maintains that we can only act on the fluids by first modifying the action of the solids, and hence that no good can result by analysing the blood, and ascertaining its peculiarities in typhus. In the specific infectious diseases, measles, small-pox, and scarlet fever, the system appears incapable of receiving the poison more than once during life. Now, if the alteration of the circulating fluids were the only cause, and chemical changes there induced the occasion of the after symptoms, we might surely expect to find the fluids capable of such an alteration many times during life. The fluids must be perpetually changing, if not by the ordinary processes of nutrition, secretion, and excretion, at least after large depletions and repeated losses of blood by different causes, such as spontaneous hæmorrhage, venesection, or cupping: and blood thus renewed would be capable of receiving the same chemical changes again and again; but the nervous system is clearly altered in its sensibility to certain stimuli. We well know how different is the susceptibility of the nerves at different periods of life, and we can far more readily suppose that the infection of small-pox fails when the system has been once infected, from inability of the nerves to receive the necessary impression, than that the new blood should be insensible to chemical agency. Another argument in favour of the belief that the constitutional symptoms arise from an impression on the vessels, and not merely from changes in the fluids, is to be found in the fact that the system may be fully saturated with a poison, and yet exhibit no external symptoms of its presence, and that the fluids may be so impregnated as to convey it to others, and yet the person primarily infected remain unconscious of its existence. There are many known instances of persons who have died at advanced ages from natural decay, induced solely by time, who never had small-pox, although their systems were many times polluted with the virus by inoculation. Among my own acquaintances is a gentleman now 70 years of age, who has hitherto resisted all infection by small-pox and vaccination, both natural and artificial.

We know that in some diseases one attack serves as a protection against another. How can we explain this, except by supposing that the solids are insensible to the stimulus. If the changes were in the blood alone, we must conclude that this fluid constantly renewed, as we know it is, must have properties imparted to it which seem more properly to belong to the nerves. That the system may be charged with this virus, and yet not exhibit its effects, is shown by the well-authenticated history of a lady, who, being in the family-way, was exposed to the contagion of small-pox, but was not affected at the time, except by disgust at the sight of a person suffering

under that loathsome disease. She shortly afterwards gave birth to an infant, which went through all the regular stages of small-pox. This case well exemplifies the possibility of a person being infected, but not attacked, and yet capable of conveying a disease to another by means of the circulating fluids. Similar instances are related in Duncan's Medical Commentaries.<sup>1</sup> The case of the lady just alluded to is related by Dr. Jenner himself in the first volume of the Medico-Chirurgical Transactions, in which he mentions two other analogous incidents. M. Rayet gives us corresponding instances, and quotes cases in which the fœtus has been born covered with well-marked variolous pustules. In these instances we find the blood of the mother impregnated, yet producing no effect in a system rendered insusceptible by former attacks.

What takes place when inoculation is practised would confirm the idea that an irritation of the vessels precedes the general symptoms; for the consequences induced by the introduction of the poison into the blood is not immediate, as when a chemical change has been induced in it, or when any powerful impression has acted upon the nervous system. And, indeed, we know that when there has been an absorption of poison, positive local changes do actually occur; for instance, when by vaccination the virus of cowpock has been introduced into the arm, "the vaccinated part presents no appearance of change till the third and fourth day; the pustule enlarges on the sixth, seventh, eighth and ninth day; on the tenth the turgid circumference of the pustule continues to spread, the areola acquires a diameter of from one to two lines, and the part of the skin upon which it is developed occasionally becomes indurated and very much swelled. \* \* \* The person vaccinated experiences a biting heat and violent pruritus in the part affected, and a sense of weight and pain, which occasionally extends to the axillary glands and the whole of the arm."<sup>2</sup> Here the local irritation clearly precedes the constitutional disturbance; some degree of fever, with restlessness, and acceleration of pulse, subsequently ensues.

So also in the inoculation for small-pox, on the second day a stain appears about the incision; on the third there is a papular elevation of the cuticle; on the fourth a vesicle is formed with a depressed centre, and a sense of itching is perceptible in the part; on the following day (the sixth) pain and stiffness are felt in the axilla; but on the eighth day the constitutional symptoms usually begin to appear, with rigors, headache, &c. Besides a contamination of the blood produced by the vaccine or variolous poison, there must also, I imagine, be irritation of the vessels, either veins or lymphatics, as otherwise it is difficult to account for the swellings in the arm and axilla, and the local irritation, which invariably precede disturbance of the system.

The almost certain order of the phenomena in typhus shows that the chief seats of the disease are involved by it in regular succession.

<sup>1</sup> Vol. xix. p. 260.

<sup>2</sup> Rayet, p. 447.

There is, first, an affection of the head, then of the skin, afterwards of the lungs, and, lastly, of the bowels; which regular implication of different organs would lead to the inference that irritation rather travels through the vessels, than is excited by an impression from the blood, which would act nearly simultaneously on all parts of the vascular parietes. It is scarcely possible but that medical men, students, nurses, and others in attendance upon typhus patients, must almost daily have their systems saturated with the infection. Dr. Heygarth supposes that the distance at which diseases can be communicated by infection extends only to a few yards; but even this distance can never be kept between a medical man and his patient. The pulse must be felt, the state of the abdomen ascertained by pressure, percussion of the chest and even auscultation must be performed, and that not only at the back, but in front, and as well at the lower as the upper lobes of the lungs; and here again anxiety to arrive at truth, and willingness to bring all our own senses to aid the investigation, induces us often to throw aside the stethoscope, and, that the ear may not possibly be deceived, it is at once brought into contact with the body, separated from it only by a fold of linen. Since then the hand of the practitioner is actually in contact with the skin of the sick, since he can scarcely avoid inhaling breath just emitted from the disordered lungs, and remains at each visit many minutes in the vicinity of the patient's bed, there can be no shadow of a doubt but that his system must become charged with the virus; especially when he examines not one case a day, but many, not on one day alone, but every day for weeks, for months, nay, for years together. Stating then the facts respecting the part which the blood performs in the earlier periods, we find that the poison may, and probably does, enter the system with the breath, and so comes in contact with the minuter vessels: if they be insensible, then no mischief results, and, unless local change takes place, the poison will be ejected from the system, for there does not seem any accumulation, at least as far as I have been enabled to observe. One single impression or exposure to the contagion of typhus is just as likely to produce a severe attack as a constant attendance upon those labouring under it; and without a decided effect, we do not find any sign of disorder; there does not seem any such condition induced as would result from a slow action, or such as arises from exposure to noxious vegetable exhalations, the effect of which we see depicted in the countenances of those exposed to the continued action of malarious poison. There appears no immediate state between being free from typhus and being decidedly infected with it. The period of incubation is sometimes indeed protracted, but not often, and even then a decided feeling of illness is experienced, although the person is yet able to pursue his ordinary avocations.

I know not how to explain the fact that the course of this disease can at once be cut short by medicine, unless we are willing to admit the immediate agency of the nervous system. Emetics administered, in cases which I had every reason to believe would have

proved typhus, seemed to avert that disease in 1831.<sup>1</sup> Dr. Currie, whose authority will not be questioned, says that he succeeded in checking that fever in twenty-six cases by the cold affusion, when it broke out among the men of the thirtieth regiment, quartered at Liverpool in the year 1792,<sup>2</sup> and he relates a case in which scarlatina was put an end to by a similar mode of treatment, even without the appearance of the rash.<sup>3</sup> In Dr. Marsh's treatise on the origin of fever, it is stated, that hooping cough has thus received an immediate check by the administration of an emetic; and allusion is also made to the case of small-pox thus suddenly arrested.<sup>4</sup> Dr. Bateman remarks that he was able to reduce this febris maligna to a febricula of five or six days by the use of emetics, which in two cases put an immediate stop to the febrile symptoms.<sup>5</sup>

It is not easy to explain the effect of mental emotion in apparently producing this disease, unless we are willing to admit the existence of a change in the nervous system, the part of our frame destined to the reception of impressions: the action of stimuli in enabling persons to resist infection, and the *modus operandi* of certain debilitating means which invite it, are equally curious and inexplicable, except upon such an hypothesis. Admitting then that the blood becomes infected or diseased by the admixture of the germ of the disorder in the case of eruptive fevers, and that by this means the poison is brought into contact with parts sensible to the impression, I conceive that it is essential for the production of the phenomena of these disorders, that disturbed vascular action should be produced, which again would be dependent upon nervous influence.

Leaving now this point, which will perhaps remain a source of medical schism to be discussed by theorists, it is incumbent upon me briefly to touch upon the actual changes in the blood and the vessels of circulation.

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### CHANGES IN THE BLOOD.

Although difference of opinion may exist as to the part of the system first affected in typhus, and though doubt may be entertained of an essential change in the fluids preceding local disturbance or the constitutional impression, yet few will hesitate to allow, that in the progress of typhus the blood undergoes a material alteration. In the present state of our knowledge concerning the result of injuries to nerves, we cannot but suppose that an agent powerful enough to depress the nervous system, and seriously to disturb its functions, must also in a great degree affect the fluids, either directly by the

<sup>1</sup> Account of Typhus, by the author, p. 8.

<sup>2</sup> Currie's Med. Rep. vol. i. p. 15.

<sup>3</sup> *Ibid.* p. 64.

<sup>4</sup> Marsh on the Origin of Fever, *Dubl. Hosp. Rep.* vol. iv. p. 532.

<sup>5</sup> Bateman, p. 93.

influence of the nerves over them,<sup>1</sup> or indirectly by an alteration in the secretions.<sup>2</sup> The blood consequently experiences a very early and essential change; and although inflammatory symptoms are present, yet when drawn from the veins, it is materially different from that which is usually found in the first stage of inflammatory fever—it certainly in many cases does not buff, or cup; sometimes it does not coagulate; at other times it appears fluid, and readily allows the red particles to subside, and occasionally is completely diffluent: all which appearances are quite contrary to what we find in acute inflammation. Now we are aware that the coagulation depends upon the presence of fibrine; and that inflammatory blood contains an unusual proportion of this principle;<sup>3</sup> which is not only supposed to be in excessive,<sup>4</sup> but also to possess an increase in its plastic property.<sup>5</sup> Hence the conclusion necessarily follows, that the constituent upon which the coagulation depends, is either much diminished or extremely modified. Authorities have already been quoted to show how the blood may be deteriorated from many causes plainly in operation during this fever; and should there be any foundation for the supposition that disordered secretions are poured into the blood from the vessels themselves, we shall find no difficulty in amply accounting for its unhealthy state.

It is only by the supposition that some change of an injurious tendency takes place in the circulating fluids themselves, that we can offer an explanation of the symptoms by no means uncommon in certain cases during the prevalence of epidemic typhus. The cases to which this allusion refers, are those in which a fatal termination takes place about the third week, when the patients for a considerable time have been in a lethargic state, but are conscious when roused, and declare themselves free from pain. No one organ appears to suffer in an essential degree; the skin is perhaps hotter than natural, the pulse feeble, the tongue dry, hard, and black; the breathing may possibly be somewhat hurried, but auscultation can detect no disease of the lungs, nor is there any indication of essential mischief in the abdomen. Patients in this form of typhus will often take nourishment, and occasionally exhibit signs of amendment. The fatal termination of these cases is very mortifying, as it is impossible to avoid entertaining expectation that they will terminate in recovery; there seems indeed no reason for an unsuccessful result; there are no symptoms of essential organic change to occasion it; no great excitement to exhaust the powers of life; still a serious constitutional disorder is excited, which our remedies are unable to remove, and which the efforts of nature are obviously quite inadequate to oppose: nor do examinations post mortem, in

<sup>1</sup> Andral, i. 543.

<sup>2</sup> Ibid. 560.

<sup>3</sup> "The serum is more viscid, this arises from its containing nearly double the usual quantity of albumen which it did in the healthy state."—*Annals of Philosophy*, 1823. Gendrin, vol. ii. p. 442.

<sup>4</sup> Müller, 117.

<sup>5</sup> Carswell.—*Art.* "Inflammation."

these instances, throw any light upon the cause of death; no decided alteration points out one organ as the seat of changes incompatible with life: nay, as Morgagni has expressed it, there are few circumstances in fever more extraordinary than the frequent absence of any ostensible cause for death. Some essential alteration must however have been in progress during all the period of the disease, which tended so directly to a fatal result. What the exact changes in the blood are, is yet to be ascertained; but if not otherwise diseased, it is less disposed to coagulate, looser, and there are certain morbid alterations dependent upon its softened condition. Mons. Andral refers to it, distinctly, the enlarged and pulpy state of the spleen, which he considers to be one of the anatomical characteristics of continued fever, with what he calls adynamic symptoms. Mons. Louis found, that out of all his cases of typhus, the spleen was healthy in four cases only; in some it was five times its natural size, and of a red blackish or deep blue colour.<sup>1</sup>

This alteration in size and texture has been observed in the disorder of our own country; it may be detected if the left hypochondrium be examined during life, and is probably the cause of uneasiness complained of in that situation. The liver has been found soft, owing to the state of the blood,<sup>2</sup> and from the same cause the muscular structure of the heart becomes flaccid,<sup>3</sup> which change indeed will be generally perceived throughout all the tissues. To this disordered condition of the fluids may be attributed effusions of blood in the later stages of the disease. Hemorrhage very often takes place from the bowels, originating in an ulcerated portion of the intestine, but undoubtedly in many cases it arises from the vessels without any abrasion of surface. MM. Louis and Chomel have noticed that the muscular fibre is soft and without tone, but not the seat of hemorrhage as occasionally happens with us.

#### OF CHANGES IN THE VESSELS.

M. Louis states that in more than half the cases examined by him, the lining membrane of the heart was livid or violet coloured, and that the muscular structure exhibited the same appearance.<sup>4</sup> The inner coat of both arteries and veins is very often both in typhus and other essential fevers of a deep red colour. This in most cases proceeds from mere straining, but has been observed to arise as well when very intense inflammation has been excited, as when there has been some sort of dissolution of the blood.<sup>5</sup> We may in general refer this redness to the dyeing of the membranes

<sup>1</sup> Louis, p. 313, 323.

<sup>2</sup> Chomel, 267.

<sup>3</sup> *Precis d' Anat. Patholog.* vol. ii. p. 1, 420.

<sup>4</sup> Bichat, *Anat. Gen.* tom. 2, p. 160.

<sup>5</sup> Louis, p. 323.

by the colouring matter of the blood, for it is often found to be confined to situations where blood has remained in contact with the discoloured portion, and to be restricted to parts in a depending position. We are told, however, by Bichat, "that the redness of the arteries in some cases of fever cannot be referred to staining either from within or without, and he maintains that it must still be a question whether this should be considered as disease or not."<sup>1</sup> While thus the nature of appearances in the larger vessels is doubtful to those well qualified to judge of them, it will not be surprising that the alteration of minuter ones should be still more in obscurity. Inflammation, which is produced by irritation of the capillaries, is certainly often excited. Muller sums up its leading processes, by remarking that "the blood is attracted in increased quantity to a part in this state, and escapes from it with great difficulty;"<sup>2</sup> but he does not say what is the exact condition of the vessels themselves, nor how far the changes which take place in them are occasioned by action, if any, in their parietes. It may be appropriately observed, when offering a conjecture upon the condition of the vessels in any class of diseases, that much difference of opinion exists among physiologists as to the very first step in that most common process, inflammation; Muller imagines that when this is established, the circulation is slower, but Mr. Lawrence considers that "there is increased activity of the vessels of a part; yet not a state of increased activity merely, but increased activity altered in its mode."<sup>3</sup> Dr. W. Philip's opinion is that "the blood in the capillaries begins to move more slowly: these vessels in the same proportion suffering a degree of morbid distention: and this often goes on till they, by many times, exceed the healthy diameter, and the blood, in the most distended, ceases to move altogether."<sup>4</sup> Dr. Thomson, observes, "that the velocity of the blood, so far from being always diminished in inflamed vessels, is often increased, particularly in the commencement of inflammation: and that this increase of velocity may continue in the capillary vessels from the commencement to the termination of that state:" and further, "that a diminished velocity in the circulation through the inflamed capillary vessels may take place in the very commencement of inflammation, and may continue during the existence and progress of that state."<sup>5</sup> So great then being the difficulty of ascertaining the exact condition and rate of circulation in an important portion of the living system during reparation of the simplest injury, we cannot expect more clearly to demonstrate its operations in the highly complicated phenomena of fever. When, however, we see in exanthematous disorders, great turgescence of minuter vessels, we cannot but ascribe much of the disturbance of the circulation to

<sup>1</sup> Gendrin, *Hist. Anat. des Inflammat.* tom. 2. p. 6.

<sup>2</sup> Müller, p. 231.

<sup>3</sup> *Lectures on Surgery, Med. Gaz.* vol. v. p. 161.

<sup>4</sup> *On the Vital Functions*, p. 292.

<sup>5</sup> *On Inflammation*, p. 83.

their dilated state: this excitement, moreover, arises in membranes which are as important from their situation and office in some cases, as in others from their extent. Should the inner coats of vessels be secreting surfaces, they must necessarily, when in an inflamed condition, pour forth various fluids, which mingling with those previously circulating, will materially affect their properties and effects. An external agent or poison, admitted from without, provokes the exanthematous disorders, the minuter vessels are obviously and immediately excited, and we are entitled to suppose that all the consequences of this state will follow. What those consequences are, the analogy of similar organs will point out to us. What is the anatomical character of the lining of the arteries and veins? A serous membrane, or one nearly allied to it: such at least is the opinion of J. Cloquet,<sup>1</sup> Mayo,<sup>2</sup> and Meckel.<sup>3</sup> What must result from increased action in such a part? Undoubtedly the ready and abundant secretion of albuminous fluids, serum, lymph, or pus. In surgery, the result of inflammation of vessels is duly appreciated. Am I wrong in asserting that it is too little regarded in considering medically the causes of fever and general inflammatory disorders. Bichat, it is true, points out some differences between the lining membrane of the heart and bloodvessels and the serous membranes, one of which is brittleness; and notices some points of distinction in the lining membrane itself, in various parts of the vascular system, where, doubtless, important peculiarities exist. He then alludes to this membrane as a secreting organ, and expresses a "suspicion" that the fluid which is found lubricating it may be derived from the blood, and that when the opposite sides of the vascular tubes come in contact they form adhesion, not by effusion of lymph, but simply by the approximation of the membranes themselves.<sup>4</sup> We know, however, that all those secretions which serous membranes pour out, and which serve to characterise them, are furnished in abundance by the inner coating of arteries and veins, and that "of all textures the serous membranes are most prone to the effusion of liquor sanguinis."<sup>5</sup> Why then should we imagine that when a part is excited and inflamed by the small-pox virus, or other poison, the serous lining of the vessels is perfectly passive, seeing as we do how other sources of irritation make such membranes pour out their secretions in abundance. They generate pus and lymph in profusion when excited by external irritants, and there is nothing extravagant in supposing that poisons acting upon them may be attended with similar results. No doubt the observations of Bichat as to the different functions of various parts of this inner tunic of vessels are important and true; indeed, we know that the lining of arteries most readily yields fibrine, while serum and pus are most abundantly furnished by

<sup>1</sup> Cloquet, *Man. d' Anat. descrip.* Paris, 4to. 1825, p. 377.

<sup>2</sup> Mayo, *Physiology*, p. 48.

<sup>3</sup> Meckel, *Anat. Gen.* tom. i. p. 131.

<sup>4</sup> Bichat, *Anat. Gen.* tom. ii. p. 51.

<sup>5</sup> Müller, 415.



veins. In some disorders, nay, in inflammation itself, we have been informed that fibrine is found in great quantities.<sup>1</sup> Whence does the blood receive this supply? The lining membrane of the arteries may not be its source, but is capable of affording it. Let us see whether the ideas which I have ventured to suggest, can explain any of the hitherto puzzling phenomena of disorders where the albuminous principle is in excess: let us take rheumatism for an example. What are the leading features in this complaint? Are they not all the symptoms which would result from highly stimulating blood, or from inflammation rapidly changing its seat? Have we not the most copious effusion of fibrine? Is not the lining membrane of the heart one of its frequent seats? Is not the pericardium also very frequently lined with this effusion? Do we not find the valves of the aorta often coated with fibrinous deposits? The question may fairly be entertained, whether or not the vegetations found in this situation arise from exudation; it may be asserted that they are deposited by the blood itself when filling the valves, which for a time must remain motionless, turgid, and capable of receiving a deposit or sediment, while the distention and elasticity of the aorta are forcing back its contents and keeping the valves closed until the heart's next contraction. This argument, however, would apply to other valves besides those spoken of, while we know that these vegetations are seldom met with except at the entrance of the aorta. I have removed these growths with care, and candidly admit that I could not discover any irregularity of surface or vascularity of membrane beneath them, nor could I trace any continuity of vessels. But in the cases where this was done they were quite recent, and we know that it is not necessary that there should be redness of the serous membranes even when in a state of inflammation, as we see exemplified in one form of peritonitis, when "the peritoneum is quite pale."<sup>2</sup> But returning from this digression to my narrative, the next subject to be treated of is the

#### GLANDULAR SYSTEM.

Under the above head it is obvious that parts having various functions must be classed together, the parotid gland for instance, and the glands of the small intestines; the one furnishes an important secretion through pervious ducts, the others exhibit no obvious passage: but still, though differing from each other in structure, they are equally liable to organic changes, and may therefore be considered at the same time. The high authority of MM. Chomel, Louis, and Bretonneau, has been exerted to prove that the essential organic lesions in typhoid fever, arise from certain changes in the glandular follicles of the mucous membranes in the small intestines.

<sup>1</sup> Andral, i. p. 530.

<sup>2</sup> Gooch, on the Diseases of Women, p. 35.

Now I have already observed that inflammation of the intestinal canal, when accompanied by ulceration, is one of the causes of phlebitis, and gives rise to a train of symptoms which indicate presence of matter in the circulation; and here again I may express my belief, that many cases are looked upon as typhus, which arise, it is true, from irritation of the vessels, but differ in their origin and course from that infectious disease, which alone should be so designated. In my experience, inflammation of the glands of the intestines is by no means a constant accompaniment of that form of typhus fever which is commonly met with in our country; it does however, occasionally take place. Dr. Bateman, remarks, that there is one kind of diarrhœa which occasions a protracted disease, of which ulceration of the intestines is one of the consequences.<sup>1</sup> Dr. Abercrombie, Dr. Alison, Dr. Duncan, and many others, have noticed it in connection with fever. Dr. Bright has described and admirably depicted it. Hildenbrand observes, that pain in the abdomen comes on in the second stage, arising, as he says, from inflammation of the bowels, which is invariably present at this period of typhus. When it does occur with us the course it follows conforms accurately with the description of M. Chomel, who clearly fixes the commencement of the organic changes in the viscera upon the glandular portion of the intestinal canal. He observes that the alteration of structure in these parts follows a definite course, both in its beginning, advance, and also in its progress towards reparation. The glands chiefly affected are those of Peyer,<sup>2</sup> and those situated near the ileo-cæcal valve are the first to take on a disordered action. Ulceration of the intestines is consecutive upon the glandular disease, and this, extending upwards from the termination of the ilium, occupies a space of from two to eight feet. When recovery takes place, resolution begins in the part first affected, and reparation proceeds in the same order as the disease advanced. M. Louis states, that there are two forms of alteration in these patches of glands, one of which is characterised by a peculiar deposit which is absent in the other. In speaking of that variety where there is

<sup>1</sup> Bateman, page 46.

<sup>2</sup> The term Peyer glands is here used, as that is the common denomination of certain patches chiefly found at the lower part of the small intestine. Müller observes that the nature of these thickened, generally oval, patches of the mucous membrane has, up to the present time, been quite unknown; and he notices their increased importance from the morbid changes, suppuration, and ulceration, induced in them in typhoid fever attended by affection of the bowels. He then enters into their description, and states that besides the follicles of Lieberkuhn, and the villi found here as in other parts of the intestines, there are circular white spots, about a line in diameter, slightly raised, and that no secretion could be expressed from them. On rupturing the surface of one, a cavity of a corresponding size appeared, containing grayish matter, composed of granules smaller than the ordinary particles of mucus. The membrane which covered the cavity was extremely thin. It appears then that there are no large follicles with open mouths or cells in the patches of the so-called "Peyer's glands," but merely sacculi, of which the nature is unknown.—Müller, page 496.

no deposit, he says, that it exhibits various degrees: in the first place, the patches of glands and the mucous membrane in its immediate vicinity only present an exaggeration, as it were, of the natural structure, a distention of which is then induced with a slight softening and redness; this state is common, both to the mucous membrane and the cellular tissue. As the morbid changes advance, thickness and redness increase, the mucous and cellular tissue become so united that they cannot be afterwards separated; ulceration next takes place; this in some cases is superficial, the mucous membrane being only partially destroyed; in others, however, deep ulceration exists with total disorganisation: occasionally a whole collection of glands is destroyed by a single ulcer, many of which, in other instances, appear simultaneously, and consume the patch by their united efforts. When the mucous membrane has been removed by ulceration, the muscular becomes implicated, and finally the peritoneal coat is involved in the common destruction. The edges of the ulcer, which assumes a round or oval shape, are occasionally perpendicular, at other times slanting. The second form of the glandular affection differs from that above described in the mode of alteration of the sub-mucous tissue. In this variety a peculiar deposit is found, in addition to the simple inflammatory action, a pale or yellowish red unorganised substance, from two to three lines in thickness, is secreted. This effusion is poured out between the membranes; for M. Louis notices, that on making a perpendicular incision through them, the submucous tissue may be seen diverging so as to enclose it. To this last species he applies the term hard, to the first he gives the appellation soft.<sup>1</sup>

The membrane over the patches of glands sometimes puts on an appearance termed pinked (*gaufrée*), which has been declared peculiar to typhus, but this again is said to be by no means invariably present.<sup>2</sup> Considerable doubt arose at first in my mind as to whether the disorder described by MM. Louis and Chomel, under the name "maladie typhoïde," could be that which Hildenbrand has denominated typhus. Can a fever almost invariably presenting in one country ulceration of the bowels, be very nearly free from it in another? Are France and England so unlike in climate and mode of living, as sufficiently to account for this difference? But the impression on my mind, arising from the correspondence between the leading features, as already detailed, is that the two fevers are identical. From what MM. Louis and Chomel have themselves advanced concerning the affection of the bowels, statements may be found in opposition to the views which these writers have taken on the subject. It is with great deference that I venture to put forth an argument against the assertion of such authority, that "certain changes in the glands, producing ulceration in the mucous membrane of the bowels, commence with the disease, are inseparable from its existence, and that all other changes are consecutive to

<sup>1</sup> Louis, *Recherches*, pp. 198, 207, 449.

<sup>2</sup> Chomel, p. 222.

this." Now typhoid symptoms coming on during inflammation of the bowels, I should consider to arise from phlebitis and not from typhus; but I am induced to think that the cases described by M. Louis, were typhus, and not inflammation of the bowels, because he admits that in some instances there were the symptoms of typhus, but that the pathognomonic alteration of the mucous membrane of the intestines was absent: to this fever he gives the name of false typhus (*typhus simulée*).<sup>1</sup> As my object is to be as concise as possible, it will only be observed in addition that M. Louis furnishes us with another argument against the fact that the symptoms called typhoid arise simply from ulceration of the bowels; for he has mentioned other instances, in which patients sink without typhoid symptoms, yet have the peculiar changes in the intestinal canal: to this fever he gives the name of latent typhus (*typhus latente*).<sup>2</sup> These facts could not escape the eye of his critical adversary, who points out their inconsistency, and further objects that according to M. Louis's theory, a disease can only be ascertained to have been typhus at the post mortem examination of a patient.<sup>3</sup> In alluding to the controversy between two members of our profession so highly gifted as MM. Louis and Broussais, we must regret, that in the endeavour to advance science and establish truth, any other expressions should have been employed, than France in her most chivalrous days would have sanctioned between two noble opponents.

M. Chomel, who also regards the changes in the glandular tissue to be the cause of the symptoms in typhus, says that the changes in the intestinal follicles are constant, or *almost* constant; he quotes a case, however, where there was no affection at all of Peyer's glands, and allows that occasionally there was no trace whatever of disease, and that ulceration seldom commenced in the patches till from the twelfth to the fifteenth day.<sup>4</sup> If then the symptoms of typhus can be present without this change in the intestinal canal, it is clear they do not always depend upon that as a cause; but it would seem that the intestines are likely to be affected in the course of the disease, as is shown by observation both here and in Germany. Much more might be said upon this subject, but considering that the fact of the cause of typhus being due to changes in the glands is untenable, and believing that it is but one of many effects of the vascular disturbance, it need only be observed that when this condition of the intestines has been induced, much sympathetic irritation of the brain undoubtedly results. The lymphatic glands of the mesentery are often enlarged, red, and sometimes contain pus; their affection in many cases has a distinct reference to the condition of the intestine.<sup>5</sup> This also M. Louis seems to

<sup>1</sup> Louis, cap. 5.

<sup>2</sup> Louis, p. 113; and *Examen de l'Examen de M. Broussais*.

<sup>3</sup> Broussais, *Examen*, p. 439.

<sup>4</sup> Chomel, pp. 56, 76, 78, 115, 223.

<sup>5</sup> Chomel, 203, 205.

consider as one of the peculiarities of typhus, but Muller regards it as merely sympathetic; his account bears upon my subject as showing how readily minute vessels may take on diseased action and secrete pus from their lining membrane, he tells us that "the inflammation and suppuration of the mesenteric glands, consequent on ulceration of the intestines in typhus, afford us distinct proof that in this case at least, the pus is formed in the absorbent vessels and glands themselves."<sup>1</sup>

The glandular structure of the larger viscera is extensively diseased in some cases, and larger patches of ulceration will occasionally be found there than even in the small intestines.<sup>2</sup> When the glands of Brunner<sup>3</sup> are affected, the whitish matter which is secreted elevates them considerably, so that they assume the shape of a cone, from which cause arises the mistaken notion, that pustules are formed in this structure. We are informed by M. Chomel, that it is a rare circumstance for these glands to become ulcerated, and still less common to find them affected singly; he, however, quotes a case to exemplify this anomaly.<sup>4</sup> Many other of the lymphatic glands, besides those of the intestines, are liable to inflammation and suppuration, such for instance as the axillary and inguinal; but whether the cause be the same in all, must for the present remain only a conjecture. Of glandular parts, the parotid and submaxillary are most constantly implicated; sometimes when the cases are tending to recovery, at other times early in the disease, when no other than a fatal result can be anticipated. Swellings beneath the ear do not always prove that the parotid gland is affected, as M. Louis has noticed that sometimes suppuration takes place in the cellular tissue around the gland, which at other times, however, is itself affected.<sup>5</sup>

The whole secreting system seems more or less to be deranged. M. Louis has even found that the liver, or at any rate its secretions, are much disordered,<sup>6</sup> nor does the kidney or even the pancreas escape.

As regards the condition of the glands in some of the exanthemata, we cannot help being struck with the resemblance of scarlet fever to typhus in this respect. The parotids were often affected in the scarlet fever which prevailed at Copenhagen in 1777.<sup>7</sup> This was also the case in an epidemic of the same character which ravaged New England, in which suppurating tumours are described to have followed the attack.<sup>8</sup> In the scarlatina prevalent in

<sup>1</sup> Müller, p. 754.

<sup>2</sup> Chomel, p. 60.

<sup>3</sup> Erroneous notions exist respecting the glands of the intestines; it may therefore be as well to observe, that the glands of Brunner do not reach lower down the intestine than the end of the duodenum or commencement of the jejunum. The glandulæ solitariae most numerous in the cæcum and appendix are single sacculi, similar to those which when aggregated form the patches of Peyer.—Müller, p. 496.

<sup>4</sup> Chomel, p. 202, 217, 251.

<sup>5</sup> Louis, p. 323.

<sup>6</sup> Ibid. p. 187, 313.

<sup>7</sup> Willan, p. 337.

<sup>8</sup> Ibid. p. 313.

this country, in 1802, swelling of the parotid glands occurred, which sometimes suppurated.<sup>1</sup> Buboës, with swelling of the parotid, were met with in the scarlet fever described by Morton, and also in that which occurred at Upsal, in 1741.<sup>2</sup>

It may not be considered inappropriate to make a few brief allusions to certain morbid changes in the secretions. The sordes coating the tongue, lips, and teeth, is a vitiated mucus, and not, as has been conjectured, blood discoloured by an acid: if it were blood, we should expect hemorrhage from the mouth, which, however, does not occur. M. Louis observes that the state of the tongue is dependent upon the condition of the nervous system, and is quite unconnected with disorder of the stomach or bowels.<sup>3</sup> These ideas are quite in accordance with our experience, and in all probability, the absence of moisture in the mouth arises from stoppage of secretion in its passage through the salivary duct. An enormous extrication of gas sometimes takes place in the large intestine; which, however, does not seem dependent upon any cognisable alteration, certainly not upon ulceration in the intestine.<sup>4</sup>

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#### MUCOUS MEMBRANES.

The mucous membranes in typhus present either separately or conjointly various morbid alterations, the chief of which are staining, softening, inflammation, and ulceration. The whole of the membranes of this class are obnoxious to these changes, but not in an equal degree, some being much more sensible than others to the impression which results from the typhoid poison. Under the head of mucous membranes, those parts will be reviewed, to which Meckel has extended this term, so that not only will the tunics be included which line the hollow viscera and communicate externally with the air, as also other tissues which from secreting mucus are entitled to be so considered, but certain internal membranes and the cutaneous tissue itself.

In speaking of changes in the respiratory organs, M. Louis has observed that the epiglottis, the glottis, the larynx, and trachea are sometimes affected, though less frequently than other portions of the membrane of this order; and here let me delay for a moment to state that my reason for quoting so often from foreign authorities is, because examinations post mortem are invariably made abroad, and the changes arising from morbid processes are more generally known, and have been classed with uncommon diligence by the author above referred to. Several cases have occurred to me in which the larynx and upper portion of the trachea have been intensely

<sup>1</sup> Willan, p. 313.

<sup>2</sup> *Ibid.* p. 272.

<sup>3</sup> Louis, *Recherches*, p. 64. *Exam. de l'Exam. de M. Broussais*, p. 144.

<sup>4</sup> Louis, p. 226.

inflamed, and erysipelas extending to these parts has more than once proved rapidly fatal. Few morbid changes in typhus are more constant than those in the lining membrane of the lungs; it would be rare indeed to find a case of this disorder in which disturbance of the respiratory functions did not form a prominent feature in life, or where organic changes were not met with after death. Hildenbrand considers the affection of this part as essential to the disease, and Dr. Tweedie states that bronchitis is invariably present.<sup>1</sup> In the epidemic fever described by Dr. Bateman, the chest was frequently affected, all which points of correspondence join with others in proving the identity of the disorder, though prevailing at different periods, and in countries far removed from each other. The bronchi are in general red, or of a violet colour, darkening towards their termination, and are often found to contain a bloody secretion.<sup>2</sup> Without any organic changes they are sometimes discoloured by transudation, and it should be recollected in examinations of the body that all the mucous membranes are liable to be thus reddened, for we are likely to fall into error if reliance be solely placed upon alteration of colour as an indication of structural disease.

The mucous membrane of the alimentary canal is very often disordered; not only does ulceration over the patches of glands destroy the tissue in this part, but in others also: thus the pharynx and œsophagus are occasionally ulcerated, a change which I have myself never met with, but which has been seen by M. Louis, who observes also that the stomach is in most cases more or less seriously implicated, being either softened, attenuated, changed in colour, or texture: still he declares that it was often natural, oftener indeed than in death from other causes.<sup>3</sup>

Now it is important when we approach the consideration which refers the main-spring of typhus and all other diseases to the mucous membrane of the stomach and intestines, that we should be acquainted with the appearances usually presented by them. Being impressed with the fact, that the post mortem appearances of the stomach were but little understood, Dr. Yellowly examined this viscus after death in twenty cases of persons affected with various ailments taken indiscriminately; in one only of the whole twenty was it free from morbid alteration, the changes which he found being chiefly referable to vascularity. The villous coat presented appearances of congestion, and was either florid or dark coloured, the blood occasioning this fulness was contained in distinct vessels, or formed extravasations of various sizes, character, and degree; this happened under all circumstances, and when from the character of the previous indisposition the most healthy aspect of the stomach might fairly be anticipated: the difficulty of distinguishing between such vascularity and inflammation has been well shown by Dr. J. Davy.<sup>4</sup>

Valuable as are the remarks of M. Broussais on the result of

<sup>1</sup> Cyclopæd. Pract. Med. vol. i.

<sup>2</sup> Chomel, 291.

<sup>3</sup> Louis, pp. 159, 171, 543.

<sup>4</sup> Med. Chir. Trans. vol. x. p. 92.

inflammation of various parts of the alimentary tube and the symptoms peculiar to each—important as no doubt it is to watch changes in local organs, and to relieve them when oppressed, and calculated as this theory undoubtedly is, to call the attention of practitioners to the condition of the mucous membrane of the stomach and intestines, yet I feel it difficult to subscribe to the notion, that all essential diseases owe their origin to change in this structure.

How indeed can M. Broussais's theory be admitted, that typhus is produced by gastro-enteritis, when we find that many cases terminate either by death or recovery, without any symptoms referable to the bowels in the one case, or any morbid alterations in the other? How can we explain by this idea the leading symptoms of the disorder? How, for instance, can we refer the headache, which at an early stage is so constant and distressing, to the condition of membranes of the intestinal canal, when we find that it is most severe where the disorder of the bowels is slightest, and that it declines in the course of the fever when diarrhœa comes on,<sup>1</sup> and ulceration of the intestines is established and progressive?<sup>2</sup> How can we explain the increase of the constitutional symptoms, and the fatal termination which occurs in typhus or other exanthemata, in those cases in which ulceration of the mucous membranes is found in a state approaching to a cure?<sup>3</sup> Is the fever which results as the consequence of ordinary inflammation of the intestines infectious? How can it happen that gastro-enteritis should produce the different essential fevers? The very term essential, implies a malady which does not depend upon another, and is used to designate a primary disease in contradistinction to those which are symptomatic;<sup>4</sup> to say therefore that essential diseases arise from gastro-enteritis is a contradiction. The infectious nature of typhus, its definite course, the rash which characterises it, prove it to be something specific; the earlier symptoms and their subsequent course are entirely at variance with the progress of simple gastro-enteritic disorders. If we admit that this theory has had its use, let us not forget at the same time that this or any other dogma which confines our attention to any single part, or to any one tissue, as the cause of the phenomena in the infectious eruptive fevers, may be productive of evil. Sir Charles Bell has truly remarked that "the study of tissues instead of the properties of the system, is likely to draw the pathologist from the main point of inquiry in the investigation of disease;" and he has justly censured those who point out local changes as the cause of all general disorders. Dr. Bateman tells us that of 678 cases treated by him in the House of Recovery, 51 only had vomiting, and in but a small portion of these cases was it accompanied by pain and tenderness of the epigastrium on pressure.<sup>5</sup>

These facts must induce the belief that inflammation of the

<sup>1</sup> Louis, 132.

<sup>2</sup> Chomel, 224.

<sup>3</sup> *Ibid.* 527.

<sup>4</sup> Dictionnaire de Med. et Chir. Art. "Essentiel."

<sup>5</sup> Bateman, p. 47.



stomach but rarely occurs; gastritis is a very unusual disease, so unusual indeed, that notwithstanding his extensive practice, Dr. Abercrombie never met with a case of pure idiopathic inflammation of the stomach, as he himself states in his pathological researches on the diseases of that organ. Since then the theories of MM. Broussais and Louis are incapable of explaining in a satisfactory manner the numerous symptoms of typhus, and since pathological investigations fail in proving the changes in the stomach or intestines to be primary or even constant, we should not assign to these alterations greater importance than to similar affections in other parts. I have only to add that ulceration has been found in the parietes of the stomach, and sometimes though rarely in the duodenum.

The signs by which affections of the different portions of the chylopoietic viscera are pointed out, vary with the part attacked. Pain in the abdomen, sickness, and diarrhœa, are the chief indications; they, however, may all be present without any appreciable change in the membranes, and ulceration may proceed even to a considerable extent, yet no one of these symptoms warn us of its existence. Diarrhœa would appear especially to point out irritation with increased secretion from the lower portion of the intestine; pain seems to be produced by inflammation of the upper part of the alimentary canal, and sickness by organic changes in the stomach.

Of the genito-urinary portion of this membrane it may be remarked, that there is in some cases unnatural redness, and that symptoms of inflammation of the bladder occasionally show themselves; one case has already been quoted in which pus was found in the fallopian tubes.

Including in this division such membranes as Meckel has classed under the term mucous or cellular, I have to notice the conjunctiva of the eye and pia mater.<sup>1</sup> The suffusion of the conjunctiva is a very constant occurrence; and is especially interesting if we may be allowed to infer that it indicates the state of circulation within the cranium. I cannot avoid entertaining the notion that we have here an external index of the condition of the other branches of the internal carotid. This suffusion appears early, simultaneously with the cerebral disturbance, or soon after. Should the above conjecture be true, the pia mater must be in a highly vascular condition, and such we are warranted in believing to be the fact, from the symptoms and post mortem appearances in this part. Affection in the head is indeed spoken of as almost invariably in typhus. During life it may be difficult to distinguish inflammation of the substance from that of the membranes of the brain, and in practice it may be unimportant; but after death we can entertain no doubt whatever as to the parts affected. The remark made by me in the year 1831 on this subject, as exemplified in the epidemic of that year, was that "The morbid appearances discovered upon dissection were almost

<sup>1</sup> Meckel, vol. iii. p. 210.

entirely confined to the lungs and brain. The various tissues of the lungs were affected in some, but in all an affection of the membranes of the brain was found, either turgescence of vessels, increased vascularity, effusion of serum or pus, or the deposition of lymph varying from the thickness of a line, to a quantity only sufficient to render the arachnoid opaque.

“The ventricles were the seat of the effusion of serum, pus and lymph were deposited at the base, on the hemispheres, and between the convolutions of the brain.”<sup>1</sup>

All the authors who have written upon typhus take notice of the cerebral disturbance; the name given to the fever attests that this has always been observed to be a prominent feature in the disease. While the conjunctiva of the eye indicates increased vascularity alone, the membranes of the brain furnish us with incontestable proof, that in very many cases the vascularity there excited has gone on to positive inflammation. The proportion in which the procession of inflammatory action takes place, has been made by some a matter of calculation. Out of fifty-four cases alluded to in the *Cyclopædia of Practical Medicine*, thirty-seven exhibited traces of inflammation of the brain.<sup>2</sup> M. Louis, who considers this affection as merely secondary, admits that the pia mater was injected in half his cases, and in many to a remarkable degree; he adds that the arachnoid had poured out a turbid and flocculent secretion in one fourth, and that in one fifth a false membrane had been formed on the inner portion of the dura mater.<sup>3</sup> The number of cases too in which fluid was effused into the ventricles will contribute to maintain the position, that the membranes of the brain are affected, and that they are so in a positive definite manner. There is in all, I believe, increased vascularity of the pia mater; this condition may be, and probably is, all that occurs in the slighter cases, and subsides without further mischief; in the more serious ones, however, where the patients have lived intemperately, or are of an irritable habit, the vascularity incident to the disease lights up into intense inflammation. The symptoms, I think, justify this view, those even who take little cognisance of the brain as obnoxious to the operation of the poison which engenders this disease, allow that the headache is an almost invariable symptom; all the other signs of inflammation in the meninges are also present: if then we find the signs of a certain organic change, and also the known consequences, we should be blind to all rational means of accounting for the symptoms, did we not connect them. We are fully borne out in concluding that when similar effects arise the cause is in both cases the same. All the characteristics of meningitis are met with in typhus; there is one impression, however, which I do not find mentioned in accounts of inflammation of the brain; several patients have told me that

<sup>1</sup> Some account of the fever prevalent in 1831, by the Author, p. 9.

<sup>2</sup> *Cyclopæd. Pract. Med.* vol. i. p. 178.

<sup>3</sup> Louis, p. 374.

when labouring under this fever they have felt a strange sensation of doubt with respect to their own identity, imagining that their individuality was shared by others, and that they combined many beings in their single selves. With these observations I shall dismiss the consideration of cerebral tunics, which appear to be more frequently affected than the substance.<sup>1</sup>

The effusion of serum tinged with blood into the theca of the spine indicates also excitement in the membranes of the spinal chord, and the great pain at the back of the neck and limbs must induce the belief that this part is frequently the seat of irritation. The spine is itself often free from any morbid change, it was so at least in six cases examined by M. Chomel.<sup>2</sup>

There are but few other topics to be mentioned under the head of mucous tissue; one, however, is the skin,<sup>3</sup> the alterations in which have already been noticed at considerable length, and here, as in other eruptive fevers, much vascular disturbance is to be perceived; in this structure is seated that phenomenon of increased vascularity termed the rash; this is the seat of erysipelas; this is the part chiefly exposed to sloughing and mortification. These points, however, have already received sufficient attention. I shall therefore pass on to the next division.

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### SEROUS MEMBRANES.

Under the head of serous membranes I shall allude to the arachnoid, the pleura, and the peritoneum.

The arachnoid might have been considered at the same time with the pia mater, as it is difficult to distinguish in some cases whether effusion poured out between this membrane and the pia mater proceeds from one or the other,—in general they are simultaneously affected.<sup>4</sup> A change in the arachnoid is proved by its opacity, and like all serous membranes, probably also by increase in its sensibility, but it seems to me very doubtful whether disturbance of the brain, which is often attributed to inflammation of the arachnoid, can arise from such a cause: the pia mater I imagine to be the part affected when cerebral disturbance is produced, except when such a quantity of secretion has been poured out from the arachnoid as to influence the brain mechanically by pressure.

The pleura is an important part, and with all the other tissues of the lungs is not unfrequently the seat of inflammation. It is a practical point of great moment to be aware of this fact, and to be impressed also with the knowledge that the inflammatory process goes on in this membrane without the usual admonition of the acute pain and hurried breathing which are so characteristic of ordinary

<sup>1</sup> Chomel, p. 293.

<sup>2</sup> Meckel, *Man. d'Anat.* vol. i. p. 465.

<sup>3</sup> Chomel, p. 393.

<sup>4</sup> Abercrombie, p. 19.

pleurisy. Patients labouring under typhus will often remain in a state of apathy or indifference, and unconscious of all ordinary impressions, local disease therefore is wanting in outward demonstrations; thus pleurisy will occasion no pain, and there will be no cough, as the lungs will be sufficiently expanded by respiration to prevent congestion. I have known irreparable mischief produced before an idea was entertained that any disease existed in the chest, or that attention was drawn to the affected organ. The pleura does not appear to suffer from the direct action of the typhoid poison, nor indeed do any of the membranes of this class, but seems to become involved by the spreading of inflammation from the contiguous tissue, or other causes. A considerable quantity of fluid is frequently found in the pleuræ, and arises according to M. Louis from exudation, owing to congestion of the lungs: such a change is certainly comparatively rare with us; the quantity he observes varies from three to thirty ounces, and the effusion is double, taking place at the same time on both sides of the chest. It is scarcely necessary to add that in the pleurisy of typhus, lymph, serum, and pus, are the fluids effused, pus and serum being present in the greatest abundance.

Examples have been given of peritonitis, one of which appeared to have been primary, the other secondary, by which I mean that in the one case there was an obvious cause, capable of exciting inflammation, namely, pus, in the fallopian tube. Strictly speaking, however, they should perhaps be both considered secondary, the membranes of this class being comparatively rarely implicated, and only so late in the disease. Ulceration in all the other tunics of the intestines producing perforation of the peritoneum, seems a common incident in France, but is rarely met with in this country.<sup>1</sup> It has never happened to me to meet with effusion into sero-fibrous cavities, but both Bateman and Hildenbrand observe, that cases presenting pain and swellings, as in rheumatism, have occurred in their practice. Such an event has however occasionally presented itself to me in some of the other exanthemata.

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#### ON MORBID CHANGES IN THE PARENCHYMA OF ORGANS.

Our next object will be to consider the alterations in the tissue of organs, but of these such only will be commented on as are most liable to change, and most important and formidable when diseased. The lungs and brain are alike exposed to take on disordered actions, and alike involve the safety of the patient; these, therefore, will form the subject of this section.

The frequent alteration of the mucous, and the occasional implication of the serous membranes of the lungs, has already been spoken

<sup>1</sup> Louis met with it in one eighth of his cases. Chomel calculates the occurrence as one in twenty-one times, p. 47.

of; attention is now called to the remaining portion of it, the actual structure. Already has a caution been expressed lest inflammation of the pleuræ should be overlooked, doubly on our guard must we be that pneumonia does not establish itself and irreparably damage the lungs, or irrecoverably exhaust, by the irritation which it occasions, the strength of our patients. The comparative insensibility of the parenchyma of this organ will readily satisfy us of the absolute necessity of frequently resorting to auscultation, the use of which is signally exemplified in the treatment of typhus; for it is not only essential to ascertain the fact whether the lungs are inflamed, not only necessary to make out the character of the lesion, but of vital importance also to know the exact spot which is diseased, for there is no strength to be thrown away, and as our measures must be depleting, they must be appropriately directed. In my experience the substance of the lung is affected in almost all severe cases, scarcely has one patient passed through the protracted periods without oppression of the chest, hurried breathing, and small crepitation. The lungs, when examined after death, have presented the various stages of inflammation; and not only has consolidation been discovered at the base, to which part it is confined by M. Louis, but I have seen it also in the upper lobes. A purulent secretion is met with occasionally throughout the structure, and abscess will sometimes form in the upper, and indeed in every other part. In one case<sup>1</sup> examined by me, inflammation in the upper lobe of the right lung went on rapidly to ulceration, and large cavities were formed in this portion of the pulmonary tissue.

The very rare occurrence of gangrene of the lungs in typhus has struck me as curious, and capable of strengthening my notion that it is not one process of inflammation alone which leads to all the varieties of termination. Inflammation in this part ends in purulent effusion, hepatisation, cavities, any other way in short but sphacelus. Yet the strength of the patient is prostrate, his fluids are diseased, and inflammation is excited, but not in the situation which leads to that complete obstruction of vessels which seems essential to mortification.

In the greater number of those who die from typhus, the substance of the brain is rosy and injected; this has been remarked by M. Louis, who says, however, that the consistence of the brain was but little altered, though out of the whole number examined by him in six cases he found it firmer, and in five softer than is natural. When we perceive great increase in the vascularity of the pia mater, and know the intimate connection of this membrane with the brain by means of its numerous minute vessels, it is difficult to imagine that irritation can arise in the one without being communicated to the other, but not only does excitement at the surface take place, but also occasionally in its substance. Sir John Pringle states, that he met with abscesses in the brain, and also in the cerebellum,<sup>2</sup> and

<sup>1</sup> The first.

<sup>2</sup> Page 303.

we learn from Hildenbrand that the brain will occasionally suppurate. Dr. Bateman considers that the inflammation in this fever is modified, except when it attacks the brain, but I do not see any reason to make an exception to the general rule, because, although the brain is often greatly affected, and though patients who have great disturbance in the functions of this organ remain comatose for many days together, experience at times great difficulty of utterance, and suffer from effusion, as was exemplified in the case of Clarke,<sup>1</sup> yet they will recover more completely from such affections when originating in typhus than is the case when similar results arise from idiopathic cerebral affection.

These observations will terminate the brief sketch which I proposed to give, respecting the actual organic changes in important organs, from the poison of typhus and its consequences. If for one moment we take a retrospective view of the organic changes, we shall find numerous results produced in the course of a single disease; many parts suffer; but although the proposition may appear startling, when first laid down, that these arise from one cause, and that disorders should be considered as identical, which in one country, or during one season, produce great determination to the bowels, yet in others be comparatively deficient in such signs, I would still observe, and we may find examples in well known substances or in other diseases, that the same poison will produce quite as various effects in different individuals, and may be modified by many causes. Take arsenic for an example. Who can say with certainty at what time the effects of this poison will commence; when we know they may appear in ten minutes, or that eight hours may elapse without any visible indication. Who will venture to assert what will be the appearance in the stomach after death—when we learn by experience, that although inflammation is usually produced, yet sometimes there will be absolutely none; who will predict with certainty the remote effect on the nervous system, when we know that sometimes palsy and loss of power of the limbs ensues, sometimes convulsive movements and violent spasms. The parts too implicated by the action of this poison are various; the skin and mucous membranes, the brain, the spine, and from continued exposure even the bones and joints have been known to suffer.<sup>2</sup> Look at the operation of mercury: the circulating fluids, the soft parts, the bones, all are in turn affected.

See what a host of hideous forms march in the train of syphilis! How multiplied and repugnant are the aspects in which this poison shows itself in the cutaneous tissue alone! How many, and what various parts are affected in its course! What torture and disfigurement accompany its progress. Hunter in his work on this

<sup>1</sup> No. xliii. p. 63.

<sup>2</sup> "Arsenic acts on the brain, heart, and lungs—the throat, gullet, and intestines—the lining membrane of the nostrils and eyelids—the kidneys, bladder, and vagina."—Christison on Poison, p. 18.

subject ; Hennen, in his *Military Surgery* ; and Cooper, in his dictionary, show how differently this same virus may act even in its primary impression.

Numerous are the effects of malaria ; but enough has been said to prove the fact that the operation of the same poison is multifarious, and sometimes on one part, sometimes on another. I am aware that peculiarity of constitution, previous habits, present state of health, climate, season, and many other things, modify the action of these agents ; to all which causes it should however be remembered the poison of typhus is subject and amenable.

The classification of typhus should be based either upon obvious and palpable differences in its aspect, or upon an intimate knowledge of its real nature, the latter of which is of course most desirable : but as this is yet unsettled, little need be said upon the varieties of the disorder. Cullen divides them into the milder and gravior : this arrangement, as it simply states the fact that the fever is sometimes benign, at others malignant, is in no degree objectionable. M. Chomel also makes two varieties, namely, typhus and typhoid malady ; the typhoid malady, he says, lasts longer than typhus, the one continuing fourteen the other twenty days ; and that the rash appears on the fourth day in the shorter, but not till the eighth in the longer ailment.<sup>1</sup> These surely are the same disease, varied only by circumstances, the reason of which will appear if my explanation of the steps of this disorder be admitted. Dr. Armstrong makes three kinds ; the simple, the inflammatory, and the congestive, terms which are very questionable, as they imply that the character of the disease essentially varies in the three descriptions. He, moreover, divides the inflammatory sort into the acute and sub-acute, a refinement which seems unnecessary. Leaving this subject to be determined when we are more thoroughly acquainted with it, I pass on to the most important division, practically speaking, the

## TREATMENT.

The next object of inquiry will be the mode of treatment, which ought to be adopted in typhus. The confusion found in medical works upon the subject, forcibly attests the importance of ascertaining the origin of that disorder and the different steps in its progress. To promote this object a clear arrangement in the periods of the disease will be obviously valuable, as enabling a practitioner to direct his remedies to the real condition of the patient, to arrange and to methodise his treatment : this has been done by the German professor with perhaps too great minuteness, but in this country its importance has been undervalued. Nothing indeed can be more contradictory than the plans, the adoption of which is advised by

<sup>1</sup> Chomel, page 337.

those who have written upon this fever. No situation can be imagined more embarrassing than that of a young practitioner, who, having neglected opportunities of clinical instruction, and relying chiefly on books for his information, is suddenly obliged to take upon himself the responsibility of a case of typhus. He is struck with indications apparently opposite; there appears a formidable array of urgent symptoms, seemingly requiring immediate relief; a serious disease is before him; life is in imminent peril; some quick change seems absolutely essential; some active means must at once be employed; yet at the same time there are symptoms which oblige him to pause, and soon satisfy him that powerful remedies are entirely out of the question, for, should he employ them, the results from such measures will appal him, and prevent their indiscriminate employment in future. There is such a mixture of action with debility, that while prompted on the one hand to the use of energetic measures, he will feel on the other that a great risk must be incurred by their application.

Perhaps, by way of experiment, the treatment of a case is by active depletion; good may result, and the plan appear justified by its effect: yet the good may be but temporary, and he may be right in thinking that his plan alone has caused the train of alarming consequences that ensues. Let him try a contrary mode, and it is likely enough that a long and anxious period of danger, and a tardy convalescence, will make him doubt much as to the propriety of leaving nature unassisted. The works on whose authority he relies, may perhaps be again consulted: he will there read that neither bleeding, nor emetics, nor purgatives, nor active means of any kind are recommended, nay, he will even find them denounced in terms sufficiently strong to deter him entirely from their employment, did he not discover, on further inquiry, how other writers maintain that they never lost a patient when they employed venesection, emetics and active cathartics, which should be resorted to boldly and invariably.

It may be said, that watching cases and observing treatment will give practical tact, but practical tact must have reason for its basis, and can only be valuable when founded on a correct notion of the object to be attained.

The importance of ascertaining the origin of a complaint is, as has before been stated, of the highest value with respect to its treatment. The blood-shot eye, the pain and increased temperature of the head, attended by delirium, offer inducements to depletion which it is very difficult to resist, and which it would be most unpardonable to overlook, if the disease had not a specific origin. But when once we are satisfied that all the above symptoms arise from the introduction of a poison into the system, we feel that much more important objects are to be attained than the mere subduing of inflammation, even although we should feel satisfied that such a condition did actually exist. We know that a cause affecting the whole system is now in operation, and that the reduction of action



in one part is doing but very little, whilst the causes giving rise to it still remain, and are capable of producing it elsewhere. A specific disease cannot be cured by depletion; over excitement can indeed be controlled, but the disease still remains in operation. As the question of bleeding is one of the most important, I shall select that to begin with, and by way of showing what confusion and contradictions exist upon this head I shall quote a few of the many opinions expressed upon it.

In treating of jail or hospital fever, Pringle states the result of his observations to be, "that bleeding had but little effect in reducing the symptoms of that disease;"<sup>1</sup> again he says, "that in inflammatory fevers, bleeding is very useful, but seldom gives ease in typhus."<sup>2</sup> M. Broussais, observes, "that the gastro-enterite-aigue-typhoïde, is one of those forms of inflammation with which the lancet has the least to do."<sup>3</sup> Bleeding in the early stages is condemned by John Hunter; "I remember," says he, "when practitioners uniformly bled in cases of putrid fever, but signs of debility and want of success soon made them alter their practice."<sup>4</sup> In Hildenbrand's opinion, "venesection during the nervous period, as also during the inflammatory one, if the patient be weak, is a dangerous remedy in the majority of cases."<sup>5</sup> If we refer to older practitioners we find bleeding prohibited. Sauvages says that "typhus curandus est refocillantibus, cardiacis, alimentis scilicet lenibus, diluentibus, abstinendum a phlebotomiâ, &c."<sup>6</sup> Authorities, and some of great weight, are not wanting on the other side. Dr. Bateman's opinion, and the mode in which this was forced upon him has already been stated; he says, in addition, "blood-letting is capable of very general application, it is capable too of abridging the course of fever if employed early."<sup>7</sup> "It may be resorted to on the third, fourth, or fifth, or even on the sixth day."<sup>8</sup> He prefers venesection to the local abstraction of blood, or to the employment of leeches, or cupping, and declares his persuasion that four ounces of blood drawn from the arm produces more essential benefit than twice that quantity dribbling away after either of the other operations.<sup>9</sup> He forcibly urges us not to be deceived by signs of debility. "Even when the sensorial disturbance is inconsiderable, not exceeding a little occasional confusion in waking, or slight wandering in the night; yet if rather on the increase, and if the pulse continue frequent, at, or more than 120, with the slightest sharpness in its feeble stroke; if the tongue becomes parched and brownish, and cannot be steadily protruded; and if the strength be manifestly impaired, the voice feeble, and the skin rather dry, appearances which are usually considered as indications of lowness and failing powers; still," he continues, "I do not hesitate to affirm

<sup>1</sup> Sir John Pringle, p. 291.

<sup>2</sup> *Ibid.* p. 247.

<sup>3</sup> Broussais, *Examen. du Doctrine Nouv. Med.* p. 463.

<sup>4</sup> John Hunter, p. 400.

<sup>5</sup> Hildenbrand.

<sup>6</sup> Sauvages, *Nosolog. Method.* 8vo. Amstel. 1763, vol. ii.

<sup>7</sup> Bateman, pp. 94, 98.

<sup>8</sup> *Ibid.* p. 102.

<sup>9</sup> *Ibid.* p. 114.

that this condition is to be relieved by moderate evacuations, and will be infallibly aggravated and carried on into subsultus, and muttering, and picking of the bed clothes, and ultimately to death, by wine and cordial treatment."

Rasori, who gained such reputation in Italy as a "contra-stimulist," began his treatment of typhus when it prevailed epidemically in the Genoese Territory in 1799 and 1800, by the exhibition of stimulants, but he found that he had very little success in his treatment. He then took some blood by leeches; encouraged by the result, he ventured upon cupping, and was so satisfied with the efficacy of the depleting plan that he informs us how ultimately his treatment always began by taking about thirteen ounces of blood from the arm. At the same time he resorted to antimony, which he gave in very large doses. He sometimes bled a second, but never a third time, and it is said that after the introduction of this plan he seldom lost a single patient.

Dr. Armstrong recommends bleeding; to avoid early depletion, he says, is an error of the schools; but the reason which he gives for its employment in many cases, (*viz.* venous congestion, indicated by feebleness of the pulse,) and the extent to which he says depletion by phlebotomy should be carried (namely, to syncope,) are both open to objection, and we may conclude, that he had seen occasion to doubt the propriety of its employment at all in some instances, for he admits, that, "the system sooner sinks after bleeding in typhus than in any other fever," and says that it must not be repeated if the pulse should be weaker after the operation than before.<sup>1</sup>

Dr. Armstrong may have carried this practice too far, but he has the merit of daring to act contrary to the common opinion, and no doubt there was great deference paid to established usage in his time, and that of Dr. Bateman; because the grounds which would justify loss of blood, were less clear and precise than at present, and the pathology of this fever was involved in still greater obscurity. The errors of the schools above alluded to, were certain notions which had sprung from various theories of disease: the chemical school maintained the efficacy of antiseptics, the followers of Brown considered all the phenomena to be due to asthenia or weakness: the Stahlians gave us the "expectante" plan, and the humoral pathologists tried to force out the disease by perspiration or other evacuations, and employed heat, alexipharmics, stimulants, &c. The result of all the above testimonies tends to show that bleeding is decidedly useful in certain cases, but as positively injurious in others, and the great difficulty with the practitioner must consist in a nice discrimination. In some diseases if you doubt, you should bleed, but in typhus the contrary obtains. Caution, however, is always to be exercised, and the quantity of blood to be drawn must be regulated by the effect, the state of the patient, and the period of

<sup>1</sup> Armstrong, on Typhus, p. 86.

the disease. That this remedy is very rarely to be employed in a late stage there can be no doubt, but that it is eminently useful in the earlier ones I am quite convinced; and if immediate improvement results, and the disease assumes a mild form, we are not to imagine that venesection was wrong, though the blood be free from the inflammatory buff. Many earlier severe symptoms may thus be mitigated and controlled, many of the after consequences prevented: this is the result to which experience appears to have led M. Chomel, though from his remarks upon this mode of treatment he considers the simplest cases as those most benefitted by venesection.<sup>1</sup> M. Louis's tables also show that bleeding in the earlier stages had a beneficial influence upon the continuance and termination of the disease. The great object to be achieved is not the removal of one or other local symptom, least of all oppression in the head; bleeding seldom does that, but conduces to mitigate them all. In truth, various phenomena are exhibited by the disease which bleeding is unable to stop, but can mitigate and restrain, at the same time we must not be unmindful that the irritation produced in the simpler forms is liable to pass on to inflammation, and may render bleeding or other depletion advisable. That the head is positively affected, appears by the attendant symptoms—headache, giddiness, tinnitus aurium, stupor, or a tendency to sleep, change of manner, affection of speech, being at one time hasty, at another slow; mental wandering, incoherent talking, confusion, and forgetfulness, with convulsive agitation of the muscles of the face, hands or whole body, and a morbidly acute sensation in the limbs, which are sometimes rigid, at other times convulsed. To this long list may yet be added retention of urine, and unconsciousness of the evacuation of the fæces. The whole of the above we are told by Dr. Abercrombie,<sup>2</sup> are symptomatic or secondary in the course of other eruptive diseases besides typhus, such as measles and scarlet fever.

Should, however, inflammation be excited in the membranes of the brain, it will not require such active treatment as is necessary in simple meningitis. Should it be seated in the lungs, the pain will not be so severe as in idiopathic pneumonia; nor will the dyspnoea be so urgent, the cough so troublesome, or the same loss of blood requisite. If on percussion, dullness of the chest indicate that hepatisation to a certain extent has taken place, moderate depletion will arrest its further progress, and most efficiently conduce to restoration of health in the lung.

In looking over my cases in different years, I find that venesection was more necessary in 1831 than in 1837, and in the present year more so than in the last; but in by far the larger number of cases which I have had to treat, loss of blood by some means or other has been imperatively called for, and from conviction of its utility I strongly advise that blood be drawn from the arm if the

<sup>1</sup> Chomel, p. 166.

<sup>2</sup> Abercrombie on the Brain, p. 14.

patient's strength authorise the measure, and the pulse be full and sharp. Bleeding during the earlier stages of the disease, is to moderate action and to control power, but is resorted to later to relieve local complication: hence general depletion must chiefly be confined to the first periods, though it may be called for and even advisable in all. Any fixed rule or invariable course, will certainly betray us into error, for it is as fatal to perform phlebotomy injudiciously, as it will be to neglect it on proper occasions, and we need not be deterred by any fear of consequent debility from adopting this measure under the circumstances above described.

The employment of this, as well as all other active remedies, must depend upon the judgment of the practitioner, but should my idea be correct, that typhus is a specific, infectious, and eruptive disease, the same rule would obtain in this as in other disorders of the same class, in which active interference is not very often necessary. There can be no reason for bleeding in the slighter or simpler cases, they will successfully pass through their several stages and not require any energetic measures. It is only the expectation of a severe attack from the threatening of earlier symptoms, the complication of vital organs, or the excess of general excitement, that oblige us to resort to the lancet. When this measure is determined upon, it is not necessary, as in acute inflammation, to allow the blood to flow till fainting ensues; it will be quite enough to change the character of the pulse, which is readily affected in typhus. This appears to me a sufficient answer to those who recommend arteriotomy instead of venesection. General effect is the great object in either mode of abstracting blood, and as the system very quickly acknowledges the impression when a vein is opened, we need not adopt the more difficult and less controllable plan of resorting to an artery.

Dr. Bateman, in speaking disparagingly of cupping and leeches, has greatly wronged these different and very valuable modes of relieving local congestion or inflammation. Many owe their lives to these methods of depletion, which are signally appropriate in such a disorder as typhus, in which we daily see examples of general debility combined with local action; the head, the lungs, the abdomen, require their employment, and at a time when bleeding from the arm would only aggravate the general depression without relieving the topical mischief.

M. Broussais has noticed the state of prostration which ensues upon the injudicious repetition of venesection, and is of opinion that local bleeding, and that by leeches is the best; these he advises us to place as near as possible to the seat of the disease, which with him would be the stomach or its neighbourhood, and no sceptic can fail of being satisfied of the advantage to be derived from their employment, both as a means of relieving inflammation of the membranes when established, and of controlling the head symptoms when sympathetically produced.

In leeches and cupping then we have the most important auxili-

aries, and rare indeed is it, that any severe case goes through its course, without requiring their employment more than once. Of the profuse hemorrhage from leech bites enough has already been said, nothing more need therefore be added, except that benefit from their employment far surpasses any objection to their use on this score. Of the comparative value of bleeding by leeches or cupping, it may be remarked, that each seems to have its appropriate destination. Cupping is chiefly employed when the head or chest is the seat of mischief, and when the object is to procure a decided effect and immediate relief: leeches are usually applied when the mucous membrane of the chest or the abdomen is implicated, when the object is to take a very small quantity of blood, when the weight of the cupping glass would be objectionable or the patient apprehensive of this latter mode of depletion.

I shall arrange the other methods of treatment under the heads of emetics, purgatives, mercury, antimony, salines, cold to the surface of the body, sedatives, stimulants, and tonics.

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#### EMETICS.

While great doubt exists in the minds of some practitioners about the last mentioned remedy, and very opposite opinions are entertained as to its utility, all seem to agree in the benefit to be derived from emetics, which are recommended in typhus with three objects, to empty the stomach, to change the action of the whole system, and lastly, to stimulate.

M. Chomel speaks in their favour, but he thinks, that without there be an overloaded stomach, a bitterness in the mouth, a yellow tongue, and nausea, little good can be expected from them; under other circumstances he imagines their use to be the remains of an old practice, founded simply on prejudice.<sup>1</sup>

Hildenbrand employed them as stimulants;<sup>2</sup> the action of an emetic certainly does rouse the whole system, and after its exhibition and operation, a faltering pulse will at once become steady, and beat for a time with renewed power: but an emetic cannot give strength, and in real debility the temporary excitement produced will be followed by corresponding depression. When, therefore, there is great weakness this remedy should never be employed with a view to stimulate.

All authors admit the utility of emetics, but vary in their explanations as to the mode in which the benefit is brought about. The object of vomiting in typhus is to produce a powerful nervous impression, and by occasioning a sort of shock to the system to excite a new action in the frame, and undoubtedly great benefit follows its employment. It is by no means necessary in order to secure

<sup>1</sup> Chomel, p. 472.

<sup>2</sup> Hildenbrand, p. 204.

this result, or to justify us in their use, that there should be a full stomach, foul tongue, or nausea; quite as much relief is experienced in the absence of these symptoms as when they are present. The question then is not the utility of the remedy, but the appropriate time for its employment, and the kind which ought to be selected.

Hildenbrand decries the use of emetics during the period of invasion, and expressly cautions us not to resort to them whilst the shivering lasts;<sup>1</sup> but this seems the period of all others when they are most efficacious and advisable, being then capable of at once extinguishing the disorder. When general uneasiness and chills are felt, with the other threatenings of an approaching attack, I have found that the exhibition of an emetic has put a stop to them all. The headache is very distressing, and patients are fearful lest the retching may increase it, but such fears are entirely groundless. Emetics, then, I consider, to be a remedy capable of early employment; they may be given at any period, till the full development of the disorder, and do not require any previous measures. When, however, the symptoms of fever are established, and heat and reaction have commenced, still they are to be employed; but we shall now have to entertain the question of bleeding; and in cases where this is advisable, venesection should precede emetics, which may afterwards be administered, generally with immediate advantage at any time within the first three days; after this their benefit is less obvious, and seems to diminish in proportion as they are delayed. Of their efficacy in rousing the system when the strength fails,<sup>2</sup> my own experience does not enable me to speak, having then never ventured upon their use. With us the object in giving an emetic, is to cause a general impression on the system, and to effect this purpose its operation should be certain and speedy. The combination usually employed by me, is ipecacuanha with antimony, but should the patient be weak, and feel such nausea as to induce the belief that emesis will speedily be induced, ipecacuanha may be given alone, its effect being aided by diluent drinks, such as weak chamomile tea. The result of this method of treatment is often to relieve the headache, induce sleep, provoke perspiration, stop at once all disordered action, or mitigate the formidable indications. Few remedies, in truth, exert such beneficial influence over the disease as emetics, and with the precaution mentioned above, they are almost universally applicable, and open to no objection whatever.

<sup>1</sup> Hildenbrand, p. 186.

<sup>2</sup> Ibid. p. 204.

## PURGATIVES.

Practitioners in this country will differ entirely from Professor Hildenbrand, who says of purgatives, that they cannot be recommended as an ordinary remedy in typhus; and adds, that their operation is sometimes injurious. This however it is difficult to understand, as with us they are proved by experience to be most decidedly beneficial. The object and result of employing this class of medicines is, in the first place, to remove from the bowels disordered and pent up secretions, or any undigested food which can serve as a means of irritating the mucous membrane; in the second place, to obviate any tendency to constipation; and, thirdly, as a means of acting generally upon the system as an antiphlogistic remedy, or method of reducing undue strength or excitement. Various means and different medicines are appropriate as we are called upon to excite the action of the bowels at advanced periods of the disease; reference must then be had to the strength of the patient, whether diarrhœa has previously been excited, whether ulceration has taken place in the intestines, &c. &c. At the commencement of the disorder, however, after the action of the emetic, it is imperative freely to evacuate the bowels, and such a purgative should be chosen as will answer the first and third of the above mentioned objects; namely, to clear out the intestinal canal in a degree calculated also to reduce action, for which purpose a dose of three grains of calomel should be given either in combination with rhubarb, or jalap, which Dr. Rush especially recommends, or by itself, followed up however after a few hours by an ordinary opening draught, such as senna, with manna, or salts.

When it is desirable to keep up action from aperients as long as the disease lasts, salines will be found most appropriate, from their acting at the same time beneficially on the circulating fluids; in which case the artificial seidlitz powder,<sup>1</sup> sulphate of magnesia, or other purgative salts should be given, in small and repeated doses during the whole course of the fever. The combination of salines and purgatives, is in some cases of great use; and the mixture of the liquor ammoniæ acetatis with sulphate of magnesia, although unpharmaceutical, is certainly very efficacious.

In the course of typhus, slight constipation sometimes occurs, when a small dose of sulphate of magnesia out of infusion of roses, or with manna out of distilled or cinnamon water, will answer the purpose required. Should the bowels after diarrhœa become confined, with symptoms of irritation, castor oil must be our recourse, or glysters of simple warm water be substituted for more active medicines.

Apprehensions are entertained abroad of irritating the mucous membranes by the use of purgatives, and constitute one ground of

<sup>1</sup> The potassio-tartrate of soda, with carbonate of soda and tartaric acid.

objection to their employment. In the disorder which we see here, and to which we apply the name typhus, no such result ensues. Nor should we be deterred from employing remedies of this class in the earlier periods, even did we know the fact that irritation of the bowels exists, as diarrhœa with pain in the abdomen frequently cease on the efficient operation of aperients. Many cases of irritation which I saw on my visits to the foreign hospitals, would, (if it were right to form any opinion on a few visits) have been essentially relieved by a good dose of castor oil and laudanum. Of the importance of keeping the bowels open in all diseases, and of the value of purgatives generally, much need not be said, and nothing can be added to the encomiums of Dr. Hamilton, and to our conviction from daily experience; but their especial efficacy in cases where the head is affected, has been stated by Abercrombie, who remarks<sup>1</sup> that he had seen more real or palpable benefit arise from remedies of this description than from any others. Of their value, too, Golis, in his work on Acute Hydrocephalus, speaks in the highest but not exaggerated terms.<sup>2</sup> Venesection, emetics, and purgatives, may then be considered the means by which we can act upon the system generally, and their constitutional effect is beneficial in proportion as they are quickly and properly employed.

The next class of remedies will rather be addressed to the disordered actions themselves, than given with a view of influencing the guiding powers of the system. The class to which I allude consists of mercury, salines, and antimony.

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### MERCURY.

Mercury is resorted to in typhus as a purgative, as an alterative, or else with the view of producing ptyalism, its constitutional effect; and it is also employed when there is ulceration in the bowels, in order to promote cicatrisation. This remedy as a purgative has been already considered. Of its utility as an alterative, or as a means of gently exciting the secretions, there can be little doubt, especially when the tongue is dry and the skin hot. Provided that no irritation exists in the bowels to contra-indicate its exhibition, small doses of calomel or hydrargyrus cum cretâ may be advantageously administered for several evenings together, or at intervals of a day or two.

Extended experience has made no alteration in my opinion of mercury given so as to affect the mouth. In 1831 it was unable to check the fever, although given until it produced salivation; but still in that year when the cases presented urgent inflammatory symptoms, its use was continued, and it appeared decidedly bene-

<sup>1</sup> Abercrombie, p. 54.

<sup>2</sup> Golis, p. 106.



facial, judging at least by the result; but to such cases its use in larger quantities should be confined.

M. Chomel has noticed the utility of giving mercury in repeated doses so as to produce ptyalism,<sup>1</sup> but he does not specify with precision the appropriate cases for its employment. There appear to me three conditions, during the continuance of which the specific effect of this remedy is clearly advantageous; one of these is met with early, the other two later in the disease. The first of these is when active inflammation of the brain has been established. The other two are when during the course of typhus, inflammation has been excited in the lungs, which has gone on to hepatisation, or when ulceration has taken place in the bowels. An important caution respecting the use of mercury when the head is affected suggested itself from a case in which symptoms of active cerebral excitement went on quickly to absolute coma. The employment of mercury was decided upon, and from the imminence of the danger it was freely administered, so freely indeed that sloughing of the jaw eventually took place, and proved in this instance a more fatal disease than typhus, as death ensued from the irritation occasioned by it some months after all typhoid symptoms had disappeared. By keeping the gums slightly sore for many weeks, as related in Case XLIX, page 66, all the healthy sounds in the chest returned, and the solidification of the lung disappeared, which, under this treatment, became free, although it had long been impervious and dull.

There is no remedy which can compete with the hydrargyrus cum cretâ when ulceration has taken place in the bowels. On the local influence of mild forms of mercury in promoting cicatrisation, it is not necessary to dilate, the good effect of this remedy in inflammation of mucous membranes is well known, and when combined with Dover's powder, as employed in St. Bartholomew's Hospital,<sup>2</sup> constitutes an excellent formula; given at intervals of four, six, or eight hours, it allays abdominal irritation, checks diarrhœa, and calms general constitutional disturbance.

It may be further noticed, that when calomel causes irritation, the black oxide may be beneficially substituted. A very similar effect seems to result from the employment of mercury in typhus as in other exanthemata, and the same regulations and restrictions in its use may equally apply to both.

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#### SALINES.

Observation of the fact that certain bodies of this class diminish heat of the skin, probably led to the employment of salines in fever,

<sup>1</sup> Chomel, p. 187.

<sup>2</sup> The pilula hydrargyri cum cretâ composita consists of equal parts of hydrargyrus cum cretâ and Dover's powder, made into a pill with conserve of roses, or treacle.

and experience has confirmed their utility. The older physicians, Boerhaave, Hoffman and others recommend their use, and noticed their effects upon the system, as also their palpable influence upon the blood, when exhibited internally or mixed with it out of the body; but it is still reserved for modern chemists to show the exact changes on which their utility in fever depends. That the blood is disordered in malignant fevers, and that certain saline substances have the power of altering some of its morbid conditions will now be generally admitted; we may, therefore, rationally give salines in order to produce that result, but other changes take place in typhus; local inflammation is often established, capable by itself of producing great constitutional derangement, of giving rise to new sympathies, and materially complicating the disorder. In treating fever, we are not simply contending with a poison like opium or prussic acid, the effects of which are owing, as Müller states, to the action of the blood, thus contaminated, on the central organ of the nervous system,<sup>1</sup> but we have to combat numerous morbid conditions, one only of which is a diseased condition of the blood. That salines are valuable in the treatment of various disorders, has lately been much insisted on by Dr. Stevens. In support of whose advocacy of the humoral pathology, it may be said, that the ideas of Cullen, attributing all disease to changes in the tissues themselves, that is, in the solids, had too completely superseded the ancient notions of humoralism. The ideas of Bichat and Andral, that both solids and fluids suffer in fever, appear more consistent with reason than an exclusive reference of all the phenomena in this class of disorder to either system. We cannot doubt but that disease may commence with either; but, begin where it may, both must participate. "*La physiologie nous conduit donc à admettre qu'à la suite de toute alteration des solides il doit y avoir alteration du sang, de même qu'à la suite de tout modification du sang il doit y avoir modification des solides.*"<sup>2</sup> Such is M. Andral's conclusion on this subject, and one which seems palpable enough, and hardly capable of receiving a contradiction, did we not see the advocates of solidism or fluidism blind to all other doctrines except their own favourite theory.

Dr. Stevens has shown the great importance of various saline substances as constituents of the blood; and has forcibly called public attention to the fact of their agency in rendering the blood florid, and duly stimulating the heart and other organs; such are no doubt some of their essential properties, and will furnish appropriate reasons for their employment. Some medical classification, however, of these substances should be made. Salts are the combination of acids with salifiable bases; those recommended by Huxham, are carbonate of potassa or sesquicarbonate of ammonia with lemon juice and nitrate of potassa. Glauber's salt, the sulphate of potassa, was generally employed by Hildenbrand. The salines in common use at St. Bartholomew's hospital, are tartrate of soda given during

<sup>1</sup> Müller, p. 629.

<sup>2</sup> Andral, tom. i. p. 528.

effervescence, and the liquor ammoniæ acetatis of the pharmacopœia diluted with twice its quantity of water; this last salt in solution, commonly known as spirit of mindererus, was raised into celebrity by Boerhaave, but derived its name from Raymond Minderer, who first recommended it in 1621.<sup>1</sup> Although some practitioners have doubted its utility, and maintained that large doses may be given without producing any obvious effects, yet it cannot be imagined that its use can be so very general without benefit authorising its employment. Dr. Stephens especially recommends the muriate and carbonate of soda, and the chlorate of potassa.<sup>2</sup>

In the above list of salts, some contain a mineral, others a vegetable acid; the first of these resist the action of the stomach, enter the blood, and, like the nitrate of potassa, are rejected unchanged; the latter, however, the salts composed of a vegetable acid, as the citrate of potassa for example, easily decompose in transitu; in their classification therefore some arrangement is desirable: as when our object is to give a salt with a view to its stimulant effect, we choose one, as the nitrate or sulphate of potassa, which does not undergo decomposition; but if it is our wish chemically to affect the circulating fluids, we have a choice among the alkaline carbonates or the compounds of them, with a vegetable acid, by which means the alkaline base is eliminated, and the excess thrown out by the kidneys.<sup>3</sup> The effect of salts mixed with the blood, is to render that fluid more stimulating to the heart; but by preventing the tendency to coagulation, their effect must be of a lowering tendency. Much is yet, however, to be ascertained upon this point, before we can consider that we have discovered the full and entire grounds upon which their administration should depend, and our choice in their selection be guided. An interesting and instructive sketch of the history of salines as remedies, and some valuable remarks on the subject, by Dr. G. Burrows, will be found in the 14th volume of the Medical Gazette.

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#### ANTIMONY.

It was in typhus fever that such enormous doses of potassio-tartrate of antimony were given by Rasori: he used it, as we are informed, in his treatise on the petechial fever, with equal advantage and freedom. Beginning with it immediately in considerable doses, and persevering until benefit appeared, he not unfrequently administered from six to eight grains in the course of the four-and-twenty hours. In order to prevent its rejection by vomiting, he consulted the patient's taste in the selection of a vehicle, interdicting

<sup>1</sup> Merat et De Lens, Dic. Univ. de Mat. Med. tom. i. p. 242.

<sup>2</sup> Stephens, p. 300.

<sup>3</sup> Paris Pharmacologia, 1833, p. 133.

only such substances as would in the least degree excite the circulation. He informs us, that the effect of this medicine was to occasion amendment, without producing any sensible evacuation. It was usually exhibited by the mouth, but once as a glyster,<sup>1</sup> in the case of a patient who was insensible. He justifies the plan by his list of patients, and declares that he did not lose above one in a hundred. It should, however, be observed, that all epidemics become gradually milder on their decline, requiring very different treatment from that which was called for at the beginning, a fact which we should carefully bear in mind, both in regulating our measures and calculating the proportion of deaths. The mortality from typhus in our country, is certainly much greater than in the north of Italy, as is shown by the Milanese professor. This may have much to do with the circumstances under which patients may be placed, as well as with the period of the epidemic at which the calculation is made. "A large mortality," observes Sir Gilbert Blane, "may be considered as a presumption of an hospital being well conducted, as far as it indicates that the most severe diseases had been admitted, or, in other words, that the most judicious selection of cases has been made."<sup>2</sup> Rather than again recur to the rate of mortality, I may observe that in the Hotel Dieu it was one in three; in the fever hospital, calculated by Dr. Armstrong, as one in six. Dr. Bateman estimated it at one in twelve. But to return to our subject; antimony, although lauded so highly by Rasori, is not without its opponents. Dr. Bateman made use of it among other remedies in his early practice, but seldom prescribed it latterly, and expresses his disappointment with its use either in the solid or liquid form: he doubts too its diaphoretic power unless it excites constant nausea, which is objectionable in typhus, and considers on the whole, that it not only failed to produce the expected benefit, but actually contributed to augment the distress which it was given with an intention to relieve.<sup>3</sup> In the form of the potassio-tartrate it is employed by me, but by no means indiscriminately; the rules which guide its direction are chiefly to be derived from the condition of the patient. Antimony powerfully depresses the system; hence it obviously should only be used when there is inflammatory action and strength. Müller remarks of antimony, neutral salts, mercury and other substances, that "they act by producing a change in the blood, depriving it of its power of coagulating; this," he continues, "is of course effected by a change produced in the fibrine."<sup>4</sup> We may then see that in many cases its use would be of very questionable utility, and frequently absolutely inadmissible. It is however, frequently added to the salines of the hospital, either to the tartrate of soda draught, or to that containing spirit of mindererus.

Under the heads of bleeding, emetics, purgatives, salines and antimony, are comprised that portion of the treatment in typhus which

<sup>1</sup> Rasori sulla Febre Petecchiale, p. 25.

<sup>2</sup> Med. Chir. Transactions, vol. iv. p. 116.

<sup>3</sup> Bateman, p. 109.

<sup>4</sup> Muller, p. 363.

is usually called by that unscientific appellation, antiphlogistic. No one speaks more decidedly in its favour than does Professor Rasori; in spite of the great loss of muscular power, the depressed look, the comparatively slight augmentation in the heat of the skin, or trifling increase in the frequency of the pulse, still he inflexibly enjoins depleting measures. Dr. Bateman also urges us not to allow "the appearance of languor and debility to induce the disposition to swerve from the antiphlogistic plan in diet, regimen and medicine." My own observation has taught me fully to coincide with these views, and always to resort to some such measures at the first appearance of the disease. There is, however, a certain period when my conviction is decidedly favourable to remedies of an opposite class, not however given with the view of acting against the disease, but to support the power of the system. Some consideration of this other class will next be offered, after noticing one agent more, namely, the application of cold to the surface of the body, as an accessory to the division now under consideration.

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#### COLD TO THE SURFACE OF THE BODY.

On ordinary occasions and in general practice we may consider that Dr. Currie's suggestion of cold affusion over the body is unadvisable and unnecessary. In certain periods of the year, however, and in warmer climates, such a plan may be advantageous. This method of reducing the temperature of the body is at all times better adapted for scarlet fever than typhus, but it was in this last disease that Dr. Currie first resorted to this energetic measure. An opportunity presented itself to him of trying it during very cold weather, in the month of December, 1786, when a contagious fever broke out in the Liverpool infirmary; eight patients were under Dr. Currie's care; he employed it in seven, all of which did well; the eighth was treated in the usual way, with bark, wine, and opium; but died: it appears, however, that this person was extremely weak before the disorder commenced. "I have preserved," says Dr. Currie, "a list of 153 successful cases of the low contagious fever in which the cure was chiefly trusted to this remedy."<sup>2</sup> The next occasion was in the month of June, 1792, when the typhus or jail fever made its appearance amongst the men of the 30th regiment. That the disease described by Dr. Currie is the one we have been previously considering may be inferred from the leading symptoms, which he informs us were pain in the head, suffused eye, great dejection, stupor, low delirium, debility, cough with expectoration occasionally streaked with blood, petechiæ and hemorrhage; he further remarks that this disorder was the low contagious fever of

<sup>1</sup> Bateman, p. 102.

<sup>2</sup> Medical Reports, vol. i. p. 7.

our country, the typhus of Cullen, the contagious fever of Dr. Lind, in popular language, called the nervous fever, and, when particular symptoms arise, more generally known as the putrid fever; points which clearly show that it is the same disease which we have now daily to contend with. Two and thirty cases occurred amongst the men in the regiment alluded to, of whom two died. The cold affusion was tried in thirty cases; it was made with water taken from the Mersey, which contains a thirty-second part of sea salt: this was poured on the naked bodies of the soldiers; it was employed sometimes once, sometimes twice a day, at various periods, from the commencement of the disease to the end of the first fortnight; the temperature of the water was from  $58^{\circ}$  to  $60^{\circ}$  Fah. All recovered who were thus treated; the two who died had been bled, but were from the first unpromising subjects, and had been weakened by previous residence in the West Indies.<sup>1</sup> Useful as such a remedy may be in warm climates, and during the hot weather even in our own, when we have to deal with the hardy bodies and daring character of the seaman or the soldier; it is clearly too inconsistent with the feelings and the habits of ordinary society to be generally advised, and in truth is not found by experience as serviceable as was at first supposed: still we may draw some important inferences from its use, and find some modification of the plan adapted to more general employment. We learn in the first place that we need not be too solicitous in keeping our patients warm, and that cold is not so prejudicial as many might be supposed to think; fresh air at any rate can be admitted with impunity. Next we learn that sponging the body may be freely practised, and is certainly of use, refreshing the patient, provided that we adhere to Dr. Currie's rule in taking care that the temperature produced be not lower than natural. Of course when pneumonia is present, or the mucous membranes inflamed, we should neither think of the affusion nor of the application of cold generally to the surface of the body. Its local employment, however, is allowable in certain instances, such as when the serous membranes are inflamed, or the meninges of the brain excited. Headache is a very early symptom, and in the regular and mild cases subsides before the others. The use of cold to the head is undoubtedly beneficial in this state, and quite imperative if active excitement has been produced. When inflammation has been set up, general bleeding from the arm should be practised if there be sufficient power in the system, but local depletion, by cupping, if the strength has been much reduced; and after these evacuations cold will not only be grateful to a patient, but tend to allay the excited action. This may be produced by evaporating lotions, or in a greater degree by ice broken into pieces of the size of a large nut, tied in a bladder, and applied immediately to the scalp, with the additional advantage of cooling the head, being free from the objection to wet applications, that of rendering the pillows damp and the

<sup>1</sup> Medical Reports, p. 15.

patient uncomfortable; or a stream of water may be poured on the head and continued for a time; this, however, cannot in general be borne long, from its depressing as well as cooling effect. Fresh sea water is not always at command for sponging our patients, as a substitute for which a mixture of one part vinegar to four or five of water may be employed on ordinary occasions. More elegant combinations of spirit of rosemary with *mindererus* spirit largely diluted, or eau de Cologne and water, may be substituted, but they do not possess any superiority over the more homely mixture of vinegar and water.

Cold internally in the way of drink is ardently desired, and may be freely allowed. The longing for cold fluids is so strong, and so great the comfort and pleasure they afford, that we cannot but think them salutary, or should not prohibit them without good evidence to the contrary. There can be no objection even to iced liquids in the early stages. Much has been said on this subject; the ancients allowed cold drinks in fevers, as also did Hoffman with restrictions. In Italy they were allowed, but Boerhaave, on the other hand, thought them dangerous, and he insisted that they should be warm, he was followed in this by Van Swieten. Cullen did not recommend cold, at least not universally. Hildenbrand advises the use of warm fluids, with a view of throwing out the eruption. Cold, however, may be permitted *ad libitum*. When the thirst is very intense and almost insatiable, instead of allowing the patient to swallow as much as he desires, it will be often sufficient that he wash the mouth, as the thirst arises in a great measure from dryness, which is owing to the want of secretion in the glands of the fauces. Nothing is more agreeable than cold water, or toast and water, which is the usual beverage of my patients.

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### STIMULANTS.

Stimulants are absolutely necessary at certain periods in many cases of typhus; the doubts which have arisen in the minds of some practitioners as to their utility are due to the injudicious administration of them. My object in their employment is either to counteract mere debility, or to remedy an actual morbid condition, when, after active determination to a part, congestion continues and gives rise to symptoms of irritation. Most authors agree that this class of remedies is to be shunned in the earlier stages. Dr. Bateman was so satisfied of this truth, that he says, "Whatever the supposed indication of debility may be in the earlier and middle periods, the administration of camphor, ethereal fluids, and aromatic confection, &c., should be religiously avoided."<sup>1</sup> They are, however, sometimes indispensable, both early and late, in the disease;

<sup>1</sup> Bateman, p. 102.

but when used early they are only employed in an emergency, and then they must be abandoned as soon as the immediate object has been attained and the powers of life aroused. A good illustration of the necessity of their employment, and the necessity also of their abandonment as soon as their beneficial operation has been secured, may be found in Dr. Bateman's own work; where the following case is related, teaching him, as he says, a lesson which left an indelible impression on his mind: "A middle aged man was brought into the house of recovery in the lowest possible state of collapse, to all appearance in articulo mortis; the extremities were cold, the trunk bedewed with cold sweat, the pulse imperceptible at the wrist; in short, a heavy respiration and some feeble power of deglutition were the principal signs of life. Hopeless as the case appeared, I directed him to be kept warm, and to be supplied, at short intervals, with a tea-spoonful of wine, or spirits, as long as he could swallow. To my astonishment, I found him on the following day quite sensible, and loudly demanding food. The skin was warm, the pulse firm, and he had recovered a surprising degree of vigour. Fearful of withdrawing the support of some stimulus from a person whom I had seen the day before at the point of death, I continued his supply of wine; but on the following morning he was delirious, his eyes soon became red and ferrety, his skin hot, his pulse sharp and frequent, and in a few days he died with all the symptoms of phrenitis, terminating in effusion."<sup>1</sup>

Yet many now alive are solely indebted for their preservation to wine, brandy, and other stimulants; of wine it has been remarked by Hildenbrand, "the older and stronger it is the better;" but as it excites without strengthening the system, it should be combined, when there is real debility and exhaustion, with other things more capable of restoring vigour, and administered in every way that is grateful to the patient's taste, without much regard to quantity, until sufficient power is excited in the frame to maintain the improved circulation. Under this treatment, delirium and convulsions will subside, diarrhœa cease, a dry tongue become moist, the feelings of languor depart, strength be acquired and consciousness regained. There is no one period at which stimulants may not be necessary, though they are rarely so in the earlier stages, and are most serviceable on the decline of the disorder. To know the proper moment for their administration is a point of the greatest difficulty in practice, as there cannot be any positive sign to go by, no fixed rule upon the matter; the great object must be to maintain strength enough in the heart to enable the circulation to continue. Stimulants are not to be considered as an essential or necessary part of the treatment, and should neither be universally employed nor universally deprecated. Given upon the principle just laid down, they are admissible at all periods, and in every state of complication, provided that the heart is unable properly to exercise its functions; in other

<sup>1</sup> Bateman, p. 125.



words, during the existence of real debility. There is no one symptom that I know of which will preclude their exhibition, although we are told by M. Chomel that they should not be employed if delirium be present.<sup>1</sup> Still it is my firm belief that many now alive would have swelled our lists of mortality had this direction been invariably followed in the third or fourth week of the disease. The face will be flushed, the eye red, the skin hot, the mind wandering, nay, furiously excited, rendering coercion absolutely necessary, yet all this may be coupled with such signs of debility, indicated by the pulse and the coldness of the extremities, as to render wine and brandy necessary, which, so far from aggravating the symptoms, will often at once relieve them and rapidly lead to recovery. It cannot be disputed that vessels which have once been the seat of local excitement will remain passively dilated, and that such a condition may be remedied by means which are capable of giving tone to them, as is well explained by Andral.<sup>2</sup> On this subject it has been observed by Dr. Thomson, that "when fever is attended by evident symptoms of debility, the antiphlogistic plan is in many cases inadmissible." The term debility, it must be clearly understood, is not used solely to express feelings of simple languor or depression on the patient's part, nor the mistaken notions of weakness on that of his friends from observing the absence of muscular energy in the sick, nor yet the indirect debility produced by local inflammation, but that real loss of power which can alone be ascertained by a professional man, a state in which nothing like a general inflammatory condition is indicated by the skin, the tongue, or the pulse.

Under the head of stimulants, blisters and counter-irritations may be ranked; and of these some short notice must be taken.

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### COUNTER-IRRITATIONS—BLISTERS.

The employment of blisters, as practised by us, has been declared by Hildenbrand to be "barbarous," but no one who has witnessed their tranquillising effects, if well timed, can join in the condemnation of a most valuable assistant. I have known patients shrieking from pain in the head, distressed at light, and intolerant of noise, fall into a tranquil sleep on the application of this valuable remedy. Rasori condemns them because they are stimulants, which they certainly are, but when the brain is oppressed by congested vessels on the eve of pouring out a fatal effusion into the cavities of the brain, and when excitement and irritation are on the verge of lapsing into apoplexy or stupor,—is a useful stimulant to be then despised, or the beneficial application of a blister, even over the whole head,

<sup>1</sup> Chomel, p. 479.

<sup>2</sup> Précis d'Anat. pat. tom. i. p. 50.

to be avoided or looked upon as barbarous. Hildenbrand considers that the great advantage of this remedy consists in the ulceration which it produces, and in the relief obtained from the consequent discharge. We value them in this country as well for their exciting properties as for the alleviation that they afford to injected vessels. Consciousness will even return on their application when stupor has been produced. This stupor is looked upon as essentially adynamic by Chomel, who mentions two causes on which it depends, one is debility, the other sympathy with the intestinal canal. My remarks on the utility of blisters to the head refer to the first, but to the second when applied to the abdomen. In this country, blisters are usually placed near or upon an affected organ, but abroad very far from the parts which it is intended that their application shall relieve. Thus in affections of the head we commonly apply them to the scalp, the nape of the neck, or between the shoulders, but on the continent they would be put upon different parts of the lower limbs. Hildenbrand thinks the calf of the leg the most eligible situation, and recommends that they should be long kept open. Of this practice I am unable to speak from my own observation, but well know the advantage of mustard cataplasms when applied to the legs or feet: these have the additional advantage of rousing the brain and causing active determination to the lower extremities, which are often cold at the period when local stimulants are required.

We generally put on blisters at night, though some consider that the day time should be preferred, and in case of coma, either actually present or fast approaching, no time of course should be lost; in other cases, however, it is more convenient to apply them in the evening.

Sydenham advises their early use in fevers, where the head is much affected, and was himself in the habit of ordering one as soon as bleeding, his first step, had been practised.<sup>1</sup> This plan, however, likely enough to relieve headache in slight cases, would incur the hazard of aggravating it in severer ones. It has been urged against the employment of blisters,<sup>2</sup> that they are likely to give rise to gangrene; but I have never seen any ill effect of this sort resulting from them, but an irritable state of the skin sometimes comes on, which may easily be allayed by soothing measures.

It cannot be necessary to enumerate here the means we employ to accelerate the action of blisters, nor the ordinary cautions to be observed with respect to the length of time either they or the sinapism should be allowed to remain in contact with the skin, which should not be longer than enough to produce the desired effect, nor should a blister ever be kept open, as an over-stimulus to any part will probably be attended with troublesome or serious consequences.

<sup>1</sup> Sydenhami Opera 8vo. Lugd. 1726, p. 224.

<sup>2</sup> Chomel, p. 25.

## SEDATIVES.

Much has been said by different authors upon the use of opium in typhus. Dr. Bateman considers that opiates should be banished from practice, and wishes their entire rejection from the list of remedies. Rasori thinks that they are always erroneously employed to procure sleep. Hildenbrand says "we have used opium recommended by Sydenham, Brown, Cullen, Campbell," but considers that it increases stupor, prolongs the disease, produces dangerous metastases and apoplexy, prevents good from other remedies if given in large doses, thinks it is of no use in smaller ones, and adds that the English do not sufficiently consider its narcotic and poisonous effects. If, however, there is any one remedy of which the advantage is undoubted—if the immediate subsidence of untoward symptoms follows the exhibition of any medicine—if future amendment be the test of utility, then is opium a valuable remedy: but it is not to be employed largely at any period, nor resorted to in the first stages, nor when stupor is present or approaching; but if given at that period of the disease when there is increased action without power, and all the signs which indicate irritation, good will invariably result. Sydenham well knew the value of opium, and he freely employed it in the exanthematous diseases; of its use in small-pox he says, "*medicamenta paregorica æque indicari in variolis confluentibus mihi videntur, ac indicatur quodvis remedium in quovis morbo; cum hic quasi specifica sint perinde ac cortex peruvianus in febris intermittentibus.*" He goes on to state the good effects: "*quamvis haud ignorem paregorica non virtute aliqua præcise specifica operari, sed isti solum indicationi respondendo, qua sanguini et spiritibus consopendis, et in ordinem redigendis, operam damus.*" Further he adds, "*at quod dicere animus mihi erat, difficile est admodum paregoricorum dosin, quocumque in casu ista indicantur certo determinare. Etenim ea methodo sunt exhibenda, ut si prima dosis metam non attingat, alia atque alia debito tempore adsumatur, donec tandem medicamentum medici votis responderit; non tam ad ingestam anodynæ quantitatem quam ad effectum, quod in ægro producendum erat, respectu habito.*"

Hamilton, Armstrong, and Gooch, have borne testimony to the efficacy of opium in subduing inflammatory action. Dr. Stokes comes to the conclusion, that when depletion by blood-letting, or other antiphlogistic means is inadmissible, and the system is in a state of collapse, the exhibition of opium has a powerful effect in controlling the disease. But it is neither in subduing inflammatory action, nor as a remedy against collapse, that opium exerts its most signal effect in typhus; it is in that state which Sir Gilbert Blane has observed to be indicated "by tremors, pervigilium, and low

<sup>1</sup> Sydenhami Opera, 8vo. Lugd. 1726, p. 372.

delirium."<sup>1</sup> Of these signs the "pervigilium" is the most important. Vigilance is the guide to our employment of opium; this is the morbid state which opium is most calculated to remove. To quote a case or two in illustration of this fact seems to me almost absurd, when it is shown in hundreds at the hospital; it is there a daily occurrence to find that a patient, who has been without sleep for several nights, whose whole frame is in a state of tremor, actuated by some erroneous idea, and constantly endeavouring to get out of bed, falls into a tranquil slumber on taking a dose of opium, and awakes refreshed and conscious, after several hours of calm and gentle sleep, during which the secretions will often be restored, the tongue becomes moist, and a warm perspiration breaks out. It is not by large doses of this medicine, or its principles, but upon their right application that good will depend; nay, small doses answer the purpose in very many cases, and to repeat small ones, as Sydenham advises us, is safer practice than to give a large one: our object is not to oppress, but to soothe; to do enough, but no more. A valuable paper upon this subject, by Dr. Latham, was read before the College of Physicians, and is to be found in the tenth volume of the Medical Gazette. On the subject of the dose, I am sure that no apology need be made for quoting a few passages from the paper alluded to. The author observes "that the success of the remedy turns entirely upon its procuring sleep; and it is more or less complete in proportion as the sleep procured is, within certain limits, of longer duration. When, therefore, in a case of fever after long wakefulness, accompanied by wild delirium and a violent exertion of muscular force, with such a state of pulse as absolutely forbids the use of further depletion; when in this extreme case we administer the extreme dose (for such it is) of twenty minims of tincture of opium, we must be content to wait patiently the result: for the use of every other remedy is now sacrificed to this single one: indeed, while it is in the course of operation, the effective employment of any other is necessarily precluded. In cases where the delirium and excitement, accompanied by wakefulness, are less in degree, a smaller dose of opium may be relied upon for effects equally beneficial. In such cases I have been accustomed to give five minims of the tincture every hour, or every other hour, until the patient begins to doze."<sup>2</sup>

Dr. Bateman's objection to opiates therefore, that "they not only fail to relieve the distressing symptoms, but actually increase the disturbance of the sensorium, and the general distress, and at the same time parch the tongue, augment the thirst and heat, and continue to lock up the alvine discharges and other excretions;"<sup>3</sup> must have reference to the improper mode of employment or period of the disease at which they are administered. The results from the exhibition of opium show that the state of the brain essentially

<sup>1</sup> Sir Gilbert Blane, p. 256.

<sup>2</sup> Lond. Med. Gaz. p. 15.

<sup>3</sup> Bateman, p. 110.

varies in different periods of the disorder ; given early in the disease it will produce all the ill consequences noticed by the last-named author, and as he says, may then be decidedly injurious, and aggravate instead of relieving the symptoms intended to be remedied, but which if properly employed, it is capable of permanently alleviating. Opium acts here as in delirium tremens, and with good reason, for the state of the brain or its membranes is identical in the two cases, as Dr. Latham has remarked.<sup>1</sup> Dr. Marsh also notices the resemblance of the cerebral symptoms in fever to those which occur in hard drinkers, and in such as have kept their minds continually and morbidly excited.<sup>2</sup>

There is still another condition in typhus when opium is likely to be of service, and that is during sloughing. Dr. Thompson says, that there are very few cases of mortification in which if the patient survives for any time, it is not at some moment required.<sup>3</sup> In the case of Davis, (related Case XXXIX,) this medicine was freely employed ; it tranquillised the system, procured rest, during its use the secretions were restored, the appetite returned, and to its beneficial influence recovery in that extraordinary case is mainly if not solely to be ascribed.

Hildenbrand preferred camphor, but opium or morphia is employed by me as a sedative, being the most certain and the best, but it may be combined with hyoscyamus, a practice which would be right in the case of children ; but they rarely require any such remedy, the head affection being much slighter with them than with adults.

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### TONICS.

It is highly important to know what substances have been tried and found unavailing in the cure of typhus, as well as to learn what are likely to prove beneficial. Again, therefore, shall I refer to Dr. Bateman, whose work bespeaks as much candour as ability : he says "it is to be wished that cinchona were erased for ever from the catalogue of medicines employed for the cure of this disease. In the early part of my practice, agreeably to the doctrine of the times, I resorted to the decoction of cinchona on the first appearance of languor and debility, the increase of the symptoms was easily imputed to the untractable nature of the disease, or deemed the necessary result of its progress, until it became obvious from the repeated occurrence of the fact, that the tongue which had been on the day before the administration of the bark moist, and exhibiting a gray or yellowish mucous fur, was on the following morning dry, or even brown ; that the skin was hotter or more parched, with a flush on

<sup>1</sup> Lond. Med. Gaz.

<sup>2</sup> Dublin Hospital Reports, vol. iv. p. 501.

<sup>3</sup> Lectures on Inflamm. p. 178.

the cheek ; that the pulse was quicker and harder ; the thirst increased, and the sleep more disturbed. That these are the effects of cinchona, in the fever which I have had occasion to treat, even when the patient has made some progress toward recovery, so long as any fur continues to whiten the tongue, I have had such manifold proofs, that I have of late scarcely ever prescribed it, even during the state of convalescence ; having again and again witnessed a return of headache, with the concomitant symptoms of irritation during that state on the commencement of the use of this medicine.<sup>1</sup>

It is not a work of supererogation to extract this passage, for Hildenbrand especially directs the use of bark as a means of correcting the putrid character of typhus.

Tonics, at least the stronger bitters, do not seem a very manageable description of remedies : and I seldom resort to their use, from having been repeatedly obliged to abandon them. Quinine was given with apparent benefit in the case of Davis, above alluded to, in combination with opium ; but in this instance all original febrile symptoms had subsided for several weeks. Hildenbrand prefers the *arnica montana*, and also speaks well of *angelica*, *valerian*, *calamus aromaticus*, *contrayerva*, and *serpentary*, which is praised in all works on *materia medica* as a valuable remedy in typhus, from its combination of diaphoretic with tonic properties ; but we must not forget that this disease goes through a certain course, and we should rather look to assist the processes of nature, or at any rate not to counteract them, than by endeavouring to force perspiration, or prematurely to give strength, incur risk of aggravating the disorder, or occasioning a dangerous relapse. It is easier to say when tonics should not be used, than predict with certainty that good will result ; they should not be given till all fever has subsided, the skin become moist and the tongue clean, and then the lighter and purer bitters only, such as *hop*, *calumba*, or *gentian*, should be tried. The mineral acids may be usefully employed ; the diluted sulphuric acid in the form of compound infusion of roses, either singly, or in combination with a bitter, is one of the best tonics after this or any other of the exanthemata.

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#### RESTRAINT.

If there is furious delirium, and patients feel the singular inclination for self-destruction, or from great apprehension and mistrust of those about them are likely to attempt it, restraint is of course necessary to prevent their inflicting injury upon themselves or their attendants. The strait waistcoat may be employed ; but there is an objection to its use in fevers, and in those disorders in which there is increased temperature of the body, especially where

<sup>1</sup> Bateman, p. 130.

it is desirable to reduce the heat by sponging, &c. The mode of coercion employed at St. Bartholomew's Hospital is by straps which confine the patient to his bed in a supine posture; and these on the whole are superior to the old fashioned method. Something on the score of prejudice is to be considered, and there is certainly much less apparent violence in applying the straps than the jacket, which in popular belief is more used in mania than delirium. These straps are made out of girthing of the ordinary width, and of sufficient length to be attached by tongues and buckles to the frame of the bed on either side. Three are usually sufficient, they are placed immediately beneath the patient, one under the shoulders, another beneath the loins, the third under the ancles. To these straps thus immoveably fixed, smaller narrow ones are attached, and so adjusted that when the patient is laid down they can be made to confine the ancles, the arm above the elbow, and the wrists. It is sometimes necessary to pass a fourth strap over the chest when the patient is very furious and unmanageable, but this is not very often required. A patient may thus be completely secured or partially liberated; by keeping the ancles alone fastened he will in some cases be sufficiently restrained, or these may be freed while the arms remain fixed. By this method the person is secured in a position best adapted for the performance of those measures which may become necessary in the treatment of typhus, such as the introduction of the catheter, the injection of enemata, &c. Besides this, the moral influence of restraint is advantageous even in delirium; those previously furious will often at once become tranquil, and when thus coerced make no objection to whatever is recommended for them; it is better to employ the straps than incur the hazard of irritating the patient by opposing an inclination to quit his bed or room, especially if he be powerful, and exhibit other signs of resistance and violence.

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Under the head of treatment, some useful hints may be given, and some important auxiliaries be alluded to, for instance the water bed. This proved extremely serviceable in several cases where suppuration from a considerable surface had taken place: it is a source of great comfort, not only by removing pressure from an irritated part, but from the equable support which it affords. The great advantage which may be derived from it was strikingly illustrated in the thirty-sixth case, one nearly allied to carbuncle. By this ingenious suggestion of Dr. Arnott's we are now enabled materially to relieve suffering, and thus to accelerate recovery.

It is very often necessary to draw off the urine, as patients seem insensible to the impression which is produced in health by undue distention of the bladder; it is therefore not only important to inquire whether or not it has been lately evacuated, but to ascertain its real condition by an examination of the hypogastric region;

for although some water may have dribbled away or been passed, still the bladder may be distended, as we know to occur in retention from other causes. When this takes place, it is essential that the urine be drawn off night and morning.

There are many suggestions in Professor Hildenbrand's work,<sup>1</sup> which are quite contrary to any ideas entertained in this country, such as compelling the patient in the earlier periods to take exercise by walking about the room, supported in the arms of attendants, or rousing him several times in the course of the day, with the view of dissipating the stupor. There are also many remedies which deserve notice from having been tried, but without having their utility confirmed : such for instance as the chloride of sodium. M. Chomel administered it internally, and bathed his patients with it ; at first it bade fair to prove valuable, as he only lost two out of twenty patients in one year ; but in another, his mortality was twelve in thirty-seven. He then tried carbonic acid, but still more died ; so that both these modes of treatment were in turn abandoned as unsuccessful.<sup>2</sup>

In connection with this division of my subject, reference may be made to those indications and appearances by which we may form a probable conjecture as to the future result of any case.

As typhus has certain periods to be gone through, and as great and striking alterations are not to be expected when the disorder runs its longer course, and as the symptoms are very alarming, and well calculated to excite serious apprehensions in those around the patient, we must watch accurately all the signs which may be exhibited, so as to enable us to entertain and to impart hope and encouragement, where there is so much to dread, and where those ignorant of the profession must naturally be ready to despair. It is, however, important for our own reputation that the encouragement afforded them be based on substantial grounds. Some of these signs will therefore be cursorily noticed.

Rasori says, that the severity of the attack is in proportion to the affection of the skin ; this by no means accords with my own observation. I have often seen a very favourable disease follow a most abundant crop, both of the exanthematous spots and of the petechiæ : and in cases of scarlet fever, according to my own experience, fatal results most commonly occur when the earlier symptoms are mild. In typhus, more is to be inferred from the course of the symptoms, than from either the mildness or severity of their commencement. It is of better augury that the disorder be severe at its onset and readily yield to active remedies, than exhibit less signs of urgency at its beginning, and the patient show early real indication of debility. We cannot speak much of good signs at the commencement, nor need we ; but there are some indications of an opposite tendency, such as either furious delirium or the most extreme prostration,<sup>3</sup> which are calculated to justify doubts. It is

<sup>1</sup> Hildenbrand, p. 264.

<sup>2</sup> Chomel, p. 458.

<sup>3</sup> Ibid. p. 434.



only as the disease advances that we can form more decided opinions on this head. We must not be sanguine when the symptoms of the period, which Hildenbrand has denominated nervous, come on earlier than usual; when, for instance, there is a black and dry tongue, tremors of the limbs, a tendency to dysentery, a position low in the bed and invariably flat upon the back, absence of consciousness, and want of power to retain the evacuations. Tendency to hemorrhage is a much more serious omen late than early in the disorder. Extreme rapidity of the pulse is very much to be dreaded; whenever it is 120 we cannot be without apprehension for the result; and in proportion as it increases in frequency, our expectation of a favourable termination must diminish. A medical man well knows how to appreciate a return with aggravation after a partial subsidence of the symptoms. There are few indications of a more alarming nature than that which has been called in medical language *carphologia*, which means picking the bed clothes: This, or a movement of the hands, by which patients appear to trace some imaginary object passing before them, never occurs but in very serious cases, and at a time of great peril. It has been attempted to explain this symptom by supposing a partial loss of power in the retina; this cannot, however, always be the case, as the automatic movements will continue after the patient's eyes have been completely closed, so as to exclude all possible access of light.

Deafness, which annoys the patient, and is a source of great anxiety to friends, is by no means a bad symptom. Dr. Bateman indeed looked upon it as favourable. An inclination to take nourishment is decidedly a good sign, but the best of all, and the one upon which I mostly rely, is the position of the body; an easy inclination on the side may always under any circumstances inspire us with confidence and hope.

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 DIET.

Little need be said upon the subject of diet, as the ordinary rules of treating febrile disorders will also apply to this. The appetite itself is a guide to us, cold drink is all that is desired at the commencement of the attack, and all that is necessary to be given. The first drinks may be whey and barley or toast and water. Milk is our next step, and the vegetable jellies, tapioca, sago, arrow root: but nothing stronger than these should be allowed, according to Rasori and Bateman, till absolute convalescence. Cases, however, will occur where nourishment must be supplied; and beef tea, animal jellies, as isinglass or calf's foot jelly, may then be liberally allowed; these, however, should be withheld during the inflamma-

<sup>1</sup> Chomel, p. 439.

tory period, and when the pulse is sharp, though mere local inflammation must not deter us from administering wine and nourishment, as it is neither bad nor inconsistent practice to address such means to the system generally while we are even cupping and leeching to relieve local inflammation; this double treatment is often necessary, and I am sure is very beneficial. We are told that relapses frequently occur abroad, but with us they are extremely rare; the fever goes regularly through its course, all complaint ceases, and weakness alone remains. That the disease has terminated, is in most cases obvious enough; the countenance acquires its natural character, the tongue becomes quite clean, the skin soft, and the appetite craving; if it be indulged, disturbance of the system will be induced, but by carefully withholding the stronger nutriment until this period, and by taking care that when they are allowed it should be in moderation, there is little apprehension of a relapse.

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#### PROPHYLACTIC MEASURES.

Typhus prevailed to so formidable an extent over Italy in 1817, that it was found necessary by the government to take precautionary measures for the public safety. Officers were appointed, whose duty it was to purify houses, and lazarets were established, admission into which was strictly prohibited to all but the sick and their attendants: on quitting them all were submitted to the sanatory process of fumigation, &c. Such rigorous measures have not been necessary with us: still a modification of them is occasionally called for; when, for example, this infectious disease breaks out in prisons or workhouses, it becomes imperative to separate the sick, and to cut off their communication from those in health, to diminish numbers in a given space, to increase rations, to grant additional allowances, and to purify apartments by whitewashing, &c. The temporary prevalence of such a disorder has led to the permanent establishment of fever hospitals or houses of recovery, both in London and the provinces; these institutions are real blessings to a community when the alternative is between a patient's admission into such an establishment and being left at home to contend with disease under every disadvantage of bad ventilation, ill attendance, and want. At Manchester and Liverpool, such hospitals have been founded with the happiest effects, relief is afforded to the sick, and extension of the malady by contagion prevented. The necessity for some such asylums and their value will readily be imagined, where the regulations of hospitals prohibit the admission of patients labouring under infectious fever: but a question arises as to their utility and benefit when no such exclusion exists; in my opinion it is both injurious to patients and hazardous to attendants that many cases of infectious fevers should be brought together, and it

is my belief that a certain proportion may without injury be admitted into the wards of any hospital. The remarks of Dr. Currie upon this subject are apposite and just.—“Contagious disease,” he says, “and more particularly fevers, have in general been excluded from the hospitals of England, those of London, perhaps, excepted; but the evidence of our own infirmary and workhouse, of the Chester Infirmary, and of various similar institutions, proves that under proper regulations they may be admitted under the same roof with other diseases, without danger of infection spreading through the building.” But it will require a nice calculation to state the proportion which fever ought to bear to other diseases, and nice calculation also of the rate of mortality in hospitals thus regulated, and in those exclusively appropriated to fevers, before we can pronounce with any certainty on this subject.

The professor of the college at Lyons, proved by repeated trials that under ordinary circumstances, small-pox is incapable of infecting any individual at a greater distance than two feet, either in the open air or well ventilated apartments. Experiments were tried to ascertain the fact. Children were every day placed round a table, three feet in diameter, in the centre of which was variolous matter on lint and silk, both of the natural and inoculated variety. No effect resulted after nine months. He then placed four children at the distance of two feet from a child ill with small-pox for an hour daily for a fortnight. No effect, however, followed, but when inoculated, they all took it.<sup>2</sup>

The propriety of removing persons infected from a crowded neighbourhood is obvious enough whether they be taken to one or other hospital, and that their removal will arrest contagion we cannot doubt; of this Dr. Bateman gives us several marked instances,<sup>3</sup> the importance of which fact is however often overlooked.

The best of all prophylactic measures are ventilation and good diet; to these I cannot hesitate to refer the greater immunity of this city at the present time from the attacks of pestilential fever than in former days, and it is important to bear in mind, when the subject of any epidemic febrile disease is under consideration, that for many years this country has enjoyed comparative freedom from visitations of such a nature. In former years, London, like many of the eastern capitals at the present day, was constantly the seat of devastating pestilence; and it is only within the last two centuries that it has been exempt from the almost annual recurrence of some one of those awful calamities which cannot be contemplated without horror even at this distant period. A disorder perfectly new to our hemisphere has indeed lately shown itself amongst us, but the incursion even of this has been characterised by a mildness which furnishes important matter for reflection, whether regarded in a legislative, a statistical, or a medical point of view: but while we

<sup>1</sup> Currie, Med. Reports, p. 363.

<sup>2</sup> Bateman from O’Ryan, Diss. sur les Fièvres.

<sup>3</sup> Bateman, p. 169.

congratulate ourselves on such a change, and inquiring into the causes of this altered state of things, attribute them to an ameliorated condition of the community in habits of life, in clothing, in cleanliness of person, in the better ventilation of apartments, in the widening of streets, in the removal by drainage of noxious effluvia, and in the more abundant means of purification by a liberal supply of water, still we find that much remains to be done by those whose province it is to look back to the past for instruction, and to whom the present should be indebted for improvement.

Our immediate objects, however, now, are the actual measures to be adopted in the sick room, which shall be most serviceable to the patient and protective to the attendants. Dr. Bateman has well stated the points which should chiefly be regarded, and has witnessed and recorded their effects. Ventilation and cleanliness alone, he says, are adequate to the effectual prevention of the spreading of infection in any dwelling; and the freshness and freedom from all sensible taint, which they produce in the atmosphere of a room, is the best test of the absence of all noxious matter;<sup>1</sup> and I have had reason, he continues, to infer that the invigorating influence of fresh air, with coolness and cleanliness, is sufficiently great to modify both the character of the disease and the treatment which it may require or bear.<sup>2</sup>

It will, doubtless, always be a matter of difficulty, nay, of practical impossibility, to introduce even these simple prophylactics to the full extent into the habitations of the poorer classes, partly from the mode in which their dwellings are often constructed, but still more from the customs or prejudices of the people, who for warmth as well as from necessity crowd themselves together, and habitually exclude the free admission of air from their apartments. The period of the year too, at which typhus is usually prevalent, namely, in the colder months, militates against these sanitary regulations. This disease may prevail at any season, but Dr. Bateman said that in his time there was always during the autumnal months the greatest disposition to fever in London, which diminished on the approach of winter. Dr. Willan found that fevers exhibiting signs of malignity usually commenced in September, and extended by infection during the months of October and November, but that their progress was usually arrested by the frosts of the succeeding month.<sup>3</sup> Dr. Armstrong remarked that typhus usually prevailed in the winter and spring. Rasori first met with the petechial fever which he has described in the autumn of 1799, it continued during the spring, and was still prevalent, and the mortality considerable, on his departure from Genoa in the summer. When this disorder raged at Exeter, in 1586, it first appeared in March. The black assize of London in 1750 took place in May. The jail fever at Oxford occurred early in July. Sir John Pringle notices the

<sup>1</sup> Bateman, p. 155.

<sup>2</sup> *Ibid.* p. 105.

<sup>3</sup> Report on the Diseases of London, p. 43.

appearance of typhus in hot weather; no season is therefore exempt from its attack; like the other exanthemata, however, according to my experience, it prevails most in spring and autumn, though occurring at all times of the year. We have the best information from Dr. Currie concerning the prevalence of typhus in different months. Taking an average of seventeen years, he found that the largest number of cases took place during the month of March, but says that "the prevalence of fever is greater, and the influence of season upon it less, than might have been expected."<sup>1</sup> And truly the prevalence of fever was great in Liverpool during the seventeen years referred to, as it appears that out of 213,305 dispensary patients, attended between the years 1780 and 1796, 48,367 laboured under typhus.<sup>2</sup> It does not seem that the time of year has any obvious effect upon the number of deaths. M. Chomel at least has found that the rate of mortality was the same in summer as in winter.<sup>3</sup> The disparity of numbers between male and female patients is certainly not so great in this country as in France, where M. Louis tells us that one fourth only were females, but with us the mortality appears certainly greater among the men. But to return to the prophylactic measures: we must not relax either during winter or summer, nor must the round of the seasons fix a termination to our care, as a disease will prevail epidemically frequently for more than a twelvemonth. Dr. Bateman indeed, says, that the celebrated one of 1801, which led to the foundation of the Fever Hospital, continued with severity during four years.<sup>4</sup>

It would induce a smile were I to detail seriatim the precautions which M. Hildebrand has recommended, that medical men should take, when in attendance upon patients labouring under typhus: they certainly would not be followed, or if adopted, would seem to betray an apprehension which is totally unknown to our practitioners; a feeling of duty will always strongly actuate every class of society in this country, and be paramount to any considerations of personal safety. Such was the case when the plague last broke out during 1665, in our then devoted city; such was the case when cholera approached our shores: and although summoned to encounter a disorder formidable both from its novelty and from its ravages, alacrity was shown on all sides to meet the exigencies which might arise and to provide for the public security. We may smile at undue apprehensions, but should not disregard proper ones: for we have seen that our profession has suffered in a greater extent during the prevailing epidemic than in any other for nearly half a century before. The prophylactic measures necessary to be adopted when typhus breaks out in camps or in other crowded situations, will be found in various treatises on the subject: to detail them does not come within the scope of my work, but I may add that Sir James Macgrigor, in his Sketch of the Medical History

<sup>1</sup> Currie, Med. Rep. vol. i. p. 355.

<sup>3</sup> Chomel, p. 448.

<sup>2</sup> Ibid. see table, p. 354.

<sup>4</sup> Bateman, p. 9.

of the British Armies in the Peninsula of Spain and Portugal, has laid down those leading rules, which are calculated to prevent disease and check its progress, under circumstances where typhus has so often proved a real pestilence, and which, he adds, "at Ciudad Rodrigo, Celorico, Viseu and Coimbra, appeared in the most malignant form it has ever assumed."

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### CONCLUSION.

It only remains for me now to reconsider the views which with great diffidence have been suggested in the preceding pages, and to state the objects which have chiefly been aimed at, and which it has been my endeavour to prove. In the first place the belief has been expressed that an exanthematous disorder now exists in this country as yet undescribed as such by any of our own authors, or to be found in the catalogue of eruptive fevers drawn up by the most eminent nosologists. With this disorder I have now been for many years familiar, and conceiving that the opportunity afforded me in 1831, of studying its character justified my calling the attention of the profession to it, a paper on the subject was in that year submitted to the College of Physicians, declaring my conviction of the specific nature of the disease, and describing its peculiar rash. To this fever, in a printed account, it was proposed that the term "typho-rubeoloid" should be applied, as I was not then aware that the disorder had been fully described by Professor Hildenbrand, and designated by him to be typhus. This discovery led to the immediate abandonment of my idea of originality in its detection, and induced a more close investigation of those fevers which have been called typhus, as well of the various epidemics which have prevailed at different times, and of the common fever of our country. It will not be necessary for me again to enumerate the peculiarities which characterise the disorder alluded to, but it is sufficient to state that it conforms in all respects to the laws which appear to regulate the genuine exanthemata. We find that it is capable of spreading from one individual to another—that it conforms to certain definite rules—that it shares even the peculiarities and anomalies of the eruptive disorders. It seems allied in character to measles and scarlet fever, but differs from each in its aspect, duration, and sequelæ: although it has, I believe, been often confounded with these complaints, being sometimes mistaken for one sometimes for the other, or else supposed to be an entirely anomalous complaint.

It may indeed be asked if an exanthematous disorder so different from all others could in reality have escaped detection, till near the middle of the nineteenth century, and be now for the first time dis-

tinguished and classified. It may appear almost incredible that so common a disorder should have escaped the notice of the numerous writers upon eruptive fevers, at least it appeared so to me when I consulted Willan, Bateman and Rayer, expecting to find a description of this malady. My search into their writings was fruitless; still the disorder continued to present itself, and the more the subject was considered and authors consulted, the more satisfied I felt that this scourge of cities in the time of peace, this companion of armies more fatal than the sword, this walking pestilence more relentless than famine, was a specific, definite, and eruptive disorder. It does indeed seem scarcely credible that this should have been overlooked; but is it more extraordinary than that measles and scarlet fever should have been confounded together until almost our own time? We have now become so familiar with these complaints, and know that each has sufficient peculiarity in its mere aspect, to enable us oftentimes to declare a case to be one or the other without asking a single question. Yet it is well ascertained that these two disorders were even very recently confused, and both are frequently alluded to under the same appellation. Morton, the court physician, the contemporary of Sydenham, who lived and wrote at the close of the 17th century, maintains that measles and scarlet fever are the same, and declares "*Hunc morbum prorsus eundem esse cum morbillis censeo et solo efflorescentiæ modo ab illis distare. Quæ differentia tanti non est ut alterum morbum constituat, nisi pari ratione variolæ confluentes et distinctæ cæterique morbi ex accidente aliquo inter se differentes, ubi causæ, symptomata, prognostica, curativæ indicationes, atque methodus medendi, ab invicem minimè distent, in diversos morbos dividantur.*" In the last century, and even towards its close, Sir William Watson described a severe attack of scarlet fever under the title of "*Putrid Measles,*" and from the confusion of terms employed, it is clear that these two disorders were not then accurately distinguished from each other, nor in truth were they clearly defined, and their nomenclature established till the year 1781. If then measles and scarlet fever were so lately confounded together it will not appear very surprising that typhus should have hitherto escaped notice, as there is much less difference between that and measles than between measles and scarlatina. For eight centuries measles and small-pox were not distinguished from each other; but this inquiry need not proceed further; as we shall surely cease to be surprised at the detection of a new exanthema. Between all the eruptive disorders there are certain points of resemblance which we should carefully remember, although we see abundant grounds for distinguishing them from each other, and for considering them as distinct disorders, each dependent upon its peculiar source.

In employing the term new exanthema just now, it was not meant that there is any new complaint amongst us, the epithet only referring to its supposed recent recognition. Authors who have written upon measles and scarlet fever, have been anxious to claim for each

of them all the pride of ancestry, and have delighted in mounting to the highest antiquity in searching for their origin.

An opportunity is here afforded me of tracing amongst ancient writers an account of the different pestilences which are more or less allied to typhus; but such details are more learned than useful, more interesting than practical, and indeed diseases of this class were formerly but little studied individually: it was only when they prevailed extensively that they attracted much notice, and the descriptions given are rather calculated to impress upon us the severity of calamities which are more frequently distorted by the inaccuracy of poetical exaggeration than described with the fidelity of simple truth. It has been already shown that the term typhus was not applied by Hippocrates to any one disorder, and certainly not exclusively to the one which we thus designate; but we may rationally believe that this very fever was seen, and depicted by him. In his third book, speaking of the pestilent constitution of seasons, he particularly alludes to one during which much erysipelas with ardent fever, attended by urgent symptoms, prevailed, and speaks of many cases of excitement or stupor, and says that ulcers, suppuration and falling off of the flesh and nerves took place. Other cases which he calls phrenitis well exhibit the leading characteristics of typhus, both in the symptoms and duration. Thus he tells us that a young woman of Abdera, who lived near the Via Sacra, had an attack of fever, she was intensely thirsty, and could get no sleep. On the sixth day she menstruated, there was redness of the skin, with great delirium; on the eighth day she was deaf, and it was remarked that she continued so for some time afterwards; hemorrhage from the nose then occurred; on the twentieth day all the symptoms disappeared and she was declared convalescent; a slight relapse, however, afterwards took place, which speedily subsided, and she then completely recovered.

Many other cases might be cited from this author exhibiting the general features of typhus, but the futility of such researches has already been contended for. No other example from Hippocrates or any ancient writer will therefore be given, for it would clearly avail us little could the fact be proved that the disorder was familiar to the earlier physicians, when we know how limited was their practical skill, and how erroneous their views of pathology. Many bare truths have been long known, which, from confined notions or from want of other acquirements, mankind have not been able to turn to account. The discoveries of Copernicus, when revived after several generations by Galileo, were slighted by ignorance, and denounced by fanaticism.

The humoral pathology, for a time banished from medical reasoning on the etiology of disorders, contains vast truths, which we can now understand, and in some degree correctly explain: but to return.

Armstrong, Bateman, and Currie, each describe a fever under the name of typhus, so analogous in origin, mode of propagation, early



symptoms, progress, and results, to the one now prevalent in this country, that it is impossible to withhold the belief that they are identical and certainly specific. Is it to be supposed that a disorder can continue for fourteen years, as stated by Dr. Bateman, sometimes almost extinct, then again bursting out with violence, consistent in all essential particulars, presenting time after time the same phenomena, and spreading by infection, but yet not be specific. Can we suppose that any but a specific disorder would for the seventeen years alluded to by Dr. Currie, year after year follow a definite prescribed course. It is surely unlikely that a disorder noticed for nearly a quarter of a century by Hildenbrand, and constantly exhibiting such points of similarity as induced him to pronounce it to be distinct, could have been other than what we call a specific disease, that is, one itself a species. The fever described by Rasori in Italy, under the name of petechial, that by Huxham in our own country as the nervous, that by Pringle, seen in different parts of the world, and known as the jail or camp fever, are so analogous that it would be carrying refinement in classification beyond all reasonable limits, to doubt their resemblance or to hesitate about arranging them together. Many may object to the propriety of placing in the order of the exanthemata these several disorders, the identity of which it has been my endeavour to establish: it may be urged that the eruption is frequently absent, but this, as it has been attempted in the foregoing details to prove, is not an absolutely essential feature in any of the recognised exanthemata, for we have "morbilli sine morbillis," "scarlatina sine exanthemate," nay "variola sine variolis." The eruption in typhus, though present, will often elude notice from being partial and confined to the trunk of the body; and even when universal may still be so faintly developed as only to be detected by the eye of one whom experience has made familiar with the disease; but still Armstrong, Bateman, Rasori, Huxham, Louis, Pringle, and Chomel, have all remarked the existence of a rash, although they have not insisted upon this incident as an essential feature; which should afford a basis for classification. Let, however, typhus show itself in Germany, in France, in Italy, or in England, it is found not only to exhibit a rash, but one in all cases corresponding, similar, and characteristic. This rash is merely briefly mentioned by some authors, by others it is confounded with, or improperly called petechiæ. Real petechiæ are often present, apparently as substitutes in place of the eruption. More quotations than are given might have been added, which would show that this feature has been present, and yet little dwelt upon; for instance, Dr. Cheyne, who had such ample opportunities of observing this fever, says, that in the epidemic prevalent in Ireland to such a formidable extent during 1816, petechiæ were met with more commonly than usual, and that some patients had a *florid rash*, others a *measly efflorescence*.

If disorders, thus conforming in all essential particulars, and in many cases in all minute details, be not as I believe one and the

same, it is clear that we are in want of some more accurate information concerning them. In the investigation of the laws which regulate typhus, several interesting points concerning eruptive diseases struck me with more force when thus treated of and arranged as general facts, than they did as individual ones—thus the frequency with which measles and small-pox may attack the same person is much greater than is commonly supposed, as both will frequently occur in the same individual twice during life—then, again, the slighter constitutional effects from any of these poisons, such as the fact that during the prevalence of scarlet fever hundreds would suffer some slight affection of the throat, without other “local or constitutional ailment,” which assertion I can confirm by my own experience, having often found that when the younger branches of a family are labouring under scarlet fever, parents and servants, though otherwise in good health, will all complain of sore throat.

My third object in the preceding treatise may appear still less easy of demonstration: it is an attempt to explain some of the phenomena in eruptive and inflammatory fevers, by reference to certain states and alterations in the vessels themselves. Analogy alone here forms the ground of reasoning, as when minute structure is in question, it is a matter of extreme difficulty to show the changes which it actually undergoes. The ideas entertained by me upon this point are, that the poison of typhus enters the blood, and so infects the system. It does not, however, follow, that the disease will manifest itself, even although the circulating fluids are so contaminated, or infected, as to produce the disease in another. The symptoms, it would seem, arise not from the admixture of the poison with the blood, but from the action of the fluids thus diseased upon the vascular and nervous systems. With this view I have not asserted that inflammation is always excited in the vessels, but that irritation invariably results whenever constitutional symptoms appear; that this irritation is partial, and chiefly affecting those textures called mucous by Meckel, namely, the pia mater, the cutaneous tissue, and the membrane lining the lungs and abdomen. It has been shown, that in the more severe cases, the irritation in these various parts often goes on to acute inflammation, of which state, as excited on ordinary occasions, we have all the usual symptoms, although appearing in a modified form.

A fourth object has been to distinguish between that exanthematous disorder, to which it is proposed that the term typhus should be restricted, and the morbid state often confounded with it and denominated “typhoid,” from the resemblance between certain features in the two. Now in ranking together under the head of typhus many disorders variously designated, I only follow the example of Dr. Burne, and many of our recent as well as more ancient authors. M. Chomel, indeed, goes so far as to say, that he considers all inflammatory, bilious, and mucous fevers as modifications only of one disorder; and Dr. Chambers in his lectures, as reported in the *Medical Gazette*, not only classes together the

varieties of typhus and the synocha and the synochus of Cullen, but appears to consider them all analogous to the remittent fevers, and ascribes their origin to some such epidemic or endemic influence as gives rise to the marsh fever. There is, however, I conceive, a sufficient distinction between fevers which arise from atmospheric sources and those produced by specific animal poisons. In some fevers arising from malaria, there may be great depression of strength, and a black dry tongue, but yet I do not think that these should be looked upon as typhus, since the diseases which arise from atmospheric influence do not exhibit the characteristic features of the exanthemata, namely, propagation by infection, and a definite course. It may be long before these disputed points are settled, and it is difficult to say, when a disorder attacks a community, to what cause its spreading is to be referred; we all remember how general was the belief in the infectious nature of yellow fever, which was even supposed by some to be after all but one form of typhus. Very few, however, if any, can now be found to advocate the doctrine of contagion in that most formidable disorder. It appears to me, that a great cause of confusion in the classification of fever arises from the circumstance of its being based on a wrong foundation.

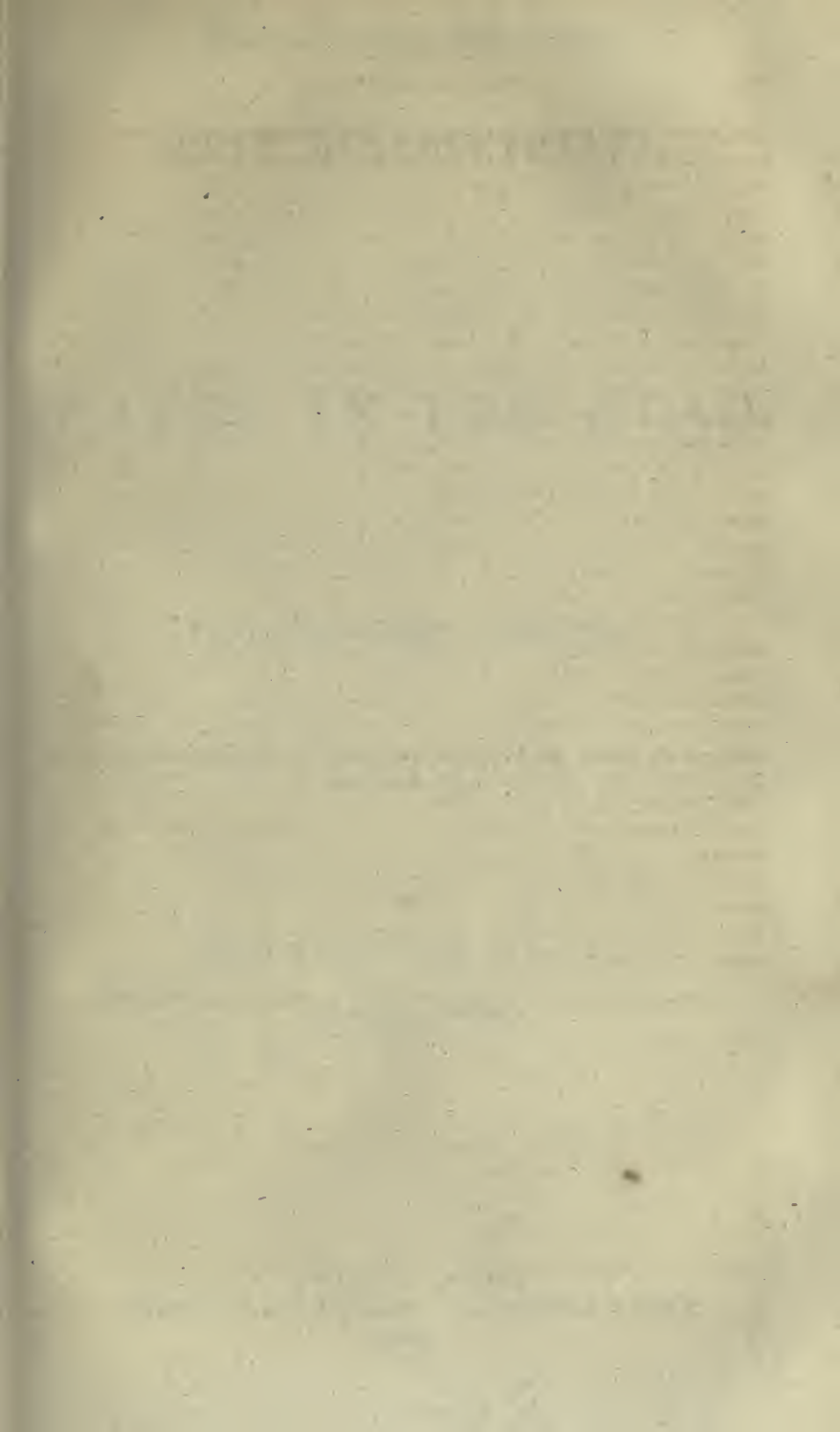
In the artificial system of Botany, external resemblances were once considered sufficient to form a groundwork of arrangement; but the moderns, dissatisfied with so superficial a method, declare that the intimate structure of plants is the only sound basis for classification; so, also, as our acquaintance with the nature of disease advances, should we look for a more natural order than formerly, by ascending to the causes of phenomena. Experience lessens the value of mere symptoms, as the indices of an organ's condition, or rather as trustworthy guides to direct the administration of remedies, for we daily learn that opposite conditions can produce very similar effects; proving how imperative it is carefully to search after the causes, by the meeting and removal of which, diseases can alone be eradicated. To attain this desirable object is in many cases extremely difficult, but we have now learned to appreciate the influence of external agencies, and know the sensibility of internal organs to stimuli. Majendie, Fontana, and others, have proved the absorption of a host of extraneous substances into the circulation, and their action when thus introduced is, according to M. M. Addison and Morgan, on the sensible structure of the bloodvessels; by these means we are made acquainted how poisons obtain entrance into the system, and may be said almost to witness the invasion and commencement of disease.

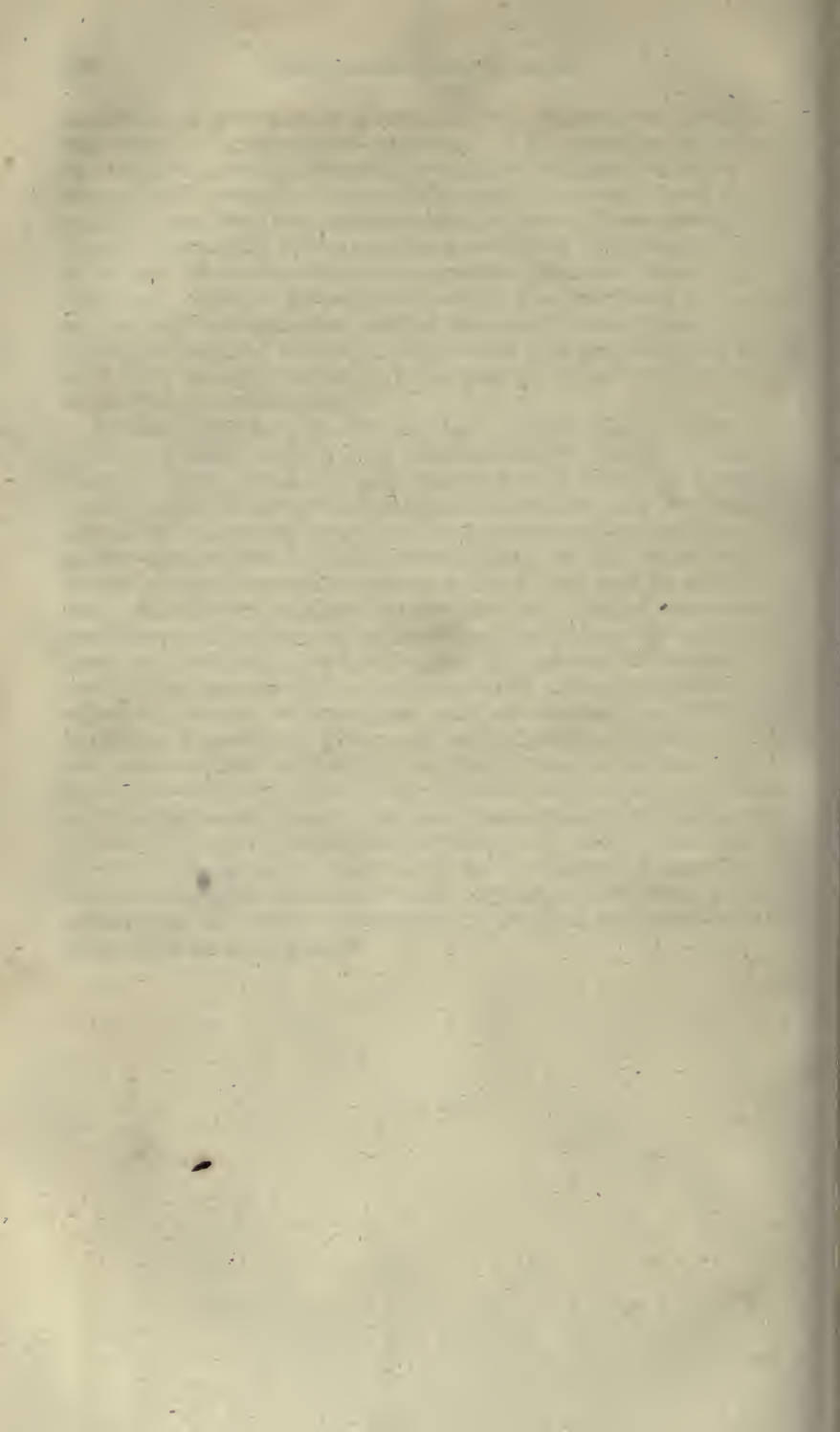
It would then be very important to class fevers as far as possible from the causes out of which they originate. Cullen separates them into continued and intermittent; an objectionable arrangement from the fact that the same source frequently gives origin to both. In more modern works, they are divided into continued, periodic and eruptive, but an eruptive disease is often a continued one, according to the definition of this class, namely, that it proceeds without

abatement or apyrexia ; and many eruptive diseases are periodic, in the ordinary acceptation of the term. A more rational division of this class can, perhaps, be made, by simply dividing them into symptomatic and specific. For no febrile action or actual fever will be produced and continue, without there is such a cause as disturbed action in some part of the system, to excite the symptomatic fever, or without there should be some specific influence in operation on the other. Specific influences are either of atmospheric or animal origin, such as small-pox, and the disorder which I have thus imperfectly attempted to treat. Other ideas here suggest themselves, but I have already exceeded the bounds in which it was proposed to confine my undertaking.

As this professes to be nothing but a short treatise on the prevailing epidemic, brevity has been constantly aimed at, and the works of many writers of our own, as well as of foreign countries, bearing upon this subject, have been consulted during the composition of the preceding pages, without extracts or quotations being given ; not that the opinions are valueless, or the names without weight, though frequently assertions have been met by contradictions, and theories opposed by theories, with endless reference to conflicting authorities ; these have been passed over as only calculated to raise doubts ; to have stated the opinions of every writer would have been much too comprehensive, and even to have consulted all whose writings bear upon the subject would scarcely have been practicable ; for, to use the language of Johnson, if permitted to compare small things with great, to have done so " would have protracted my undertaking without end, and perhaps without much improvement, one inquiry only gave occasion to another, book referred to book, to search was not always to find, to find was not always to be informed ; and thus to pursue perfection was, like the first inhabitants of Arcadia, to chase the sun, which, when they had reached the hill where he seemed to rest, was still beheld at the same distance from them."

THE END.





ACUTE HYDROCEPHALUS,

OR

WATER IN THE HEAD,

AN

INFLAMMATORY DISEASE,

AND CURABLE EQUALLY BY THE SAME MEANS WITH OTHER DISEASES OF  
INFLAMMATION.

BY

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Inflammations of the serous tissues of the brain in acute hydrocephalus should exhibit the ordinary results of inflammation of serous tissues in general, superadded to any results which might be attributable peculiarly to inflammation of those tissues themselves.

The constituency of the blood itself is ordinarily disturbed and deranged by the greater number, if not by all, diseases of inflammation; and the fact of an inflammatory disease is rarely ever doubted or disputed when sustained by the appearance of a thick coat of lymph or fibrine presenting itself on the surface of blood obtained from subjects of acutely inflammatory affections by the ordinary operation of venesection.

In cases of inflammation of the vascular and membranous tissues of the brain, the little volume now submitted to the reader will exhibit innumerable proofs of an analogous disorganisation of the blood, as a result of an inflammatory condition of the tissues which are the seat and subjects of acute hydrocephalus.

The results of the inflammatory changes in question are:

1. Injuries of texture of one or more of the investing membranes of the brain, consisting of opacities of their tissues and fibrinous attachments of one or more of those membranes to contiguous surfaces of immediately adjoining membranes.

2. An inflammatory transudation or secretion of coagulable lymph or fibrine, appearing in the several forms of coatings, linings, and separate masses of fibrine deposited on the surfaces and within certain cavities of the brain.

3. Quantities of serum, sometimes effused upon the external surfaces of the brain, and presenting visibly in the spaces amongst its convolutions, and occasionally, but not frequently, interposed between certain other investing membranes of the cerebrum: this latter appearance is for the most part a result of violence from falls and other accidents.



4. Purulent matter, occasionally but not frequently forming a part of a case of acute hydrocephalus, complicated with an accidentally disordered condition of adjoining tissues; as of the tissues within the temporal bone, including perhaps the entire apparatus of the organ of hearing, bone and all.

5. The usual fluid contained within the chambers of the brain, which has given to the disease which forms the subject of this little volume the incorrect designation of dropsy of the brain. This is a fluid sui generis, and is the produce exclusively of inflammation of the serous membranes investing the brain, and of the vascular tissues concerned in supplying the encephalon with blood. This is not blood, nor serum, nor purulent matter, nor fibrine; but a fluid, as already stated, sui generis: an infiltration from the mass of blood by the cephalic tissues already adverted to in a state of inflammation. Its constituents, as analyzed by Berzelius, are as follow:—

Albumen	-	-	-	-	1.66
Matter, soluble in alcohol with lactate of soda	-	-	-	}	2.32
Chlorides of potassium and sodium	-	-	-		
Soda	-	-	-	-	0.28
Animal matter, insoluble in alcohol	-	-	-	-	0.26
Earthy phosphates	-	-	-	-	0.09
Water	-	-	-	-	988.30
					100.00

Berzelius concludes with observing, that the peculiar fluid of hydrocephalus may be considered as the serum of the blood, having about the degree of dilution which ordinary serum would have if diluted with about seven times its volume of pure water. *Traité de Chimie*, t. vii. p. 141.

The above explanatory remarks addressed to the unlearned professional reader, if such a distinction may be admitted to exist, appears necessary to enable him thoroughly to comprehend the intention of my little volume. The non-professional reader will naturally determine his principal attention to the more practical points of the subject.

The manner of execution, together with the eventual practical results of the second object of the Work, that of establishing the curableness of hydrocephalus, equally and by the same means with other diseases of inflammation, must be left to the silent influence of time, sanctioned by the decision of a liberal and educated profession.

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17, Russel Place, Fitzroy Square.  
July 22d, 1840.

## INTRODUCTION.

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Introductory to the present Essay, I propose to present the reader with some brief historical notices of acute hydrocephalus, subsequently to its earliest recognition as a separate disease.

The recognition of acute hydrocephalus as a separate disease, and as distinguishable from all other febrile affections, was first made during the earlier part of the last century.

The first positive case of the malady, actually recognised as such, is to be found recorded in the third volume of the Edinburgh Medical Essays, published in the year 1733, in a communication from Mr. John Pasley, Surgeon, of Glasgow, entitled, "A Hydrocephalon, accompanied with remarkable symptoms."

The remarkable symptoms of Mr. Pasley's case were generally those which the more correct information of a subsequent period has usually recognised as the proper attributes of *hydrocephalus acutus internus*.

Mr. Pasley is, moreover, entitled to the credit of having possessed sufficient acumen of apprehension to have enabled him to appreciate the value and bearings of his case. He was therefore at once led to a practical extension and generalisation of his subject; for in a passage annexed to this case, we are distinctly informed, that since the subject of the case in question had been under his care, he had seen several children who had complained of pain in one particular part of the head, with heaviness and drowsiness in their eyelids, the pulse much slower than natural, great aversion for food or drink, an inclination to vomit, with other symptoms similar to those under which his first patient had laboured. He adds two post-mortem examinations, which amply confirmed his opinion, that death had deprived him of his several patients, by the same fatal process of effusion into the ventricles of the brain.

The first professed essay on Hydrocephalus, furnishing any evidence of its having been in any useful degree known to the writer himself, was published at Edinburgh in the year 1768, by Dr. Robert Whytt, then professor of medicine at the University of Edinburgh. As a first attempt to produce something of a pathological history of a malady which had never been described before (for Petit, in his very meagre contribution to the Academy of Sciences in Paris in the year 1718, cannot be admitted as a claimant to that honour), this monograph of Dr. Whytt's deserved, as it received,

some credit, with the thinking part of the profession. As a complete picture, however, of acute hydrocephalus, as it has been since more accurately known and described, it proved in my opinion a signal failure, inasmuch as many of its essential phenomena were entirely omitted in Dr. Whytt's account of the disease, and many more were not made available for any purposes of practical treatment.

In the same year, papers were read on *hydrocephalus internus*, before a society of physicians in London, by Drs. Fothergill and Watson. Each of those gentlemen gave a brief history of the ordinary symptoms of acute hydrocephalus, in strongly-marked outlines, of their respective cases; and the latter, especially, has noticed a striking feature of the malady, which has since been very frequently omitted in more extended histories. "The head," observes Dr. Fothergill, "is always hot from the first attack, and the *præcordia* likewise." In the further discussion of the subject, we shall see how much value we should attach to this very simple, but important observation of Dr. Fothergill. "The head is always hot from the first attack." Here is a spark at least of life, but what became of it? Why was it allowed to twinkle for a short period, and then to become extinguished? We find the doctor, in the same paper, express his utter want of power over the then ordinary progress and results of the malady. "At the same time I must own," he says, "that it is not in my power to suggest any probable means of curing the disease of which I treat. It has baffled all my attempts, both when confided in alone and in consultation with the ablest of the faculty." Drs. Fothergill's and Watson's papers are recorded in the fourth volume of the *Medical Observations and Enquiries*. Edit. 2, pp. 40 and 78.

In the year 1775, Dr. Dobson, of Liverpool, published a case of hydrocephalus, which he successfully treated by mercury. The case was reported in the sixth volume of the *Medical Observations and Enquiries*. The disease having proved fatal to three children of the family to which the patient belonged, he determined on this occasion to deviate from the beaten track, and was thus led to the exhibition of mercury, "from the expectation that it might enter into the course of the circulation, and reach the absorbents in the ventricles of the brain." This case terminated favourably, and made a considerable impression on the minds of physicians.

On the use of mercury as a remedy for hydrocephalus, as introduced on this occasion by Dr. Dobson, Dr. Cheyne makes the following remarks:—"Antecedently to that period hydrocephalus was an incurable malady. But mercury, in consequence of the reports which were daily received of its great efficacy in many diseases incident to Europeans in the East Indies, was beginning to be generally employed in England. Had Dr. Dobson never formed his hypothesis of its mode of operation it would have found its way into prescriptions as a remedy for hydrocephalus. Dr. Lysons, of Bath, had already recommended it in continued fevers. Dr. Hamil-

ton, of Lynn Regis, was using it in inflammations; Dr. Clarke, of Newcastle, in dysentery; and Dr. Haygarth, of Chester, who appears all his life to have been no less zealous for the improvement of his profession than benevolent in the application of his knowledge, had made trial of mercury even before Dr. Dobson, although the latter had the advantage of prior publication. Dr. Haygarth had been induced to prescribe it, in the hope that, by producing an *aqueous* evacuation from the neighbourhood, it might be a means of removing the fluid accumulated in the ventricles."

About this period it became a pretty general practice, with the more energetic physicians of this country, to prescribe opium and calomel in combination, as a means of subduing acute affections of different parts or organs of the body; but often without any uniformity of view, as to the manner by which the object was to be attained.

A similar remark applies to the use of blisters to the head in hydrocephalus. See Dr. Foart Simmons's remarks suggested by the perusal of Dr. Percival's papers, in the 18th number of the *Medical Commentaries*. *Medic. Comment.* vol. v. pp. 174 and 415.

Up to this time we have no new or improved theory of hydrocephalus, no example of a stretch of thought beyond the antiquated notion that the effusion into the ventricles, in hydrocephalus, was the result of a state of laxity of the exhalants, or of a thin and watery condition of the blood: but in 1779, Dr. Charles Quin, profiting by some hints he received from his father, Dr. Henry Quin, a physician of eminence in Dublin, published in an inaugural dissertation, what the author himself entitled "A new Theory of Water in the Brain."

In the illustration of his doctrine, he assumes for the proximate cause of effusion into the ventricles, a previous over-distention from an increased excitement, with a morbidly plethoric condition of the vascular tissues of the encephalon. It may be as well to give the substance of his theory in his own words. "Ex his itaque rebus patet in quibusdam casibus aquæ in ventriculos effusioni ortum præbere sanguineam cerebri plethoram; eodem fere modo quo peripneumonia et interdum asthma hydrothoracis fiunt causæ. Etsi in animo quidem variam et mutabilem volvamus signorum seriem, quæ se in hydrocephalo acuto ostendunt, et quæ vix alio explicari possunt modo, libentius forsân in sententiam ibimus, morbum istum quem jure acutum Whyttius, et post illum reliqui depinxerunt auctores, semper fere a statu tali capitis plethorico initium capere."

Then, in illustration of the increased force with which the blood is determined to the head, our author proceeds to notice some of its more immediate and striking effects.

"Hinc etenim intelligere possumus cur oculi (sicut in febribus accidit ubi nimio versus cerebrum impetu sanguis propellitur stimulum nequeant pati; hinc febris incipiente morbo causa in propatulo est; et febris demum cursu absoluto, eo forsân tempore articularum pulsus tam vi quam frequentia languere incipiunt; eo stupor

instat; quo aquæ effusione plethoram sanguineam excipientē, jam absit nimius sanguinis stimulus et vi tantum mechanica cerebrum premat aqua.”

This briefly stated view of the theory of *hydrocephalus acutus internus* suggested to its author the following indications of treatment: “Curationis consilium (dum intra canales suos fluida cohibeantur) ad morbidam illam cerebri plethoram amovendam dirigi debet, quam plurima veram morbi incipientis causam esse evincunt.”

“ Id efficiendum est

1. Sanguine detracto :
2. Datis Catharticis :
3. Vesicatoriis capiti apposis :
4. Setaceis juxta verticem immissis :
5. Capitis situ idoneo :
6. Frigore forsā capiti admoto :
7. Adhibito pediluvio.”

Thesaur. Medic., vol. iv. pp. 133, et seq.

Here we have a distinct annunciation of Dr. Quin's new theory of hydrocephalus, as consisting, when about to take place:—1st, in an increased determination of blood into the vascular tissues of the brain; 2d, in overfulness of those tissues in consequence, and, as an effect, of an increased force of action of the arteries which are employed to supply the brain with blood: and 3d, in an effusion, in result of the morbid overfulness, which the theory supposes, of an aqueous fluid into the brain.

These several states of overfulness of the vessels of the head, and increased excitement of the cerebral arteries, are represented as taking place in the midst of circumstances indicative of an inflammatory diathesis, and this fact is sustained, and afterwards fully proved by well-authenticated dissections.

Founded on these distinct views of the pathology of hydrocephalus, Dr. Quin, as we have seen, sought all his remedies in the resources of the antiphlogistic system; and hence the apparent efficiency of the indications of treatment exhibited in the above series of measures, as recommended in his celebrated thesis of 1779. He may thus be said to have discerned his object at a distance with tolerable clearness; but it cannot be denied that he wanted, either sufficient power of genius, or sufficient moral courage, to enable him to arrive at its full attainment: for even after a lapse of ten years, when he published a second edition of his Edinburgh theory, he found himself incapable of reporting more than two cases of hydrocephalus successfully treated; and even those cases (in the proportion of two in twenty-two) are given so unsatisfactorily, as to lead the reader to no very favourable opinion of the physician's practical talents, although applied in illustration of his own published theory.

Dr. Quin may be represented as having perceived the dawn of his subject, which at an after period was destined to open into a more perfect day; but his feeble conception of it failed to place before his mind the prodigious accession of power over the issues of

hydrocephalus, which his rare good fortune, or the more original sagacity of his father, had immediately placed within his reach.

The principal advantage derived by the profession from the writings of Dr. Charles Quin, was the satisfactory and decisive manner in which he connected the phenomena of hydrocephalus with an overfulness of the vascular tissues of the brain, founded on an inflammatory excess of arterial action. Although, therefore, we do not find that either of the Quins made their discovery available, in any great degree, towards an extension of their reputation as physicians, or of their power over the formidable malady which Dr. Charles Quin had made the subject of his inaugural dissertation in 1779, we have nevertheless the satisfaction of knowing, that at no time subsequently to that period, has the attention of medical men been entirely withdrawn from the pathology of hydrocephalus first published and publicly maintained by that gentleman.

We find, accordingly, that Dr. Withering, in his account of the Fox-glove, published in 1785, informs his readers, that he had embraced an opinion relatively to the nature of hydrocephalus, similar to that held by Dr. Quin, which he had acted upon with success before the publication of Dr. Quin's thesis. Dr. Withering explicitly declares that the disease originates in inflammation, and that the water contained in the ventricles of the brain is the consequence, and not the cause, of the illness.

In an essay published by Dr. Rush, of Philadelphia, in the year 1793, and forming a part of that author's *Medical Inquiries and Observations*, Vol. ii. p. 201, that excellent physician professes to entertain similar opinions of the pathology of hydrocephalus with Dr. Charles Quin. "Having observed," he says, "for many years being unsuccessful in all cases, excepting two, of internal dropsy of the brain which came under my care, I began to entertain doubts of the common theory of this disorder, and to suspect that, instead of being considered as an idiopathic dropsy, the effusion of water should be considered as the effect of a primary inflammation or congestion of blood in the brain. I mentioned this opinion to my colleague, Dr. Wistar, in the month of June 1788, and taught it the winter following in my lectures. The year afterwards I was confirmed in it, by hearing that the same idea had occurred to Dr. Quin. I have since read Dr. Quin's treatise on the dropsy of the brain with great pleasure, and consider it as the first dawn of light which has been shed upon the theory of this disorder."

Dr. Patterson, of Londonderry, published a work in Dublin, 1794, in the form of a series of letters to Dr. Quin, in which, although he criticises that author with severity, he adopts his views both as to his theory and much of his practice. In respect to the former, he thinks it nearly demonstrated, that acute hydrocephalus is an inflammatory disease, and that the watery effusion is the consequence of inflammation.

In an essay published in 1801 by Dr. Garnet, in the fifth volume of the *London Medical and Physical Journal*, pp. 121 to 129,

inclusive, that gentleman contends that hydrocephalus was the effect of, and accompanied by, a plethoric state of the vessels of the brain, occasioning a considerable degree of inflammation, and generally, though not always, producing an extravasation of watery fluid before death.

He founds his belief in the existence of an inflamed state of the vessels of the brain: 1st, on the appearance of the blood, which was as decidedly inflammatory as he ever observed it in pleurisy; 2dly, on the acuteness of the pain and fulness of the pulse; and 3dly, on the aggravation of the symptoms from the exhibition of stimulants, and the relief which always, in the first stage of the disease, attends the antiphlogistic plan; and lastly, on the appearances seen on dissection.

In 1808, Dr. John Cheyne published in Edinburgh his first essay on acute hydrocephalus, with engravings. Dr. Cheyne's essays on the diseases of children, and this amongst the rest, were ushered into the world with some pretension, and received by the profession with no little indulgence and acceptance. Without going out of my way to criticise his other works, Dr. Cheyne, in both of his essays on hydrocephalus, has fallen far short of what the profession might have expected from him, considering the vantage-ground on which he stood, in comparison with Dr. Quin and all the writers of the preceding century. We shall see in the sequel how the following passage, in reference to the greatest power we possess over hydrocephalus, may operate in enabling us to estimate Dr. Cheyne's merit as a practical writer on this subject.

"It must be admitted, that there are many cases of hydrocephalus in which blood-letting, although necessary in order to moderate the increased action of the vessels of the brain, and to prepare the abdominal viscera for mercurials, is contra-indicated by the diathesis of the patient, and by many of the symptoms of the disease; so that although we are constrained to begin with blood-letting, general or topical, we ought not to forget that blood-letting alone, even when employed early, is not to be relied upon for the cure of hydrocephalus. I do not mean to impugn the accuracy of Rush, who has affirmed that hydrocephalus may be cured by the lancet. Early venesection may, perhaps, succeed in the cases in which the affection of the brain is primary.

"Diseases are modified by climate. In Philadelphia venesection may succeed better than in Edinburgh or Dublin. In the latter city, I have heard of a case in which blood-letting was successful; but I believe it has generally failed with others as well as with me."

One case, the reader will be kind enough to remember, had taken place in Dublin, during or before the year 1808, in which the abstraction of blood had been successfully resorted to in the treatment of acute hydrocephalus. One wonders what could have induced the author, who had not even seen this one case, but only heard of it, to waste his time in writing two books on the subject of hydrocephalus.



We are now advancing in our brief review towards a period in the history of hydrocephalus, when it will be proved that abstraction of blood has more than once cured hydrocephalus in climates very little inferior in severity to those of Edinburgh or Dublin.

In this short sketch of notices of the contributions to our stock of facts on the subject of hydrocephalus, by our modern, and especially recent writers, I am induced to speak very kindly and respectfully of a small volume on hydrocephalus, which was published by my late excellent friend Dr. Carmichael Smyth in the year 1814.

This little tract was composed at an antecedent period of the author's life, and during the full tide of his career as a physician; but he adopted the theory of hydrocephalus of a still earlier period, namely that which was made fashionable by Dr. Robert Whytt,—a theory which even to the present day, amongst the older practitioners of our time, maintains its ground with no inconsiderable firmness. Dr. Smyth was, however, one of the latest public disciples of what we may call the old school of effusion from debility and relaxation of the vascular tissues of the head. If I am not mistaken, he fought the last battle in defence of its honour; and when we consider the utter poverty of his ammunition, both as to quantity and quality, it must be acknowledged that he fought it gallantly. Inasmuch, however, as we are about to devote several of the following pages to prove the unsoundness of the old theory and the unquestionable correctness of the theory opposed to that of Dr. Carmichael Smyth, it will appear at once an act of justice to the memory of my late friend, as well as an apology for what I shall have hereafter to produce in opposition to his views, to quote from his own work the facts and statements which he has advanced in its favour.

“It is generally allowed, that infants or children are, with few exceptions, the only persons liable to this complaint, and that children of either sex are equally so, with this difference, however, that females are sometimes attacked by the disease at a more advanced age than males. I do not recollect having seen a boy with the disease after nine years of age, but I have attended several females at twelve and thirteen, and one young lady, the daughter of a clergyman, in her twenty-first year. Children of a fine clear complexion, lively or sprightly disposition, having a peculiar softness of the muscular fibre, who are easily lowered by evacuations, and fatigued by exercise; those especially who are of a cold languid habit, where there is a feeble action of the heart and a want of vital energy, are, from what I have observed, more subject than others to this disease.

“Children also seem more liable to be affected by hydrocephalus during dentition than at any other period. An opinion has very generally prevailed, although, I am persuaded, without any foundation, that the complaint was connected with a particular shape of head. Scrofula has been mentioned by some as a predisposing cause, and I readily admit that the same predisposition is favourable to both diseases.

“That this complaint has proved particularly frequent and fatal in certain families is a well known fact. The immediate cause of this unfortunate propensity may be difficult to explain, but, so far as it originates in constitution, we cannot be surprised to see the children of the same parents have a similar constitution, which naturally leads to similar diseases.

“Sometimes children, apparently in the best health and spirits, are suddenly seized with the disease; but in the greater number of cases its origin may be traced to bad nursing, improper food, hard water, dentition, and other debilitating causes, by which the child's health and general strength have been impaired.

“From the preceding account of the subjects, and predisposition to hydrocephalus, it is evident that the disease is generally confined to infants and young childhood, and seems connected with the weakness of that time of life when the constitution, as is well known, has not yet attained that strength and vigour which it afterwards acquires: and this connection or relation farther appears from observing that females, naturally of a more delicate and lax habit than males, are longer subject to the complaint than the latter more robust sex.

“The circumstances of predisposition are likewise such as lessen the powers and energies of life: and when the hydrocephalus occurs as a secondary complaint, the previous diseases are all of them remarkable for the weakness they induce, which is followed not only by dropsy in the brain, but by the same disease in other parts of the body.

“As it appears, then, that the dropsy of the brain agrees in all the principal circumstances with the general character of the class, we are warranted in concluding that it has a similar origin, or must arise from the same causes which we have already proved to be either an obstruction to the return of blood through the veins, or weakness, general or local. The first is probably the cause in those instances of hydrocephalus, accompanied by a diseased organic structure of some portions of the brain adjoining the lateral ventricles; but as examples of this are not frequent, we must look upon the other causes, namely, weakness, general or local, or both, as the usual source of the disease.

“I have already endeavoured to prove, by evidence derived from our experience and observation of diseases, the only evidence the subject admits, that general weakness or debility is a frequent cause of dropsy; this fact I consider to be so well established as not to be called in question by the most sceptical.

“The case, however, is very different with respect to local debility, the existence of which, as a cause of dropsy, is not ascertained by the same evidence, but rather inferred from analogy, or assumed as a means of explaining the phenomena and appearances of the disease.

“Fortunately, however, in the present instance, we are not under the necessity of having recourse to supposed or doubtful data; as

general weakness and the circumstances peculiar to the infantine constitution are of themselves sufficient to explain the origin of the disease.

“The brain and nervous system of children have more sensibility and irritability than those of adults; for which reason they are more sensibly affected by impressions of every kind, they are more quickly lowered by evacuations, and sooner exhausted by fatigue.

“The energy of the brain of a child depends chiefly on the vigorous action of the heart, and will be found to be in proportion to the action of the heart, and to the quantity and possibly also the quality of the blood sent to the head.

“In all cases of general weakness, the heart is the part of the system first sensibly affected; but from what has been above stated, every cause lessening the action of the heart, and rendering its contractions weaker or less frequent, must have an immediate and direct effect on the energy of the brain of a child: now as the action of the absorbent vessels is known to depend upon the energy and vigour of the part to which they belong, the lessening the energy of the part necessarily diminishes the action of the absorbents; and as we know from experience that their action can be increased by the occasional excitement of stimuli or irritation, we have reason to conclude that their action is lessened by diminishing the natural exciting causes, and lowering the tone or energy of the part. But if this conclusion is just, and to me at least it appears to be so, the origin or formation of the disease can easily be traced to general weakness alone, combined with the peculiarities of the infantine constitution, without the aid of any local weakness, or other partial affection.

“When we find those authors who consider the dropsy of the brain as an inflammatory disease recommending general bleeding or a liberal use of the lancet, whether we approve or disapprove of their practice, we must at least allow that it is consistent with their theory or opinion of the disease. But it is with some surprise that I observe Dr. Cheyne, whilst he combats their doctrines, recommending their practice; for I cannot admit a difference in degree to be a difference in principle.

“The practice of general bleeding, the debilitating effects of which, particularly to children, is well known, seems to me to accord very ill with the account given by Dr. Cheyne of the subjects and predispositions of this disease.

“One would hardly suppose that the author of the above observations (some observations by Dr. Cheyne not here quoted) would be an advocate for bleeding, or for any practice by which weakness could be increased. For my own part, I have never seen a case which seemed to require it.

“The celebrated Whytt, who (I speak from personal knowledge) was no enemy to the lancet, observes, that in the fever accompanying the first stage of the hydrocephalus, though the pulse is often extremely frequent, it is rarely ever so full as to indicate bleeding;

and it does not appear that he employed this even as a means of relief, still less as a remedy for the disease.

“Besides the collection of a fluid, with the sodden and placid appearance of the ventricles, the only unnatural circumstance that ever struck me was a number of red points observable on making a transverse section of either hemisphere of the brain; which, in my opinion, are nothing more than the small veins of the brain gorged with blood, owing to the compression made by the distended ventricles on the sinuses or larger veins; but whether this conjecture is well or ill founded, there is one thing of which I am confident, and am certain that every anatomist conversant in the dissection or examination of morbid bodies will agree with me, that neither the brain itself nor its membranes, in any case of genuine hydrocephalus that ever yet has been examined, showed any appearance of inflammation, or of the usual effects of this having taken place; this remark I feel myself called upon to make, as several eminent men have entertained an opinion that the collection of fluid in the brain is always the consequence or effect of phrenitic inflammation. But the authority of no name, however respectable, can be put in the balance against the authority of facts and experience.”

But to proceed in our historical narrative. The subject of hydrocephalus was next taken up by Dr. Yeats, of Trinity College, Oxford, in a letter to Dr. Martin Wall, in the year 1815. In that letter Dr. Yeats urges the importance of early attention to the predisponent symptoms, which, he asserts, when understood, may be easily controlled, but which, when not understood, neglected or overlooked, may end in the train of symptoms which form the groundwork of the future disease of water in the brain.

This tract, as already stated, was addressed to Dr. Martin Wall, clinical professor at Oxford. The learned author consulted all the previously existing materials on the subject, arranged them specially for his own purpose, finished his volume, added an appendix to it, and put it upon his shelf, where, with very little disturbance, it has remained ever since.

Up to the date at which we have now arrived, that of 1815, we have been traveling for nearly forty years in the wilderness, through a barren and unproductive country, beset with all sorts of doubts and difficulties, obscurities and disappointments; having no better light to enlighten our path than was shed over the very commencement of our journey by the tiny lamp of Dr. Charles Quin in 1779. In a far distant country there shone, indeed, a light of some refulgence, and it shone for some short time upon the subject before us. It once was called the “star of Philadelphia.” The reader will readily apply the metaphor to the late Dr. Rush of that city. We may, indeed, observe that Dr. Rush alone, of all his contemporaries, whether of the new world or of the old, fully comprehended the subject of treating hydrocephalus upon the principles of Dr. Charles Quin’s theory.

We have next to notice the more recent work of Dr. Gölis, of

Vienna. Of that work, its translator, the late Dr. Robert Gooch, speaks in the following terms of high commendation :

“With opportunities for observation which no other man ever enjoyed, he has written the best book I ever read on acute hydrocephalus.”

This is the last work, and at all events the most recent publication of any *practical value*, that has appeared on the subject of hydrocephalus. In the sequel of the tract now about to be submitted to the acceptance of the reader, it will be made to appear how far, and in what respects, the treatise of Dr. Golis greatly exceeded in value all similar attempts of preceding writers ; and to what extent, and in what practical departments of the subject, any available room is yet left for any substantial improvements.

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#### EARLY SYMPTOMS OF ACUTE HYDROCEPHALUS, OR WATER IN THE BRAIN.

The disease known by the designation of dropsy of the brain is a fever of more or less intensity, accompanied, and proximately produced, by an increased determination of blood to the head ; occasioning great turgescence of the vascular tissues of the brain, and its investing membranes ; producing much arterial excitement and an excruciating pain of the head, and eventually terminating in effusion of an aqueo-serous fluid into the ventricles of the brain, accompanied occasionally by deposits of lymph upon the investing and lining membranes of the encephalon.

I do not propose to treat of all the varieties of hydrocephalus as distinguished, first, into external dropsy of the brain, or that form of it in which the fluid is collected in the cellular substance between the scalp and pericranium ; or, secondly, when it is effused between the pericranium and the cranium ; or, thirdly, when either of these external collections of fluid is found complicated and intercommunicating with fluids effused into the ventricles or interior chambers of the brain.

Nor do I intend to extend my attention to all the forms of internal dropsy of the head, as contradistinguished, firstly, into that in which the effused fluid is found between the cranium and dura mater ; secondly, in which it is found between the dura mater and pia mater ; thirdly, in which it is found between the latter membrane and the brain ; and fourthly, in which it is found effused within the cavities of the brain itself. Of these several forms of internal hydrocephalus, the first is so rare that I have never seen an example of it ; the second and third are also of rare occurrence ; and when seen are found

complicated with the fourth variety, or that in which the effused fluid is found effused into the several ventricles of the brain. The discussion of this form of hydrocephalus is what I chiefly propose as the subject matter of this little volume.

Although the acute hydrocephalus is a disease of uniform and unsuspected activity, and therefore of continued progressiveness from its commencement to its ordinary termination in death, *when not disturbed by the interposition of art*: it has, nevertheless, been deemed convenient to distribute it into stages and periods of various durations; as being severally remarkable for the prevalence of certain peculiarities or varieties of symptoms. Hence, writers give us long descriptions of predisponent symptoms, as constituting the period of formation of the disease. Then comes the period of the more active part of the attack, more or less distinctly marked as the season of an assemblage of many symptoms indicative of phlogosis and excitement.

This form and stage of the malady gradually wears itself out, and, sooner or later, precipitates its victim into a state of extreme hopelessness, as well as of the most pitiable but scarcely conscious misery.

When these artificial distributions of a continuous malady are employed with great caution, and for the exclusive purpose of marking with sufficient distinctness the outlines of a case, they may be made very useful towards enabling the professional reader to form at once a comprehensive conception of the whole of the malady. With this explanation I propose to distribute the pathological history of acute hydrocephalus into three forms or assemblages of symptoms; namely, first, the stage of formation of the disease; second, the period of high phlogosis and fever; and third, the stage and state of extreme collapse; of which the natural and most frequent termination, when not prevented by art, is in death. This distribution of the disease into successive forms and periods, has furnished opportunities for inaccurate observers and loose illogical writers to ramble into vague generalisations, and to confound the proper symptoms of hydrocephalus with certain diseased conditions of remote organs. In illustration of this statement, I would here notice a practice which very much prevailed about thirty and forty years ago, of referring predisponent tendencies to various diseases to certain morbid conditions or functional imperfections of the organs of digestion. The period alluded to was about the time when Drs. Cheyne and Yates published their respective tracts on hydrocephalus. That was accordingly a time when the professional press of this country too much abounded with the generalisations complained of, to the neglect or exclusion of inferences from facts founded on severe pathological investigations. A pompous writer of the period in question states, perhaps truly enough, that many of the symptoms which constitute the disease called hydrocephalus, occur in children who have worms in the primæ viæ;

and the diagnosis, between the remittent or abdominal fever of children, and hydrocephalus acutus is in many cases difficult and doubtful.

"There is hardly," he says, "a symptom of hydrocephalus which may not also be observed to occur in cases of the infantile abdominal fever, accompanied or not, as it may be, by the presence of worms in the intestines: and it is rather by a nice attention to the series and consecution of the symptoms, and to their mode of progress generally, than by an exclusive attention to any one of them, that we can truly establish the diagnostic differences amongst these several diseases. Besides, in many cases of hydrocephalus, the approach of the disease is insidious: its decided and characteristic symptoms being often preceded by a cachexia referable to disordered actions of the chylopoietic viscera, rather than to any actually diseased action of the head itself. In hydrocephalus, the bowels are often remarkably torpid and the alvine discharges characteristically unnatural. In pseudo-hydrocephalic cases, experience has fully established the advantage of active purgatives, and of medicines specially calculated to excite the liver and other chylopoietic organs to more natural secretions. Cases, too, of hydrocephalus, or cases at least so similar in all their symptoms to those which characterise fatal and undoubted cases of that disease, have now and then yielded to and terminated favourably by a similar mode of treatment. The authority of Dr. Hamilton, the author of "Observations on the Utility and Administration of Purgative Medicines," will, it is presumed, be generally admitted as excellent evidence of this important fact.

Dr. Hamilton's work, the first edition of which was published in 1805, was soon followed by the second part of Mr. Abernethy's "Surgical Observations." Both these publications contain many facts, which demonstrate the great advantage to be obtained in the treatment of sundry formidable diseases by remedies calculated to effect an improved condition of the functions of digestion; and some of the cases referred to show that even acute hydrocephalus comes within the sphere of this practice, in common with a large proportion of the diseases of childhood generally; but it is to Dr. Cheyne alone, that we are indebted for a distinctly pronounced opinion, "that the *origin* of hydrocephalus is in many instances to be found in the *abdominal viscera*."

It is a matter of pretty easy inference, that if the functions of digestion be not easily performed (and it requires no extraordinary sagacity to discover the fact), that some other important organs of the living system will sooner or later become disturbed and deranged in their actions.

That abdominal diseases will be produced by imperfect and morbid actions of the chylopoietic organs, and that these again will in their turn occasion obstructions and infarctions of sundry vascular tissues, and thus become productive of dangerous determinations of blood to the head, to the lungs, and other important organs, there

can be no doubt; but they do not constitute the diseases of those organs, nor should they be mistaken for even the first stages of such maladies. Suspended action of so large and important an organ as the liver, or an impeded circulation of the vascular tissues and glands of the mesentery, may frequently be supposed to operate as a predisposing cause of morbid determinations of blood to the head, to the organs within the chest, and to other parts; and that such obstructions may terminate in inflammations, suppurations, and effusions of various forms and names, according to the nature of the tissues invaded or seriously damaged in their functions, is sufficiently probable. All this indeed may happen; but it should never furnish ground for an accurate pathologist to confound the predisponent causes of a disease with the disease itself.

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#### OF THE PHENOMENA OF THE FORMATIVE STAGE OF HYDROCEPHALUS.

Having premised the above explanation, I proceed to call the reader's attention to a succinct enumeration of the symptoms of the first, or formative, stage of hydrocephalus. This is a period of some amount of indisposition, and of a general condition of the functions which is felt to be not that of full health. An infant, or the subject of hydrocephalus of whatever age, is observed to lose his spirits and his cheerfulness, to lose his taste and his eagerness for his ordinary occupations; the healthful fulness and polish of the countenance assumes a reduced and shrunk appearance, its complexion betrays a diminished action of its vascular circulation, and its colour fades from its ordinary hue of health and strength into a livid dingy paleness; the eye loses its lustre, and the muscles their active power and elasticity. This may be designated the chill or cold stage of the invading fever,—the creeping coldness, rather perhaps than the rigor which ushers in the first attack. The pulse at this period will probably, therefore, present an uncertain character, both as to power and frequency; to which will be added, most probably in both respects, some degree of irregularity. As the extreme vessels on the surface of the skin become shrunk and contracted, the mass of blood is determined to the interior organs of the body, and, in cases of head affections, to the vascular tissues of the brain. Hence, a sense of coldness of the integuments of the face and head is speedily followed by a headache of more or less intensity. This sometimes continues to be a most distressing affection during the whole of the disease. There is now not only an overfulness of the vessels of the head, but also, as easily ascertainable in the greater number of cases, an increased heat of the whole or of certain parts of it. In a majority of cases the forehead is most frequently the principal seat of this excess of temperature; but in some other cases I have known the occiput or certain lateral



regions of the head to be chiefly affected. Loss of appetite, alternating with occasional sickness and vomiting, usually supervenes very speedily after the invasion of the malady; the loss of tone of the stomach taking place contemporaneously with the suspended or enfeebled actions of other parts of the living system. From this time forward a headache of more or less intensity, together with a positive increment of temperature of some parts or of the whole of the head, will become permanent and established symptoms. These symptoms are the result, no doubt, of great turgescence of the vessels of the head added to an inflammatory condition of the same tissues. With these symptoms of an approaching transition from the formative stage of the malady to that of full phlogosis and heightened tempestuousness of acute hydrocephalus, there are yet some doubtful symptoms, incident to the period of transition to the subsequent stage of disease, which I have yet to notice: such are, a remarkable indifference to the occupations and pleasures of ordinary health; alternations of temperature of remote parts, as of the lower extremities as far even as the soles of the feet; aching pain of the nape of the neck, the scapular regions of the back and shoulders; pain sometimes of the spinal muscles, including frequently those of the hips and loins.

The turgescence of the vessels of the head, incident to this period of the malady, is accompanied by a sense of giddiness often expressly complained of by children of four or five years of age and upwards, and pretty intelligibly indicated by younger children by their constantly rubbing the occipital part of the head against the pillow, and by frequent attempts to apply their hands to that part of the head, accompanied by a whining expression, at once of pain and impatience. The pulse of this period is one usually of considerable inequality. Deviating, perhaps, rather slightly from its natural frequency, it is found, on an attentive examination for several strokes together, to beat more feebly and not unfrequently to intermit altogether. At this period of vascular turgescence, with perhaps, an incipiently inflammatory excitement, the surface of the body is alternately hot and cold; the colour of the face changes, it being now suffused with transient flushings, and anon subdued and shrunk into a deadly paleness. Gollis asserts that, about this period of the disease, there are occasional remissions from intense suffering; and the patient, during these moments of comparative relief, will sometimes answer the question, whether any thing ails him, by an indifferent "No."

The patient during the formative period of his malady is seldom disposed or capable of indulging in any bodily exertion; but when he does make attempts to walk from place to place, his gait is often laborious and without proper equipoise or firmness. In stepping he may be observed to raise his foot as if he was stepping over a threshold: he totters and staggers as if inebriated. This fact is noticed by many writers.

Such are the appearances which in the greater number of

children commonly precede or accompany the establishment of the stage of turgescence of hydrocephalus, and they more or less forcibly strike the attention of the practitioner, according to the cause of the disease and the constitution of the patient. Many of the foregoing symptoms, it is true, are the forerunners of other diseases; but a careful consideration of all the connected circumstances, and of the great frequency of acute hydrocephalus, will serve to guide the physician to a correct diagnosis. In weakly and badly nursed children, in scrofulous, ricketty, or otherwise constitutionally diseased subjects, sufferers from difficult and dangerous dentition, the first advances of this insidious and destructive disease are frequently overlooked; and Golis, not a little to his honour, makes the following honest statement:—"I speak here from manifold experience, and willingly confess that not only in my early years I have often overlooked the commencing moment of acute hydrocephalus, but that even now, under the above circumstances, I am often unable to distinguish the symptoms of turgescence from those of the previous constitutional ailments alluded to; especially if I have not known the patient some time before, and am compelled to form my diagnosis from what the bystanders relate concerning the progress of the malady."

The following passage from the work of the same accomplished writer presents to us a beautiful specimen of close and accurate observation of symptoms, under circumstances of some uncertainty as to the origin of the disease:

"Indifference succeeding to increased sensibility and irritability; a constipated state of the bowels after habitual diarrhœa; a scanty secretion from the kidneys, or an unusually yellow urine, with or without sediment; dryness of the skin, which previously to the accession of the disease perspired on the slightest exercise, or on eating or drinking, and particularly during sleep; sleep without medicine occurring suddenly in restless children; remarkable gravity and earnestness which had never been previously noticed; these symptoms, taken together with those already mentioned, are indications by which the commencement of the stage of turgescence of hydrocephalus may, with great probable correctness, be suspected."

Equally, or even more difficult, is it to distinguish the formative stage of this disease in very young infants of from one to four months old; inasmuch as children of this tender age eject the contents of their stomach with great facility, even when in good health; become soporose from a slight overloading of the stomach; and their pulse, from trifling indigestion, or even in apparently good health, sometimes deviates from its natural regularity.

Sleeplessness; unusually continued screaming, with a throwing back of the head and spine; panting almost to breathlessness during paroxysms of screaming and passion, and hanging down of the head exhausted and drooping after such attacks; alarm on the gentlest touch; increased sensibility of the eyes to strong light; an

excessive quickness of hearing, and a consequent liability of being easily disturbed out of sleep; diminished appetite both for food and drink; intolerance of all movements of the body; frequent application of the hand to the back of the head, and an occasional pulling of the nape of the neck with the same hand; lying on one side of the head in bed with the head retracted, not depending on any previous trick or habit; a scanty secretion of urine having its colour of a deeper hue than common; absence of all audible flatulence; increased heat of the head and especially of the forehead and upper part of the nape of the neck. These symptoms, with an attentive observation of the manner and actions of the patient, with due reference to, and allowance for, prevailing diseases, added to a practical acquaintance with the proper attributes of hydrocephalus under its several modifications of age, temperament and condition of the parents in society, will best guide the practitioner to a probably correct diagnosis of the disease about to become established in the cerebral system.

Such, however, is the ordinary mode of approach of hydrocephalus, such are the symptoms of its formative stage, or that of its period of turgescence, as designated by Dr. Golis. It is the most frequent variety of its accession; it is the most dangerous to the patient; and upon the whole there is reason to fear that it is the least reflective of credit on the sagacity and resources of the physician.

The least frequent mode of approach of hydrocephalus is that of which the formative stage is of the shortest duration. Its objects are generally the healthiest and liveliest children. Its symptoms of the cold stage are those of creeping chilliness of the legs, thighs, and loins; a great sense of lassitude and languor; giddiness, with an appearance of confusion bordering on an expression of want of capacity; pain and great stiffness of the neck, and pain of the back of the head; a sudden accession of sickness, with an inclination to vomit, without any known or manifest cause; a full, hard, and slow pulse, now and then interrupted by several unequal and irregular strokes of the artery; sensibility of the eyes to feeble light; ringing in the ears, with much disturbance of the organ of hearing from slight causes.

After these symptoms of overfulness of the vascular tissues of the brain, symptoms which indicate the state and stage of turgescence, shall have existed for a period of brief duration, the patient becomes the subject, often very suddenly, of a violent febrile excitement, not unfrequently accompanied by frightful convulsions. These alarming indications of an affection of the head are far more calculated than those which we have previously described, to excite in the relative and bystanders the requisite anxiety and sense of danger that are found sufficient to induce them, without hesitation or loss of time, to ensure an early attendance of their physician.

If the practitioner is called in proper time to this manifest

expression of encephalitis, and he employs the necessary remedies with activity, the effusion is much more easily prevented or arrested than under the form of a milder variety of the formative stage of hydrocephalus, or that which I must request the reader to identify with the period of turgescence of Golis. By an early and active interference of art under the circumstances of this bolder and less disguised form of the malady, a greater number of sufferers who are attacked by the disease are happily rescued from premature death than under the opposite circumstances.

But if the physician has not a clear view of the disease, I am happy in being able to make this statement in the language of the Vienna physician. "If he does not apply the necessary remedies with overwhelming power, there follows, in some few cases, after two or three days, but most commonly after the lapse of only a few hours, the moment of effusion, which may be recognised by its characteristic symptoms, and which is soon followed by the stage of palsy, in which the patient is irresistibly lost."

The duration of the formative stage, or the period of turgescence, is sometimes only that of a few hours; but in some cases it extends to eight, ten, fourteen, or even many more days.

We now proceed to attempt a pathological history of the second, or inflammatory period of this horrible disease. In the more insidious and subdued form of the malady the diagnosis is more difficult; and mistakes are more frequently fallen into when it is most important that practical misconceptions should be avoided; that is, during the very commencement of the malady.

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#### ON THE SECOND, OR INFLAMMATORY PERIOD OF ACUTE HYDROCEPHALUS.

Here the signs of turgescence, or simply of plethoric excitement, are lost in those of a phrenetic and encephalitic state of some or all of the tissues within the skull; for here I have no hesitation in declaring my full belief, that in all cases of acute hydrocephalus, the brain and its envelopes become the subjects of inflammation, of more or less intensity. In support of this fact, I shall not forget, in the sequel of this little work, to furnish irrefragable proofs. At the period of transition from the stage of turgescence to that of direct inflammation of the important organs within the skull, the patient complains, in stronger language than heretofore, of intense pain in the forehead immediately over the eyebrows, occasioning a sense of severe pressure upon the eyes themselves.

These acute encephalitic affections are sometimes known to alternate with spasmodic pain of the lower intestines, or with pains in the limbs, or with spastic rigidities and distressingly painful affections of the nape of the neck, and its strong muscular connections with the occiput. All these pains are much more intensely violent than during the formative stage of hydrocephalus. In a

certain proportion of cases these pains are comparatively slight; and this is a reason why physicians have sometimes doubted the existence of local inflammation of the brain and its envelopes. For the miserable victims, tortured beyond measure by the distressing symptoms of a malady now rapidly progressing, there is no place on which they can lie still, and no friend, however near or dear, to whom they can confidently look for help; the eye shrinks from light, and forthwith retreats, acutely irritated, into its socket, where it remains shaded and in part protected till the dusk of the evening. The head is hot to the hand, as are also the forehead and, in many cases, the nape of the neck. This increment of heat, of at least some part of the head, is, I believe a never absent symptom of this stage of hydrocephalus, although neither this nor any other part of the surface of the body appears inflamed or visibly turgid.

Excepting in some of the worst forms of the inflammatory periods of hydrocephalus, in which the albuginea is streaked with blood, and the inner surface of the eyelid is commonly inflamed; excepting also in a case of complication with a febrile eruption, or with a chronic inflammation of the eye, it is a fact, I believe, that these parts are generally, if not always, pale. It is only in the first of the above conditions that convulsively trembling movements of the eye are ordinarily observed during this stage of the disease. The carotid arteries are both seen and felt to pulsate strongly; and the ruddy countenance, which only a few days before was round and plump, begins to assume the aspect of a squalid paleness, and in some few cases, by reason of a partial œdema, a mis-shapen and distorted appearance.

Amidst the rapidly increasing intensity of the symptoms at about this time, accurate observers have generally recognised a great change in the features and complexion, in the voice and movements, of the patient, as well as in the actions, sentiments and temper of the subjects of acute hydrocephalus. In short they form a class of patients distinguishable for a miserably pitiable and characteristic physiognomy. "I reckon these changes in the features and appearance among the physiognomic indications of hydrocephalus."—*Golis*. The nose is always dry; the lips, formerly of a rosy hue, now present the complexion of a faint dark red, and moreover fissured by reason of their dryness; the tongue, which at first was clean, now becomes covered with a white or brownish yellow fur; thirst and appetite for food are easily appeased or entirely cease, excepting in one form of the malady, during the inflammatory stage of the disease, which seizes its victim in a tempest of symptoms called by *Golis* "the tumultuous accession of hydrocephalus." On the contrary, the stomach is often disturbed by nausea and retchings to vomit; the contents of the stomach being rejected four or six times in twenty-four hours. But these vomitings become less and less frequent as the disease advances to its next subsequent stage, or, as sometimes happens, ceases entirely. When it continues, it is principally aggravated on the patient

attempting to move or sit up in bed. The power of digestion, which even in the formative stage of the disease had become much diminished, commonly ceases altogether during this stage of inflammation. Food taken many days before often passes undigested, unhealthy both as to its appearance and fetor; consisting of much unhealthy looking mucus, admixed with a great quantity of viscid and vitiated bile. In the *tumultuous accession* of this disease some patients are constantly chewing. At length the breath begins to be tainted by a very sickly, offensive odour. Pressure on the pit of the stomach occasions much tenderness. The abdomen, which may be tumid at the beginning of the malady, subsides surprisingly in its progress, even without any increased evacuation from the bowels. The falling of the abdomen may indeed be considered as one of the pathognomic indications of acute hydrocephalus.

The bowels often remain obstinately constipated in spite of active purgatives and also of injections. The stools are gluey, most commonly brown, sometimes of a clay colour, and at other times of a yellowish green. During the use of calomel, green indeed, in all its several shades, is the predominant colour. The motions also are for the most part slimy and fetid. Flatus scarcely ever passes, excepting under the most tumultuous forms of the disease; especially in that remarkable variety of it to which Golis and other German writers have given the name of *wasser schlag*, or water stroke, which also is that presumed by Dr. Charles Quin to have been the apoplexia hydrocephalica of Cullen.

The urine is always scanty, and voided with pain. At the beginning it is generally turbid and white; but in the following stages its hue is that of whitish yellow with a heavy slimy deposit. If at this period of the disease this sediment should form, the urine will nevertheless remain turbid, and will affect the smell but slightly; but soon after it runs into the putrid fermentation, and it will then affect the olfactories more sensibly.

The sense of hearing now becomes more acute, and loud sounds more painful.

A constant moan, with complaints of pain in the stomach and abdomen, at the nape of the neck, and the occipital region of the head, excite in the attendants the most heartfelt anxiety and pity. The nights are for the most part sleepless, or else the sleep is exceedingly disturbed. Children during this stage of hydrocephalus may be observed frequently to grind their teeth; they dream much and cry out loudly and suddenly in their dreams. At this time they are much given to sleeping; and it is only to pressing questions that they are willing to give answers, and then only monosyllabically or in a few words. Their movements are languid and constrained; they sit up with difficulty to drink, or for other purposes; and they cannot keep long in a sitting posture without support, and without its being followed by nausea and vomiting.

The pulse is now become slow, unequal, and intermitting. During

the slow pulsations one often feels a feeble intermediate stroke; and if the patient should awake suddenly, in a fright or a dream, or during the moment of a violent pain in the head or any other part, the pulse instantly rises to double the rate of its previous frequency. A pulse of considerable slowness may be assumed as the ordinary pulse of an advanced period of the second stage of hydrocephalus, and may, therefore, be looked upon as a good practical pathognomonic sign of that stage of the malady.

The skin, which a short time before was moderately well stretched and tense, becomes flaccid, dry, and of a dingy colour. It is about this time, also, that an eruption sometimes manifests itself about the nape of the neck and shoulders. This eruption has been considered by some writers as especially characteristic of the second stage of hydrocephalus; but we also meet with it, with almost equal frequency, during the stage of effusion and palsy. The patients now commonly lie on one side or the other indifferently; the hand on which they lie is placed under the head; the other hand, with the arm outstretched, lies along the side, but it is often moved forwards and upwards towards the head; but only to remain there for a few moments, until chased by some new form of pain or irritation, to seek relief in a new position by a sudden effort of painful restlessness or of unproductive exertion.

When an infant awakes from its slumbers, it wants to be placed in a new position on the mother's knee, or in the nurse's arm; and then again, it almost immediately expresses a wish to go to its bed or cot. It seeks, in short, a change in every direction, but is every where disappointed; and is forced to seek new changes, with similar results of speedy renewals of pains, with no substantial improvement of circumstances from any alterations or alternations of position.

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#### ON THE THIRD STAGE OF ACUTE HYDROCEPHALUS, OR OF THE PERIOD OF EFFUSION AND PALSY.

I consider this period of effusion as really identified with the last stage of hydrocephalus, which terminates in palsy and death; there being no good reason, in my opinion, for separating the terrible symptoms of an advanced period of the malady, from the miserable remnants of life which are usually attendant on the still more frightful horrors of the dying state. The description of this stage is given so faithfully to truth and nature by the learned Golis, that I feel disposed to ask the reader's permission to adopt his descriptive delineation of it, with a few such changes in the phraseology of that estimable writer as may be necessary to adapt his account of the disorder to the associations of the English reader.

Most of the symptoms of the preceding stage, after having continued for a certain number of hours, or more frequently for several

days, and in some few cases even for weeks, become greatly exasperated. The little patients can no longer remain out of bed, nor sit upright, even when supported by others; and much less are they able to stand: and the restless desire for a frequent change of posture now ceases. They no longer desire to go from the mother to the nurse, and then to the mother again. They become willing to lie tolerably quiet in one bed, and principally in one attitude, placing themselves in an oblique position, with the head towards the right when they have to lie on the right side, and with the feet to the left; and inversely when they lie on the left side. But the most common posture in this stage is on the back; and in this attitude the patients with both feet are constantly kicking the bed-clothes. When lying on the back, and especially in that position, they draw up one leg so as to make the heel approach the nates, the knee being nearly upright; they then swing the limb thus bent to right and left, and after a time stretch it out at full length. While making these movements with one of the legs, they are apt to move the arm of the same side towards the head, then to the mouth, and then to the nostril; which they pick sometimes so roughly as to make the nose bleed.

The tones which in this stage of the malady they attempt to utter, and the few broken words which they would express, but are half forgotten in the delivery, are for the most part pronounced very slowly, with great difficulty and effort, and by reason of obstructions in the nasal passages, very unmelodiously. The fingers are frequently carried into the ears, which from the trembling of the hand, they cannot often reach or find. They frequently catch at an eye, as if they would pluck it out of its socket; or, as in some other cases, they pull themselves by the hair with reckless and useless violence.

Their lips are often dry and fissured, and thus furnish for the fingers and the teeth a constant occupation in attempts to effect the entire separation and removal of such dried and broken remnants of integuments.

All the external senses, except that of hearing, which during the early part of this stage of the disease is often very quick, become dull and almost annihilated.

The sensibility of the eyes, which in a former stage was morbidly raised, becomes reduced to a great degree of dulness: their parallelism is injured, and their focus distorted, their oblique glance being directed downwards. The pupils at this time are usually widely dilated, and the eyes themselves almost motionless, or oscillating without object or regular direction, but very insensible to the action of even strong light. Their sight is weak and deceptive. Objects held before them are perceived indistinctly, and are often seen double or at a remote distance.

The patients at this period sigh deeply, and moan piteously. When roused out of a state of seeming reverie, they from time to time, open their eyes widely, and again shut them closely; and they repeat this opening and shutting of the eyes for several minutes. A



gloomy earnestness is at the same time painted in their flushed countenances, accompanied by a petulant daring expression, but more frequently by that of utter distress and despair. This scene is again soon shifted and succeeded by a short interval of quiet; which, however, is almost immediately broken by a return of the former moanings and complainings. A curious contrast is thus presented of patience with fierceness and wild intolerance of intense suffering. The wretched subject of the disease in the mean time becomes wasted to a skeleton; his shrunk and flabby skin hanging loosely on his emaciated legs without vital softness, except where here and there partial sweats take place in succession or alternation with the previous partial creeping chills, which had perhaps but a few moments before preceded them.

The urine having much of the same character as during the former stage, now begins to be voided unconsciously.

An action of the bowels seldom follows even large doses of calomel without the aid of injections. In consistence, and in some other respects, the alvine discharges are often tolerably natural in their character; while at other times they exhibit great varieties of consistence as well as of constituent materials. Sometimes they are soft and yeasty, or pap-like; at other times they are morbidly green as to their colour, admixed with portions, perhaps, of lighter colour, but approaching to fluidity of consistence. In a few cases the secretions are of a dirty gray hue, or of too light a brown; but at other times they are of a blackish colour and putridly offensive. Diarrhœa without purgatives is of rare appearance; and when it has occurred, the produce has generally been green, watery and slimy; and then the attempts to expel fæces have often been attended with great pain.

The action of the heart and arteries during the wear and tear of this stage of the malady becomes subject to more and more of irregularity and weakness.

In the progress of the disease the respiration becomes more frequently interrupted by sighs, the breath more offensively sickly and fetid; the general weakness in the mean time advancing in rapid progression.

The patient is at length overtaken by extreme drowsiness, moaning unconsciously, and grinding his teeth; after which he soon sinks into a state of complete coma. The last tragic scene is now rapidly approaching: but it now and then happens that the little sufferer awakes again to some degree of consciousness, and is able once more to take food and drink without vomiting; which, however, at this stage of the malady is of very rare occurrence. During this occasional and very remarkable interval, patients sometimes ask and crave for food, swallow with eagerness, long for their playthings, cheer their fond mother and sometimes also the inexperienced and less cautious physician, with false hopes, which are too soon dissipated for ever; the former symptoms soon returning to be more extremely violent than before, to renew their direful

work of torture, and gradually to prepare their victim for the last struggle. Dr. Golis illustrates the fact of this temporary improvement, this brief reprieve from the approaching pangs of the dying scene, by the following case.

“A child four years old, after having for many days spoken unintelligibly through the nose, not known his mother and other attendants, and not appearing so see objects held up to him; called upon his mother and maid distinctly by their names, asked for his horse and whip, supported himself in a half sitting posture in bed, and ate some panada with relish: but after a lapse of three hours he fell into his former soporose state, attended by palsy of one side with spinal cramp and convulsions; and after the lapse of six hours he expired.”

Another case is added by the same gentleman, for the purpose of illustrating a similar result, in the person of a professor's daughter five years old, who, in the progress of the stage of palsy, recovered so far as to have appeared in all respects restored to health, after having passed through the previous stages of turgescence and inflammation, and through two days of the stage of effusion, recovered her full consciousness, regained her sight and speech, swallowed food and drink; her pulse became equal and free from intermission: her skin transpirable; the contents of her bladder were voided in large quantities; the stools were figured; the sleep was good; the breathing was easy, uniform, and natural. All the secretions and excretions were in a healthy and natural state, and in short, all the circumstances, in deduction from the prosperity and good promises of the case which were presented, were, that the little patient felt great languor; that she could not move her hands and feet without difficulty, and that she was unable to hold up her head. “This case,” observes Dr. Gölis, “made me for some time distrust my prognostic, which, however, I had not concealed, that in the state of effusion and palsy the recovery of the patient is universally impossible. A relapse, however, after a reprieve of forty-eight hours, was followed speedily by death, too certainly indeed in the end to confirm the unfavourable opinion which I had given at the beginning to the parties interested.”

I have now to add to the foregoing description of what Dr. Golis, in common with some other authors, has called the third stage of hydrocephalus, an account of some of the extreme symptoms consequent on effusion into the ventricles of the brain.

The phenomena here to be enumerated are convulsions, followed by palsy, most commonly of the right side, with strong contractions of the posterior spinal muscles, and especially those of the neck, in consequence of which the head is drawn backwards and downwards, accompanied, not unfrequently, by a frightful distortion of the features. These convulsive distortions, whether of the muscles of the face, or whether of those of the spine, or lastly, of those of the extremities, do not usually cease excepting with the death of the subject. A violent fever follows this last exertion of nature, by which,

perhaps, she makes a vain effort to remove the cause of death, the fluid now lodged in the interior of the brain. A deadly sweat trickles from the head; a hectic redness succeeds and alternates with a mortal paleness of the disfigured countenance of the patient.

The sight having been for ever extinguished, the pupil, in the midst of convulsions and distortions of the eye, arrives at its greatest degree of dilatation. The pupil, it should be observed, even at this latter stage of existence, becomes occasionally, although but very seldom, spasmodically contracted. It always, however, remains immovable, and insensible to the strongest light. The albuginea is blood-shot, and the tarsus, in the greater proportion of cases, is lined with a yellow mucus. The palsied eyelid permits a substance to drop from its mucous membrane, which appears to ooze from every part of its surface, and to cause the eye itself to project more and more from the deeply-sunken socket.

The hearing, hitherto so quick, becomes gradually dull.

Swallowing becomes very much impeded, partly from palsy of the muscles of the throat, and partly in consequence of the spinal cramp, which has the effect of carrying the head downwards and backwards, and therefore of interfering with the direct line of the pharynx and œsophagus: at length it becomes impossible. Nevertheless, the little sufferers have, even in this stage, some moments during which they can swallow fluids; but at every drop which, in this palsied state, they make attempts to swallow, their nerveless hand trembles.

They pass their urine unconsciously, in small quantities, and but seldom. It is, as in the former period, of a deep yellow colour, charged with a white sediment.

Their evacuations by stool now become comparatively unfrequent; the motions being sometimes green, sometimes dark brown, sometimes soft, sometimes firm and slimy, but never fetid.

The tough mucus falls over the posterior nares into the throat, irritating the fauces, so as to excite a sense of suffocation, even to the point of vomiting, but without being attended with that effect.

From one or the other nostril, there often flow, before dissolution, a few drops of blood.

In many of the subjects of this disease, the ends of the fingers become blood red, and afterwards, on the immediate approach of death, pale. The pulse becomes exceedingly frequent, and still more intermitting and irregular than in the former stage, and so exceedingly feeble as to be almost imperceptible. The breath becomes short, quick and gradually cold. The feet are frequently observed to be somewhat swollen before death. The natural warmth of the limbs, already considerably diminished, ceases; whilst that of the head is sometimes observed to be increased. The spasms, which draw the head backwards, and cause the unpalsied arm to be applied closely against the side of the body, cease only with life. The heart still makes some tremulous movements; and the patient still breathes, rattling, with open mouth. Frightful distortions disfigure

the countenance; and thus, after divers horrible sufferings, the pitiable victims of this malady are withdrawn from their miseries: some at a late period of the first week, others in the second week, and the rest in the advancing progress of the third or even fourth week, worn and wasted to little more than skeletons."

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#### OF THE DIAGNOSIS OF ACUTE HYDROCEPHALUS.

It is a generally prevailing opinion that the diagnosis of this disease is attended with great difficulty, even to physicians of ample experience. This difficulty is supposed to arise from this malady having many of its worst symptoms in common with some other severe diseases, and partly because its symptoms are often veiled under the mask of a previously existing pyrexia. The practitioner who holds the life of a child entrusted to his care under such responsible circumstances should feel it his bounden duty to inquire into the early and doubtful symptoms of his case with much minuteness and painstaking. Some of the minuter symptoms of the precursory stage will often prove in the sequel of the greatest importance, as indications of the actual disease that is to follow. Among such symptoms may be enumerated a gradual loss of spirits, loss or diminution of appetite, dulness of the eye, irritableness of the temper, sleepiness of young infants during the commencement of the fever of dentition, an observable change in the complexion and expression of the countenance, and perhaps beyond all other peculiarities of expression, a settled and immovable gravity.

The fact of the great frequency of head affections in children should always be present to the mind of a physician during his first visits, as well as another fact of nearly equal importance, namely, the great tendency of all pyrexial diseases of very young children to occasion overfulness in the vascular tissues of the brain.

The medical attendant should moreover direct his most anxious attention to the succession of the symptoms, and neither write his prescriptions, nor absolutely conclude upon his diagnosis, without taking the utmost pains to make himself master of all the existing symptoms, and of their relative consecution and bearing on each other, as well as of their combined influence on the whole case. Before he retires after paying his first visit, he should put himself in possession of all the pathognomonic symptoms of his case: in short, it should include a study of the principal circumstances incident to the advent, development, and increment of the several symptoms, in the order of their origin and progress. He should indeed be competent by his discretion and adroitness to learn many facts from the friends and relatives of his little patient, from his professional brethren in previous attendance, and sometimes even from casual visitors. He might thus learn many circumstances of great

importance during even the commencement of the malady, which he might not be able to arrive at by any sagacity of his own, or closeness of observation of the patients themselves. It would be useful for a young physician to keep by him, or to consult a well painted picture of the disease, which would faithfully call up to his recollection the several phenomena of the malady as they most frequently occur in the consecution of the ordinary stages of the malady, as they have already been placed before the reader.

Among the most important symptoms indicative of the stage of turgescence is perhaps a slight giddiness, with a momentary confusion in consequence of all quick movements of the head; aching pains of the hands and feet, such as have been proposed by some writers to be identified with rheumatic pains of the same part; similar pains of the nape of the neck; disturbed and unrefreshing sleep, occasionally interrupted by talking or muttering; diminished relish for food and drink, with or without other gastric symptoms; a scanty evacuation by urine or stool; disappearance of the natural bloom of ordinary health without any known cause; sudden changes in the accustomed tint of the complexion; a stumbling gait without the usual firmness and power of equilibrium; indifference for things for which the patient had previously shown great fondness and preference; peevishness; intolerance of light; dislike of notice; a natural pulse, with only now and then a few pulsations stronger or omitted; fits of absence and musings, with deep sighs; a dry skin; a general loss of strength; a marked change of the ordinary appearance of the patient.

From the presence of the greater number or all of the above symptoms of acute hydrocephalus, with a careful consideration of its causes, predisponent and occasional, together with the age and constitution of the patient, the physician may decide with a considerable amount of certainty on the presence of the formative stage, or that of turgescence, of the disease under consideration.

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#### PATHOGNOMONIC SYMPTOMS OF THE SECOND STAGE, OR THAT OF INFLAMMATION.

In the stage of inflammation, the remarkable symptoms are the great sense of pressure on the eyes, pretty constant and continuing during sleep; these pains frequently alternating with painful affections of the stomach and bowels, without at first being accompanied by any considerable accession of febrile disturbance. In a small proportion of cases we occasionally encounter violent attacks of fever, with or without convulsions; preceded for a brief period by symptoms of turgescence, as well as also by symptoms of intense anxiety and restlessness; retreating of the eye backwards into its socket, with much morbid sensibility of that organ: in sleep it is only half covered, its pupil being in the mean time contracted. Add to the foregoing symptoms an increased heat of the head; an altered

countenance with great paleness of the complexion; dryness of the nostrils with indurated and fissured lips; entire absence of appetite both for food and drink; repeated vomitings, always increased by movements of the body; a peculiarly sour smell of things ejected from the stomach; an entire suppression, or great diminution of the power of digestion; a remarkable and characteristic fetor of the breath; a constant dull pain in the regions of the stomach and liver; a great subsidence of the abdomen, although it might immediately before the accession of the disease have been full and prominent; general and rapid emaciation; obstinate constipation; urine scanty and turbid from being charged with a white heavy sediment; acute hearing; sleep disturbed, accompanied by much grinding of the teeth, but not often interrupted at this stage of the malady by frightful dreams; the heat of the head and stomach compared with that of the rest of the body greatly increased; the general debility very considerable, and more or less rapidly advancing; the pulse slow and irregular, with some intervals of intermission between the strokes of the artery; the skin more and more flaccid.

About this period the shrunk and trembling hand is carried involuntarily towards the head, and this happens concurrently for the most part with an entire change of countenance, a reduced capacity for speech and conversation, with an obvious collapse of all the powers of life.

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#### OF THE PATHOGNOMONIC SYMPTOMS OF THE THIRD STAGE.

Those, on the other hand, which mark the period of effusion and palsy are principally the following. A sudden transition from the highest state of sensibility to that of extreme dulness of all the senses; inability to sit up in bed without help; an oblique position in bed; a frequent involuntary movement of the hand towards the head; a similar action of one or both feet against the bed-clothes, one lower extremity being kept upright, and rested against the heel, so as to be instantly ready to be rocked from side to side, or to be stretched out at full length in response to the harassing restlessness of the patient; frequent application of the fingers to the ears, mouth, and nostrils, accompanied by much uncertainty of the movements of the hand to the head; a rapidly increasing dulness of the senses, with an occasional exception, however, of the sense of hearing, which may be tormentingly sharp and quick even to a late period of the malady; a downward look of one or both eyes; deceptiveness of the sight, with double vision, and a convulsive opening and shutting of the eyes for some seconds.

Then follow sudden, but uncertain flushings of the countenance, with sometimes a gloomy earnestness and a threatening mien, during a convulsive play of the eyes; emaciation in the highest degree; a clear gold yellow scanty urine, with the characteristic

deposit, and passed unconsciously; obstinate constipation; a weak, soft pulse, but as irregular as in the former stage, if not more so; a respiration intermitted by frequent sighs, the breath becoming increasingly offensive; constant and audible groaning; sudden and loud screamings; grinding of the teeth; a state of the greatest weakness. After the lapse of from four to seven days of these symptoms variously combined, there returns, in some patients, a short recovery of mind: for a brief period they recover their ability to speak, to long for and to take food, to wish for their playthings, to recognise their favourites and playfellows, and even to call them by their names, and to be entertained by their conversation. Their parents, and even occasionally their less experienced medical attendants, are thus exposed to be deluded, but only for a very short time; for the little patient soon again relapses into his former state, and sinks still lower into the complication of pitiable symptoms usually attendant on the dying state. These are convulsions, with terrible spasmodic contractions of the spinal muscles; palsy of one side of the body; vehement fever, although in the midst of great prostration of strength, accompanied by the colliquative perspirations of the moribund state.

Hectic redness of the cheeks, in fatal contrast with the utter loss of vision; palsy of the iris, or spasmodic contractions of the pupil with a bloodshot albuginea; complete deafness; difficult deglutition; a trembling movement of the unpalsied hand; diminished warmth of the unpalsied side; and an approach to suffocation from efforts to vomit without effect, are, in the greater number of cases, the more prominent parts of a picture, the most melancholy that can be well conceived, that of a protracted and cruel disease, yielding up its victim to the last fatal sufferings.

Such is a compressed account of the principal diagnostic symptoms of hydrocephalus, including its three several stages; such being in point of fact the greater part of the proper symptoms of the malady as they constitute essentially the pathognomonic phenomena of the disease.

The above accurate and carefully drawn picture, a tablet having little more upon it than what essentially belongs to the pathology of hydrocephalus, becomes, by comparison of its several sections, a minute description of the symptoms belonging to each section, and a document which may be relied upon for the accuracy of the facts described, and easily put in juxtaposition with the symptoms of other febrile diseases, presumed to present certain resemblances to the disease called water on the brain; a picture, therefore, which will furnish a sufficient and satisfactory means of coming to a diagnosis of the malady under our more immediate consideration.

## ON SPECIALLY PREDISPOSING CAUSES TO ACUTE HYDROCEPHALUS.

After the above general view of the several symptoms of hydrocephalus, it may possibly be useful to determine the attention of the reader to certain special causes of the disease operative in most countries, especially during the irritation of the first dentition. The formative stage of hydrocephalus is ordinarily a period of general indisposition; and it may be frequently known or suspected to be the effect of an occasional cause of sufficient power to have produced the symptoms complained of; and the phenomena of dentition are indeed frequently recognised, and are much more frequently ascertainable, as the occasional cause of an overfulness of the vascular tissues of the head than any other *single* cause whatever. It is a fact of daily experience, that at the commencement of the stage of turgescence from this cause, the little subjects of the overfulness supposed become drowsy and almost unrousably sleepy as soon as the said plethoric fulness of the vessels of the head can be supposed to take place.

This result is accompanied, or speedily followed, by a perceptible increment of heat in the head, and by pain of some particular region of it: the locality of the former will enable us to discover the seat of congestion, and therefore, also, the locality of the latter. The headache here spoken of naturally introduces a state of peevishness, a suspension of all cheerfulness, and incapacity for the ordinary vivaciousness and activity of early childhood. The little subject becomes silent and irritable: it ceases to be easily amused, dislikes light, and the officious attentions which are kindly intended to entertain and to soothe it. The lively colour of its countenance begins to fade, its eye grows dull, it also loses its appetite for spoon food, and takes the natural food, the mother's milk, with diminished relish. The remaining symptoms of the first stage supervene in due course. If the medical attendant should, at this time, carefully examine the state of the gums, he would in most cases find it easy to refer the symptoms just enumerated to irritation from dentition, and would come to the conclusion, that they could be no other than the result of that painful process: the proper treatment in that event would naturally suggest itself to a sagacious and well-informed practitioner. We must refer, however, the practice to be adopted in such a case to another opportunity. It may suffice for the present to state, that if applied with vigour, and sufficiently early as to time, it will have the effect of breaking the neck of a disease only as yet about to form. It may be here advantageously intimated to the reader, that the irritation from teething is, in nine out of ten cases, the occasional cause of acute hydrocephalus during the three first years of life.

The predisposing cause to hydrocephalus next in frequency to the irritation from teething is the very defective system too frequently resorted to in this country, and perhaps in most countries, to



supply the infant with artificial food on the failure of the natural food originally provided for it by the mother. On the threshold of this inquiry, I might be expected to enter at once upon the controversial and very comprehensive subject of weaning. But although tempted by many very important considerations to make some practical reflections on the shameful manner in which many ladies in easy, and even in wealthy, circumstances are induced to neglect the first and most important of their duties to their infant offspring, I feel myself at present compelled not to undertake the task. It is my present object therefore to pass on, briefly to notice the usual irregular and defective method of supplying growing infants with food competent to furnish them with a sufficient quantity of bland and salubrious blood. It is a fact much to be regretted that the milk of the cow, which is most accessible to all classes of families, is not easily digested on a very young infant's stomach; and thus motives have been furnished for druggists and other traders in matters of this kind to recommend for the purpose in question several varieties of vegetable foods easily made into agreeable mucilages; such as the mucilage of arrow root, starch made from the potato, or from wheat, flour, tapioca, and other articles of the same description, which are ordinarily made so palatable that children will not only take them without objection, but often with great relish and avidity. Thus are mothers too often enticed to put their young offspring on what is called spoon diet prematurely, and perhaps to prolong its use too exclusively, until a foundation shall have been laid for an incurable delicacy of constitution, of which this system of management is abundantly productive. It is surprising how an injurious practice, or a partiality for worse than useless objects of use or purchase, becomes universal in England, by dint of the trickeries of public advertisements. This has especially been the case with the flour of arrow-root, which has for many years found its way into every house in the kingdom where there are young children. The mucilage of arrow-root, either with or without milk, makes, it must be admitted, a nice variety of food, as an *auxiliary* to the natural nutriment from the mother; provided it be used simply as an auxiliary to the mother's milk, and only for a few of the first weeks or months of the infant's life. Its nutritious qualities are insufficient for the entire feeding of a child of more than four months old: and yet how many are there, even of our better educated ladies, who think that the flour of arrow-root furnishes the best food for infants that has ever been known, even without exception in favour of any other food whatever, whether natural or artificial. The consequence of this unfounded, but almost universal, prepossession is, that a large proportion of our younger children are attempted to be fed on arrow-root at a period of their growth when they stand in need of a great abundance of good blood to sustain them during the first crisis of their constitution; namely, that of their first dentition: under the pressure of which many of them are known to succumb. While supplied

exclusively or principally with this weak and sloppy food, all children, without exception, as far as I have been able to observe, gradually lose their flesh, and very soon after, their colour and spirits. With these changes they become less torrose and vigorous as to the form and firmness of their limbs; but more delicate as to their appetite, and more fastidious in their choice of food. With the reduced vigour of their corporeal frame, their minds, usually about the same time, sink into fretfulness and want of spirits.

The smiling gaiety of the two or three first months is suddenly, or at all events speedily, exchanged for a spiritless immobility that seeks no change, and a gravity naturally unknown to early infancy. In this way the constitutional powers of the infant become eventually so much depressed as at length to prove incompetent to carry on the business of life without great danger of interruption. In the languid progress of the feeble life here supposed, the spoon-fed infant becomes more and more attenuated, its flesh becomes more flabby, the cellular membrane less charged with wholesome fat, and its blood-vessels less distended with wholesome blood; the child's countenance becomes pale, perhaps squalid, or else bloated with an unhealthy fulness; when the eyes, brilliant enough, perhaps, in many cases to express much morbid acuteness and sensibility, sink deeply under the shelter of a rapidly projecting forehead, which an imperfect action of the digestive functions is already preparing for one of its striking peculiarities. In the mean time its abdomen is gradually enlarging to what is usually called pot-bellied; distended, first, by obstructions from sub-inflammatory enlargements of the mesenteric glands, and then by more intense inflammations of their tissues; and eventually by extensive suppurations, attended, of course, by sundry disqualifications for their proper functions in the living body.

In this state of things, the circulations of some, or all, of the abdominal viscera become liable to be impeded; and thus to become in their turn causes of other impediments in different and distant parts of the body: such, for instance, as swellings and inflammations of the joints, pneumonia and pleurisy of the organs of respiration, and perhaps, more frequently than any other, an increased determination of blood to the vascular tissues of the head, accompanied by that sort of inflammatory diathesis of the same tissues, which usually terminates in effusion of fluid into the ventricles of the brain. In this way, I think we may very sufficiently account for the fact of the frequent occurrence of hydrocephalus from defective and ill adapted food. This is not properly the place to introduce the subject of correctives of this bad system of dieting young infants. I may, however, be permitted to make a very few remarks upon this part of my subject, without incurring the charge of wandering to any great distance from the proper matter of our present inquiry.

I would first then observe that the best food for a human infant is that which the mother herself provides for its use. This food is

obviously of animal origin, by having been secreted by the lactiferous apparatus of a human female. By means of the salivary and gastric juices of the infant, some further changes must be made, and are made upon it, during its digestion in the child's stomach. In this way the food which nature herself provides for the nutrition of early infancy is easily converted into chyle by the solvent and other functional powers of the chylopoietic organs. But is a similar result to be expected if we take the liberty of alienating this natural and excellent food of infancy for other purposes; or otherwise neglect for any objects of pleasure or interest, to make it available for its proper use? Is it likely that we should be able to discover in any remote kingdom of nature, and as a special example in any produce of the vegetable world, an alimentary substance of equal value and aptitude for its purpose with the excellent food which all-provident nature has so kindly supplied?

The question is pretty obviously provided with an answer, in the remarkable difficulty which art has hitherto encountered in its attempts to discover any safe substitute for this natural food of early infancy. To improve on the operations and provisions of nature is often an unprofitable undertaking. The conception of such an idea would seem *à priori* somewhat absurd and impertinent; whilst, as in the present case, its results, in the long run, are often exceedingly untoward and unsuccessful.

Hence the fact that artificial food, of whatever materials, and however well prepared, is to be estimated as one of the principal causes, and when operating concurrently with dentition, *the most frequent cause*, directly or indirectly, of hydrocephalic congestion.

It is not to be denied, that young and healthy infants are ordinarily endowed with a strong appetency for food. With a few exceptions, the proper mother's milk is usually preferred by such infants. Such exceptions, when occurring, are for the most part the results of certain peculiarities of imperfection, either as to quality or quantity, in the supply of that excellent food.

The infant sometimes shows a dislike for its mother's milk, when it cannot be satisfactorily proved to have any faults of quality or flavour by the ordinary tests. Such dislikes, however, when very strongly expressed, usually get the better of all the perseverance and pains-taking which are usually resorted to by mothers and ladies' nurses on such occasions, to induce the child to take the breast.

The best remedy, where it can be afforded, is to procure the services of a good wet nurse. This measure is advised, not because the child would often refuse artificial foods, made of arrow-root or of biscuit powder, &c., for it would generally take foods of this kind with great appetite and relish; and for a time such artificial foods might promise to do very well for the cases in question. The evil arises afterwards, in the course of a week or two, or perhaps it may be a month or two; for sooner or later it will almost certainly happen that the artificial food will eventually disagree with the infant's stomach. An estimate of the value of such food is not to be made

by the ability of the child for a time to tolerate, or even to digest it. In a limited sense of the term digestion, it may prove itself competent to perform that process upon it. In this sense of the word, digestion might amount to little more than an easy solution of food in the stomach, with its subsequent transfer to the smaller intestines, to be there dealt with by powers and processes peculiar to those organs.

In the wider sense of the term digestion, the final result of a series of processes is generally understood by it; including the solution of food in the stomach, its chylication, or its conversion into a bland absorbable fluid; its combination for that purpose with certain specific fluids, which it meets on its passage through the superior or small intestines; its absorption, without impediment or difficulty, by the lacteal absorbents, which are vessels specially employed to convey our aliment from the intestines to the mass of circulating blood; and, finally, its proper assimilation with that blood itself. The infantile stomach is in many cases so incompetent to perform the whole of these multifarious processes, that it occasionally fails to execute the very first in the series, that of effecting the primary solution of food in the stomach.

It is in the larger sense of the term digestion that I wish to be considered as speaking of the power in question as a general competency of the infantile stomach to convert human milk or other sundry artificial foods into nutritious and wholesome aliment, consentaneous with the constitution and attributes, already just alluded to, of a young infant subject. In my experience of the qualifications of hired nurses, I have often known that the milk of the same woman has agreed exceedingly well with the child of one family, while immediately after, under very similar circumstances, it has entirely failed to furnish wholesome nutriment to a healthy child of another family. The apparently best human milk sometimes disagrees, and occasionally so decidedly as to require a change of the wet nurse as a measure of instant necessity, in order to rescue the disordered infant from the effects of a diarrhœa of great obstinacy and virulence, superinduced by the milk of the nurse now about to be exchanged. I mention these circumstances chiefly with a view of pressing upon the consideration of my readers the apparent occasional capriciousness of an infant's stomach, and its non-appetite for digesting certain varieties of milk or other aliment, which, under ordinary circumstances, it might be expected to digest most readily and advantageously to the interests of the little subject.

I have resided a good many years both in London and in the country, and therefore I think myself competent to say that children brought up in the country are, on the whole, more easily supplied with sufficient and stitable food than young natives or residents of London.

It seldom happens that a young mother living in the country has good reason to complain of want of milk for the supply of her

infant offspring. I must confess that it sometimes so occurs ; but I am quite sure that this evil is not complained of nearly so frequently as in London. This result must, I presume, be attributed to the robust constitutions, simplicity of manners, better living, and freedom from notorious immoralities of women living in the country, in comparison with persons of the same classes of female residents amidst the luxuries and miseries of London. Add to this, that a child brought up in the country is competent, by reason of the greater purity and salubriousness of the atmosphere in which it is constantly immersed, to put up with coarser food and to look well and thrive under circumstances of neglect, mismanagement, or even of occasional destitution, which could scarcely fail to prove fatal to children living in the insalubrious atmosphere of large towns. If a child survive the ordinary age of the first dentition, it will frequently arrive at a period of developement of its powers which will greatly confirm its purchase of its natural privileges of health and strength ; but the fact is that many infants do not arrive at that age in full possession of the attributes in question.

I now, therefore, proceed to show how, subsequently to the concurrent periods of weaning and dentition, imperfections and irregularities of the digestive functions may continue to keep up a predisponency to acute hydrocephalus.

When it is considered that organic diseases of no little importance are frequent effects of disorders of the functions in question, it will be easily understood how such effects may continue for years to entail upon their subjects all the liabilities to which they had at first exposed them. Persons of ordinary information can scarcely be made to conceive to what amount of constitutional injury, even for life, a vigorous infant is exposed by a premature abstraction of it from its mother's milk ; and to what extent even its life is exposed to danger, in consequence of the failures of sundry contrivances and experiments which must be then resorted to, to bring it up upon spoon food. If it should escape with its life, which it frequently fails to do, it scarcely ever afterwards, in the greater number of cases, recovers its previous fulness and firmness of flesh. The imprint of its artificial delicacy, inflicted upon it by the ignorant management of its parents, during the first two or three years of its existence, remains indelibly stamped upon its feeble and lymphatic system during the entire currency of its subsequent infancy and childhood. Hence the general sickliness of its complexion, the softness of its limbs, the morbid protuberance of its forehead, and the almost equal tendency to hydrocephalus, and to the rickets, of that period ; and hence also the contractedness and flatness of the chest ; the compressed packing of the organs which it is destined to contain, and hence the frequent want of symmetry and perfection of muscular power which attend on the years of advancing childhood, and which are apt to accompany it, amidst many other serious drawbacks upon the perfection of good health, to the ages respectively of adolescence and youth.

Among the most frequent predisponent causes to acute hydrocephalus, are the ages of infancy and early childhood; the foregoing explanation enters at some length into the facts, on which the opinions of the profession upon the subjects in question are founded. Having thus, therefore, generally indicated the great parent cause of the predisposition alluded to, I may be expected to notice more pointedly the subdivisions of such causes, as we meet with them in society.

Under such subdivisions, we cannot omit to notice various peculiar characters of mind and temperament for vivacity, intelligence, and irritability; certain corporeal forms and conformations, such as weight of brain, disproportionate to that of the rest of the body, the asserted softness and succulence of sundry parts of that great organ and its appended tissues; repeated congestions of the vascular tissues of the brain, the consequence of morbidly repeated determinations to the encephalon; peculiar development of the latter; repeated irritations from the difficulties of teething; and, according to the opinion of authors, from the presence of worms in the intestines. Under this head of the subject must be placed, in further compliance with the opinions of certain writers, injuries of the head during parturition, to which we might add tight swaddlings, as used in some countries for weeks or months after the birth. Constitutional difficulties in respiration in very young subjects producing the symptom now pretty generally known by the name of laryngismus stridulus.<sup>1</sup> Many of the febrile diseases of young subjects, such as the infectious exanthemata, small-pox, measles, scarlet fever, and of course all the gastric fevers of infancy, may be enumerated as fruitful sources of predisponencies to acute hydrocephalus. To these may be added the influence of all the continued diseases of the abdomen, producing inflammations and obstructions of the liver, the spleen, and other abdominal viscera, and also of the lungs and other organs within the chest.

All such influences must be placed in the same category of an unquestionable tendency to become sources of predisponencies to head affections: first, by producing and sustaining an excess of vascular determination to the brain; secondly, by exciting sympathetically a morbid action in the vascular tissues of the brain; and thirdly, by what I may be permitted to call a critical metastasis of the diseased actions of organs within the chest and abdomen, to the vascular tissues of the encephalon.

Permanent vigilance of very young subjects, or long continued sleeplessness for many hours, without any discoverable disease or pain; irregularities of the bowels for a long period, with improper

<sup>1</sup> For a long time I entertained the opinion that laryngismus stridulus was an effect of the irritation of dentition: but of late years I have doubted the correctness of that opinion, in consequence of having met in practice a number of examples of the diseased affection in the absence of dentition, or at least for many months anteriorly to the probable protrusion of any teeth through the gums.

colour of the alvine secretions; the abuse of opiates with other compositions, called by nurses and weak mothers soothing medicines, are doubly productive of the evil influence now under consideration on the important tissues of the sensorium. Early and frequent use of stimulating and fermented liquors, together with highly condimented and rich foods, by which the circulation of the blood is quickened in the viscera of the abdomen, are, for a similar reason, entitled to be placed in the list of causes productive of an increased determination of blood to the head. Here must also be found a place for certain injurious influences, too frequently chargeable on the over anxiety of parents to engage their children at too early an age in excessive occupations of their minds. School exercises are sometimes performed under circumstances of too much harshness of discipline, productive of strong emotions, and even of agitations of mind, not perhaps without a succession of personal panics and terror, likely enough to be followed by profound anxieties and mortifications.

These are direct influences too obviously calculated to produce injurious results—in the first instance, on the healthy actions of the sensorium itself; as well as, secondarily, upon those of the chylopoietic organs—to be either doubted or disputed.

It has been observed by Dr. Cheyne, that diseases imperfectly cured have a tendency to undermine the general health, and as such should have a place in the list of predisponencies to acute hydrocephalus. Several eruptive diseases, which are perhaps most remarkable for their frequency of influence as occasional causes of the most rapidly fatal forms of hydrocephalus, usually arising from direct mismanagement of the original disease, are also known, although perhaps of less frequent occurrence, to operate remotely as predisponent causes of the same malady. It is an extraordinary statement of Dr. Golis, of Vienna, that strong emotions of the mother during the last months of pregnancy greatly predispose the children of such pregnancies to become the subjects of hydrocephalus.

“A more multiplied experience of this cause,” observes that eminent physician, “than before, was afforded to me as well as to other physicians of Vienna, in the year 1809, when our imperial city was bombarded. Most of the children who were born after this frightful catastrophe, at about ten, twenty, and thirty days subsequently to their birth, were seized with convulsions and died. Within the cranium were found traces of inflammation, and in the ventricles effusions of lymph and of serum.”

Chronic diseases of all kinds, as well as cachectic results of all slow inflammatory affections, such as anasarcons enlargements, ascites, and effusions into cavities of all descriptions, must be added to the already very long list of circumstances productive of predisponencies to hydrocephalus; and to that list must be added still one more item, namely, hereditary predisposition.

Girtanner doubted, indeed, the pretension of this last circum-

stance to be considered a predisponent cause of hydrocephalus, and he was a physician of high character and great experience; but we must not forget that the profession generally, and physicians of the greatest experience, have almost unanimously asserted it. Do we not every day meet with examples of many members of the same family becoming the subjects, one after the other, of acute hydrocephalus; and I must confess that I am myself strongly inclined to adopt the general opinion.

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#### OF THE EXCITING CAUSES OF ACUTE HYDROCEPHALUS.

Under this head I am not sure that there might not be enumerated many of the items which I have already assumed under the general circumstances connected with diseased actions, as to many predisponent causes; but at all events, I have now to add all sudden and violent movements of the body, calculated especially to increase determinations to, and to act unfavourably upon, the vascular tissues of the brain; such as all violent agitations of the brain from blows, falls, jolts of cradles, or carriages of any description; rough and indiscreet games having the effect of placing the head during strong exertions in positions below the level of the body. A case in illustration of this point is given very appositely by Dr. Golis. "Master R., four years old, after a severe illness and inflammation of the lungs, from which however he had well recovered, fell out of a cot with his head foremost upon a stone pavement. Cold vinegar and water was applied to the bruised surface, and, fearless of any worse consequences, neither physician nor surgeon was consulted. About five weeks after this fall he began to complain of many symptoms of turgescence of the head, which were attributed by the mother to the influence of dentition. It was not until violent headaches, vomiting, and other severe symptoms indicative of a morbid determination to the head, that any medical assistance was sent for. It was then unfortunately too late." Dr. Golis alludes to another case illustrative of the same doctrine. "Miss P., a young lady of eight years of age, fell from a height of three feet with the head foremost. To avoid a scolding for her carelessness, she kept this accident a secret from her parents. Six weeks afterwards there arose the symptoms of cephalic turgescence, which was soon followed by nausea, coated tongue, and vomiting; a hot forehead, severe pains in the head and nape of the neck, alternating with pain in the stomach and great intolerance of light; and in short all the pathognomonic indications of hydrocephalus supervened in rapid succession, and thus a fatal disease was speedily established."<sup>1</sup>

<sup>1</sup> The description of the two cases just transcribed reminds me of a case, different as to its results, which occurred about ten days ago in my own



Amongst the occasional causes of acute hydrocephalus are suddenly suppressed discharges from eruptive diseases of the head and face, and from angry and extensive ulcerations behind and in the neighbourhood of the ears; the retrocession of exanthematous, and other febrile eruptions, such as measles, small-pox, scarlet fever, erysipelas, and from bastard inflammations consequent upon the application of imperfect or depraved virus of cow-pock.

In the same list should be placed suppressed discharges from fistulous openings; inflammations of the head, face, eyes, ears, mouth, lungs, and peritoneum; inflammations of the abdominal viscera, particularly of the liver and stomach; all kinds of quinseys; apthæ, particularly the infectious form of it in new born children in hospitals and foundling houses, by which great numbers of children are destroyed; the use of high seasoned foods; the sudden removal of the hair by shaving, and a subsequent exposure of the head to the action of an intensely cold atmosphere; a filthy condition of the scalp through want of cleanliness;<sup>1</sup> and finally metastasis of morbid fluids, by reason of imperfect or false crises of acute and eruptive fevers, added to many other similar influences which

practice. It was that of Master Alfred Willson, three years old, son of Mr. Willson, a wholesale tradesman, residing at No. 14, King Street, Long Acre. Two days previously to my first visit he sustained a concussion of the brain in consequence of a fall, with his head foremost, on the flags of the street, not far from his father's house. He had, as in one of the cases related by Dr. Golis, cold vinegar and water applied to his head, soon after the accident. At two o'clock on the following day he became the subject of complete stupor; and about nine o'clock in the evening of the same day, I was requested to see him in consultation with Mr. Johnson, of North Place, Gray's Inn Lane. At this time nothing had been done in the way of treatment. I requested that the copper usually employed by Mr. Willson might be forthwith sent for; and he was cupped without loss of time to the amount of between ten and eleven ounces of blood, which produced a state of complete fainting. This bleeding had the effect of considerably diminishing the stupour, but not of entirely removing it. A cushion containing iced water was therefore placed under his head, and evaporating lotions were applied to the exposed part of the sinciput; the whole of the head having been previously shaved. These applications were continued without intermission; excepting when it became necessary to change the contents of the cushion for a supply of a colder substitute. This was continued during the whole of the night. On the following morning the stupor had been in a great measure subdued, so that the patient could be made distinctly to answer my questions and to give an account of his sensations. He complained, however, of intense pain of his head, and soon relapsed into his previous somnolency: by means of an emetic to expel the contents of the stomach, and purgatives, consisting of calomel and croton oil, continuing the use of the cold cushion and evaporating lotions, I found on the subsequent day that he was convalescing so rapidly as to make me entertain much less anxiety as to the eventual result. From that period he recovered rapidly, and is now in perfect health.

<sup>1</sup> Among the children who are brought to University College Hospital for treatment on account of incipient symptoms of acute hydrocephalus, a very considerable proportion of them are the subjects of this state of uncleanness of the integuments of the scalp.

must be placed within the comprehensive cycle of exciting causes of acute hydrocephalus. Some continental writers of great reputation have ascribed a large proportion of cases of hydrocephalus to colds caught during the first days after birth. Such in fact are often causes of inflammation, and subsequently of the convulsions which in consequence occur at that early period of life; and which therefore will have their natural and proper tendency to produce that action of the vascular tissues of the encephalon which are known to terminate in effusion of lymph and serum into the ventricles of the brain.

It is indeed a curious fact that we are rarely called to perform post mortem inspections of heads in consequence of deaths from convulsion in which we do not find quantities of various amount of fluid effused into the ventricles of the brain. Many of the deaths thus produced are the results of acute hydrocephalus, in consequence of colds caught some days after birth, as Dr. Golis confidently asserts in the following passage: "The frequent examinations of infants who have died of such convulsions have taught me that this disease has been the water stroke, or the acute hydrocephalus. In children of a more advanced age, the cooling of the head suddenly has sometimes produced that fearful disease, as is abundantly proved by the following case. Henry A., four years old, vaccinated, strong, lively and well nourished, heated himself by violent running in a spacious garden; having profusely perspired with bare head and breast, and having the back only covered with his shirt, was exposed to a pouring rain until he was wet through. Next morning he complained of weight in his head, sense of tension in the nape of his neck, transient lancinating pains in the forehead, feebleness, absence of thirst and appetite, with slight fever, in which, however, the pulse was of the natural frequency and fulness. I already, however, remarked an irregularity in the beats of the artery; as some were hardly to be felt, and others were omitted. He was constipated, and had scanty though natural urine. The skin was dry to the feel.

My first care was to restore the transpiration of the skin, from which I expected much good. On the second night after the exposure of cold, the fever became more fully formed, and at the same time the above-mentioned symptoms more violent. A remarkable remission of the fever followed towards noon of the third day. Emollients, with the root of elder and acetate of ammonia, were the medicines which were prescribed; and cataplasms to the feet and a glyster, which operated well, were the external remedies which I employed. I expressed to the parents of the child my fear of acute hydrocephalus, and proposed blood-letting, at which they were more terrified than at the danger to which their child was exposed; because a surgeon, a stiff Brunonian without principles, had related to them some horrible stories about blood-letting, and prophesied the worst consequences. In a consultation with a learned physician and this surgeon the disease was stated to be an intermittent fever,

because at this time intermittents reigned epidemically in and about Vienna; and in spite of my remonstrances, Peruvian bark was ordered, which the parents with great readiness administered to their child; but the results verified my diagnosis; for the inflammatory tension, with severe pains of the head, and all the symptoms which accompany this stage of acute hydrocephalus, showed themselves. A second consultation, with a really practical physician attached to no system, and intimately acquainted with this form of the disease, was now called: but it was too late. All the means employed, which at an earlier period would certainly have prevented effusion into the ventricles, were no longer capable of arresting the progress of the disease. Insensibility came on, followed, after the lapse of six days, by palsy, accompanied by the usual most violent symptoms of the disease; and at the end of eight and forty days from that time, the little patient's sufferings ended. Dissection:—this was attended by the physician who in the first consultation proposed the bark, and was performed by the surgeon. The bloodvessels of the pericranium were tinged; the bones of the pericranium were blue; the sutures were separated from one another by a line, and the interval was filled by a bloody extravasation. The blood vessels of the membranes of the brain were uncommonly large and turgid with blood, as were also the sinuses, in which cruor and much lymph floated in the serum. Between the pia mater and the brain, which was firm and elastic, I met with much coagulable lymph. On the corpus callosum lay a covering of the same, about as thick as the back of a knife; and it was equally thick at the basis of the cranium, where it gave an envelope to the bloodvessels and nerves. The ventricles, in which more than six ounces of water were contained, were lined by coagulable lymph throughout all their length and incurvations. The plexus choroides was very pale, and wholly covered with lymph. The pituitary gland was in its natural state, with the exception that it was covered with lymph; the septum of the ventricles was broken through; the white substance of the brain was of a reddish colour; the viscera of the thorax and abdomen were perfectly healthy.

“The incredulous physician began after this to believe in the acute hydrocephalus; whether the surgeon, who some time afterwards went to Russia, was converted, I know not.”

The above case is full of interest and instruction; I shall probably have occasion to allude to it again in the sequel of this little volume.

It is the opinion of Dr. Golis, and some other writers, that violent agitations of the brain should be placed among the most frequent occasional causes of hydrocephalus when it takes place in well-grown children, perfectly healthy and lively, after they have begun to run, clamber, and jump about, and who consequently have often to encounter falls and tumbles of serious moment. “I am not sure,” observes this admirable reporter on this subject, “that the greater

part of the sufferers whom I have had to treat for this disease, did not come by it in this way."

Another exciting cause of acute hydrocephalus, which after the foregoing may be looked upon as the most important, is the sudden drying up of discharges from large ulcers, and hot and moist eruptions, on various parts of the body. The young practitioner may here be informed, that although the occasional cause in question is of equal importance, if not of quite equal frequency of occurrence, with the exciting causes of hydrocephalus in some other cases, the mischief likely to arise from it may nevertheless be anticipated, and rendered comparatively impotent in a great proportion of cases by means of free and ample bleeding, and by the vigorous employment of other evacuating medicines. The rule for the first bleeding should be that of its being carried to full deliquium.

It is worthy of remark, and from analogy a matter of inference, that repulsion of the morbid secretions incident to the most active febrile exanthemata, especially the worst varieties of such fevers, in common with the worst forms of inflammatory cutaneous affections, should on no account be excluded from the list of occasional causes of acute hydrocephalus; for it really is one of very considerable frequency.

It has been confidently asserted by Golis, for whose opinion I entertain a high regard, that in some cases of chronic hydrocephalus, the fluid contained in the ventricles of the brain, either from fermentation or in consequence of some action of a specific nature which we do not perhaps very distinctly understand, becomes an exciting cause of the acute form of the disease. The same gentleman, moreover, informs us that he considers that the reverse of this result has sometimes taken place, and that the acute hydrocephalus, in consequence of being checked by the treatment resorted to, but not absolutely cured by the remedies employed, terminated neither in recovery nor in death; but degenerated into the chronic form of the disease. He illustrates his statement by the following example: "Matt. Sch———r, three years and a half old, healthy, and well nourished, strong, after having passed through the measles and small-pox, sustained the accident of falling over a table, which produced a violent concussion of the brain. Immediately the mother of this child requested the advice of the late Dr. Treber. The proper remedies for the stages of turgescence and commencing local inflammation were employed;<sup>1</sup> but not with the best effect: for although the acute symptoms of inflammation were removed, the little patient's former activity and vivacity did not return, giddiness, dim sight, disposition to anger, difficulty in walking, and hanging down of the head, remained; imbecility of mind, and palsy of the lower limbs followed, and even the sutures of the once firmly closed

<sup>1</sup> It is a pity that Dr. Golis has not here favoured his readers with any information as to what he considered "the proper remedies," and what might have been the amount of blood taken, if such a measure was resorted to.

bones of the cranium yielded. In proportion to the diminution of his powers of mind, there was an increase in the circumference of his body: and he devoured three or four times the proper quantity of the most indigestible food. In this state of mere vegetation, he was attacked with scarlet fever, on which supervened acute anasarca and hydrothorax, from which he was as happily saved as from the fever. With the development of chronic hydrocephalus the size of his body advanced more rapidly than before the accession of the two above-mentioned diseases. He moved with difficulty, and became daily larger. Blindness and palsy of the hands followed; and stools and urine passed unconsciously; and in the eleventh year of his miserable life he was removed by death.

Examination of the body after death:—"All the sutures of the cranium were excessively thin, and were separated. After removing the vault of the cranium, the brain fluctuated under the dura mater like the abdomen in ascites; and excepting the dura mater no trace was found of its membranes. The cineritious substance, in which nothing organic was observed, lay on the medullary like a thin inseparable layer. Both substances represented a foot-ball filled with fluid; and floating in the centre of it was found a membranous sac consisting of a preternatural membranous tissue, in which more than three pounds of pure clear water were contained. This sac was prolonged through all the vertebræ down to the sacrum, and round the outer surface of this membranous canal there was remarked a thin layer of spinal marrow adhering to it. The cavity of the spinal marrow was so dilated that a man's thumb entered it with difficulty. The water sac, formed of preternatural membrane, easily separated from the medullary layer of the brain, the outer surface of the sac was as smooth as the surface of the medullary substance to which it was annexed. This surface was soft and white. In the neighbourhood of the medulla oblongata was remarked a cineritious bundle of infinitely fine threads, which, in prolongation from their origin, were distributed and lost on the vault of the ball. Of the choroid plexus, of the pituitary gland, or of any other organisation of the brain, there was not the least trace to be seen.

External inflammations of the head, neck, and face, and violent inflammations of the eyes in new-born children; inflammations of the ears and nose, and throughout the respiratory passages; all kinds of erysipelas, which may occasion turgescence in the head or propagate inflammation to the membranes of the brain, are capable of producing acute hydrocephalus: sometimes it may prove the hyper-acute form of it, or the apoplexia hydrocephalica of Cullen, or another form of hyper-acute hydrocephalus, which we ordinarily designate simply by the term of convulsions.

Violent inflammations of remote parts or organs, either by impeding the circulation of blood in the head, by occasioning an increased determination of blood to the head, or by the sympathy which the nerves of remote tissues may have with the brain, may be presumed to produce acute hydrocephalus, but more frequently

perhaps to occasion the severer forms of it, the water-stroke of the German writers, or the apoplexia hydrocephalica of Cullen.

It has been asserted that violent vomiting, produced either by emetics, or by consent of the stomach with some other suffering organs, have sometimes the effect of producing very active forms of hydrocephalus. Without positively disputing this statement, I have every right to believe that it is in a very great degree exaggerated; it being a fact that I am in the habit of prescribing emetics in acute diseases as often as most practitioners: but it so happens, that I do not recollect having met with a single case of this description in the whole course of my practice.

It is an opinion, probably much better founded, that suppressed diarrhœas and dysenteries have a tendency to determine suddenly to the head, and to occasion hydrocephalus in its very severest forms. We have no very great experience in this country of the results of dysenteries; but I can speak with more confidence in regard to the effects of suddenly suppressed diarrhœas; inasmuch as it is a matter of distinct recollection with me, that in the course of my practice I have met with several cases of hydrocephalus which I felt inclined to refer to the cause in question. I have, however, at different periods of my professional life, and in both public and private practice, encountered several examples of the most tumultuous forms, as so called by Golis, of acute hydrocephalus cases, which I have ever since imputed to bad management and consequent sudden suppressions or retrocessions of the peccant fluids incident to sundry discharges from large ulcers and extensive skin diseases.

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#### OF THE PROXIMATE CAUSE OF ACUTE HYDROCEPHALUS.

Assuming for the moment the fact that the disease now under consideration is an inflammatory affection of the vascular tissues of the brain and its envelopes, terminating in the effusion of a transparent aqueous fluid, accompanied in some cases by an effusion of lymph into the ventricles of the brain and other chambers of the encephalon, I now proceed to establish these facts by ample references in support of them to competent authorities.

The earlier histories which we find recorded in books having any bearing on the subject under present discussion, were records of what they saw, by persons, in the first place, not anticipating the appearances discovered; and secondly, by persons not sufficiently competent to distinguish accurately between healthy and diseased tissues, and to predicate with truth and confidence how, and to what extent, the appearances discovered were connected in the way of cause and effect with the diseases which had preceded them. Moreover, the malady, which has of late years received the designation of acute hydrocephalus, had not, at the remote period alluded to, been recognised by pathologists as a separate disease. For these

and other reasons, founded on defective anatomical and pathological knowledge on the part of *post mortem* examiners of our earlier examples of such investigations, they failed to furnish all the knowledge of proximate causes of diseases which, under other circumstances, might be expected to have been afforded by them. We have accordingly to observe, that up to an advanced period of the last century, it had never occurred to any physician or pathologist to consider acute hydrocephalus in any other light than as a simple dropsy, as the effect merely of effusion of an aqueous fluid into the ventricles of the brain, without any reference whatever to the proximate cause of such effusion.

Amongst other writers upon subjects of this nature, we may refer, in illustration of the statement now made to a few dissections of hydrocephalic subjects, which were performed by physicians and anatomists anteriorly to the last century. A dissection of this kind was given so long ago as the year 1676, by Borelli, in his *Histories and Medico Physical Observations*, obs. xxxviii. The case is given as one of a young woman who had been the subject of an intense pain of the head for four months. When Borelli was called to it, he found the patient without fever; but rejecting all manner of nutriment, with the exception alone of water sweetened with sugar, on which she lived many days. She complained of nothing but of pain of the coronal suture of the head. The remedies which Borelli considered most likely to be useful were forthwith applied, and he accordingly ordered bleeding from the arm, together with inunctions and fomentations to the pained parts; but these measures were adopted without affording any relief. At this time there was no swelling nor redness; but our author nevertheless proceeded to the use of what he believed to be effective remedies, and he caused to be applied to the occiput and the surfaces behind the ears a succession of blisters. But even this treatment failed equally of success. At length the same surfaces were cupped and scarified, and were ultimately treated with the potential cautery, but equally unsuccessfully. Our author further intended to make a crucial incision through the scalp, and to use the trepan; but death put an end to the patient's miseries before these measures were carried into effect. Having observed some appearance of what he calls purulency of the right eye, Borelli conceived the opinion that upon opening the head he should find an abscess containing pus. In this expectation he directed the especial attention of his pupils to this part of his intended procedure; but upon making the proper incision into the suspected part, there spirted upwards, to some height, a considerable stream of aqueous fluid, equal in quantity to about two pounds: "e quo statim

- It would have been better if our author had referred to circumstances upon which he founded his statement that there was no fever; for it is not to be supposed that the severe symptoms attendant on the progressive development of the whole of the case, could have existed without a considerable change in the character of the pulse, if not in its frequency, certainly in its firmness, quickness, or hardness.

aqua clarissima cum impetu et ad libras duas exivit, quasi e fonte scaturiens, et in altum prosiliens." The history concludes with a statement, that the hydrocephalus was the consequence of a severe cutaneous affection of the head which had been badly treated by repellants. "Non parum potuit ad hunc morbum conferre, quod quinque vel sex ante morbum mensibus scabiem capitis passa erat puella nostra, et male a monachis quibusdam curata repellentibus remediis et unguentis frigidis fuerat."

Amongst the causes of the acute and fatal inflammatory affections which we have now to discuss, we may notice one of a class which we now and then encounter, and which we impute to a translation of a diseased action to the head from a distant part of the body. Cases of hydrocephalus are sometimes examples of the disease from this cause in adolescence and also in adult subjects. A case in illustration of this point may be consulted in Morgagni's very valuable work "De Causis et Sedibus Morborum, Epist. 1. Art. 2d."

A young gentleman of thirteen years of age, endowed with a fine talent, who had been the subject of inflammation of the left lung since the year before, was seized with pain of the head, especially affecting the region of the forehead, including also the eyes, from which there was a defluxion of a viscid secretion. On the following day he fixed his eyes staringly on his attendants; he became at the same time the subject of sickness; and he ejected a viscid matter from his stomach. Soon after, he was taken suddenly with convulsions, during the presence of which he fell into a soporose state, which was frequently complicated by great convulsions. On opening the head, the dura mater, to the depth of the parietes of the blood-vessels, was found tinted a grayish hue; and when the dura mater was torn away from the crista galli, there escaped a small quantity of sanious serum from the parts whence the optic nerves had taken their origin. Morgagni, in the sixth, seventh and eighth epistles of his first book, gives several fatal results of effusions of serum and of watery looking fluids into the ventricles of the brain, but without connecting with any of them an inflammatory action of the vascular tissues of the encephalon. The fact, indeed, of such an action of those tissues had not been observed at that period: at all events it had not been applied, as far as I am aware of, to any pathological explanations of the morbid symptoms which had accompanied them, or of the morbid actions of the surfaces or vascular tissues by which they had been secreted.

Hitherto, then, we have no hints given us of the presence of inflammatory action as having been even presumed necessary to the effusion of serum and aqueous fluids into the cavities of the brain, which Morgagni and others had described with considerable accuracy. If lymph had ever been effused together with aqueous fluids, we may observe, that up to the period of Morgagni it had not been seen nor described.

I shall next avail myself of the opportunity of republishing an ingeniously drawn up case to which my attention was directed by



a reference to it given by Dr. Charles Quin, which very curiously demonstrates the occasional proximity of human attempts to attain their objects, and eventually how compatible such near proximity may prove to the attainment of the fact or good proposed, without finally effecting that object. The case referred to was published by Epiphany Ferdinand, in his work entitled "Medical Histories," published at Venice in 1621. "In the year 1599, in the month of June, a young gentleman in his thirteenth year, being of a hot, but humid temperament, became the subject, in the hottest season of the year, of a most violent pain of his head, especially of his forehead, as well also as the back part of his head. The pain was accompanied by a sensation of deep seated heaviness, *dolor erat gravativus*, and proceeded rather from phlogosis than from true inflammation of the brain and parts subjacent. On the first day of the disease there was fever which was not acute, but rather sluggish, it was, however, attended with sleepiness; the pulse was not frequent; the urinary secretion was healthy looking and coloured. The countenance was anxious, and the head felt hot upon the hand being applied to it. On the second day, the same assemblage of symptoms presented themselves; and the eyes were painful. On the fourth, fifth, and sixth days, the same symptoms were still complained of. On the seventh day of the disease, the left eye was closed, and the pains of the head were very acute and intense. On the eleventh day, the patient was much worse; and on account of the extreme violence of the pain, he gave himself up to loud exclamations. On the fourteenth day of the disease, he seemed somewhat relieved of his pain, but he did not see perfectly, even with his eyes open; although there was nothing amiss to be seen with them, excepting that the pupil of each eye seemed to be somewhat too much dilated. On the following day the patient complained of no pain.

But the worst of all the symptoms, that of blindness, remained; which could not be made to yield to any medicines whatever.

The symptoms detailed in the above history are unquestionably those of acute hydrocephalus, although the case is given with the heading of one of blindness; and the method of treatment adopted by Ferdinand, at the remote period of its date, two hundred and forty years ago, is a remarkable example of great comparative excellence. Nevertheless, it proved unsuccessful, for want of sufficient activity in the first instance; a want, even in our days, which is a frequent cause of failure; that of vigour in the highest degree at the commencement of the disease. Venesection from the median vein was immediately resorted to, for the median appeared the most prominent. Although Galen has in many places asserted that adolescents should not be made the subjects of phlebotomy until they have attained the fourteenth year of their age; nevertheless, inasmuch as our youth in this case was well grown for his age, possessed great strength, and was the subject of a sanguineous plethora, he was, on the third day subsequently, bled in the vein of

the left arm. The blood was not putrid, but inflammatory, "adustus:" on the fifth day scarifications, with cupping, were applied to the shoulders; on the sixth leeches were introduced to the nostrils; on the eighth, blood was taken by venesection from the forehead; scarifications, with cupping, were again applied to the shoulders; and bandages, ligaturæ, were frequently resorted to to take away the pain of the head. But whilst these things were being practised, a new symptom, worse than all that had preceded, began to show itself, namely, blindness, or gutta serena. It manifested itself on the eleventh day. To this symptom we gave our best attention, without a moment's delay; fearing lest the humour might become fixed, and the disease incurable, which really happened. Immediately therefore on the appearance of this symptom, namely, late on the eleventh day, blood was abstracted from the temples and from the angles of the eyes, scarifications with large cuppings were applied to the back part of the head, together with a cautery to the nape of the neck. I proposed the insertion of a seton in the neck, but the patient finding himself much exhausted, declined it; and thus, compelled by urgent necessity, I caused sinapisms to be applied to the anterior surfaces of the head, and also vesicatories to the same surfaces, and to the occiput. But unfortunately, and greatly to be lamented, our measures proved unsuccessful." See the work already referred to, Hist. xviii.

On perusal of the above case, it will obviously appear to the reader, at least it so appears to me, that the patient's life was not lost for absolute want of activity upon the whole, but for want of sufficient vigour of its employment in the first instance, added probably to want of distinct knowledge of the proximate cause of the disease. It is stated, no doubt too theoretically, that the malady proceeded rather from phlogosis than from true inflammation of the brain. It is again remarked, that in connection with other important symptoms, which we of the present day can sufficiently recognise as decided indications of acute hydrocephalus, that the accompanying fever, *ignava potius*, was not acute but mild, that the pulse was not frequent, that the urine was healthy and well coloured, but that the head was hot to the touch. The case, however, must have been attended with some amount of fever, as it really was, with what the author called "*phlogosis*." We may presume that Ferdinand had some hesitation about the utility, or at all events about the necessity, of bleeding on any considerable scale; for after quoting the authority of Galen against bleeding until a boy shall have attained his fourteenth year, he nevertheless comes to the conclusion of bleeding from the median vein; but not until the third day subsequently to order venesection from the other arm. On the following days, cuppings and scarifications were ordered to be applied to the shoulders; and on the sixth day leeches to the nostrils; on the eighth day venesection to the forehead, large scarifications were applied to the occiput, and an actual cautery to the nape of the

neck; but the poor exhausted patient declined it. "Verum pro dolor, omnia fuerunt irrita."

The management of the above case presents several important points of a practical nature for our consideration. We are told that the youth was in the thirteenth year of his age, and that when he became the subject of the disease he was bled: but we are not informed of the quantity of blood that was abstracted; it seems, however, most likely that it was insufficient; for on the third day the patient was again bled from the left arm: the first bleeding then, it is a matter of inference, had not much mitigated the disease, and we know from the further account given of the disease that it had not subdued it; then follow the other severe measures already enumerated. We shall be better by and by prepared to ascertain the reason of the failure of the entire practice. I believe I may, however, at present take upon myself to assert, that it failed of success because the bleeding in the first instance had not been carried to the extent to which the nature and peculiarity of the case required. The reader may here recollect, in the case of Master Alfred Willson, already described, that the cupping was carried to the extent of between ten and eleven ounces before it produced fainting. That child, be it recollected, was only three years of age. It is not probable that Ferdinand, trembling under the influence of the dogmas of Galen, would have proceeded to have an amount of depletion of blood, which would probably have required the abstraction of from twenty to four or five-and-twenty ounces to produce a similar effect in a lad of thirteen. But if he had been aware of the nature of the disease which he had to contend with, and perfectly convinced of the powers of his art, he would have no doubt carried his first bleeding to the full extent of producing fainting. Had he done so, my experience in many scores, if not in hundreds, of cases of acute hydrocephalus entitles me to assert that without doubt he would have cured his patient.

I shall not now, however, stop to prove this point, as it will be abundantly established during the further development of the more practical facts of our subject. Again, the second bleeding, if necessary, should have been had recourse to, not on the third day, but within a few hours after the first; but if the first bleeding had been sufficient, which in all probability it would have been, provided it had been carried to fainting, it is more than probable, indeed I myself consider it quite certain, that the disease would have been arrested; but it was allowed to go on until the third day, when no amount of blood-letting could have sufficed to arrest its progress.

Perhaps it may be recorded as a general principle, that if this disease be not stopped within three days from its commencement, as a case of active inflammatory affection, that there would be no certainty, subsequently, of its being subdued by any decisiveness of measures, however proper or vigorous. Hence the case proved fatal for want of adequate activity in the bleeding, that is, for the want of bleeding to full fainting on the first day of the disease,

which, according to my experience, is always a safe practice, followed in the course of an hour or two, by the exhibition of an emetic and other energetic measures afterwards to be put in practice, of which the reader in the progress of this little volume will be put in full possession.

We derive little practical advantage from the dissections of Morgagni and his numerous correspondents on subjects of head affections, beyond the mere fact that many of the patients whose cases are recorded in his work had died the subjects of aqueous effusions into the ventricles of the brain. The greater number of the cases referred to were adults frequently far advanced in age, exhausted by chronic diseases, drunkards, apoplectics, and many others whose persons in all probability had not been known to the anatomist during life. Hence the extreme imperfections of the medico-pathological histories of Morgagni and his contemporaries. When the treatment by bleeding is made a subject of remark, it is simply to inform us that the patient was bled, but without any statement whatever as to the quantity of the blood abstracted, the appearance of the blood when drawn, the amount of relief obtained from the operation, and other items of information, which no well instructed physician of this country at the present day, nor any competent physician of any country, would omit very carefully to notice. I may be permitted also to remark, that the profession at the period of Ferdinand, that of 1599 and subsequently, were probably not aware of the power of mercury in subduing inflammatory diseases of great activity. At all events, we are not informed that mercurials were resorted to for any such purpose, in the treatment of the unfortunate cases which we have just recorded. On further consideration of the latter case, quoted from Ferdinand, it would be an omission not to remark that the practice adopted does not seem to have been suggested by any previous knowledge on the part of the physician that it was a case of inflammation of the brain, for he positively states that he did not consider it a case of inflammation of the brain, but a case of what he calls phlogosis, with an increased heat of the head. How remote this phlogosis might be considered from actual inflammation does not appear, or whether it was supposed to have had any analogy to inflammation, we cannot positively discover; but it is to be presumed that something like such an analogy had probably the effect of furnishing the motives for the repeated bleedings which were resorted to. I would observe, finally, as an inference from the whole of the history, that the bleeding and its accompanying measures were properly enough indicated, but they failed in vigour of application, first in consequence of the blood abstracted in the first instance not having been in sufficient quantity; and secondly, because the ulterior bleedings and other measures were delayed too long, and when adopted they were resorted to in parts and parcels, and therefore totally uselessly.

In looking over the intermediate period, between this remarkable case of Ferdinand as published at Venice in 1621 and the date of

Dr. Quin's Thesis on the Internal Hydrocephalus, there appears to have been not so much a want of improvement in the treatment of acute hydrocephalus, as a total absence of all knowledge of the subject. That a pyrexial disease attended by phlogosis existed as an affection of the head, might indeed have been known to Ferdinand in 1599, of which, however, there is room to doubt. That the acute hydrocephalus had then no place in nosology, we have the evidence indirectly of the interesting history first submitted to the reader, which was given, not as an example of hydrocephalus, but as one expressly of amaurosis, or gutta serena. The interval between the period of Ferdinand and that of Dr. Charles Quin appears to have been a remarkably dark age; there being extant no sort of evidence, that I am aware of, that a single attempt was made during upwards of one hundred years to investigate any part of the subject of hydrocephalus. The reader is already in possession of the fact, that the idea of the new theory of hydrocephalus first occurred to the Drs. Quin, father and son. How much of the merit is assumed by the latter, and should be conceded to him, may be safely left to be decided by Dr. Charles Quin himself.

In the introduction to his Treatise on the Dropsy of the Brain, published at Dublin in 1790, we have the following statement: "The author of the following pages ventures to present them to the public, in hopes they will be found to contain some new facts relative to a very interesting subject, facts, which if he has reasoned with accuracy upon them, have led him to important conclusions with respect to the treatment, as well as the theory of a disease generally fatal, and which in his opinion has been at all times more extensive in its ravages than the earlier medical writers seem to have suspected."

He does not claim to himself the merit of originality in pointing out the true distinction between the chronic and acute hydrocephalus; for the ideas with respect to that point, as well as the opinions concerning the proximate cause of the acute disease, were first suggested to him by his father, a physician of very unusual sagacity and very extensive experience.

A general outline of the doctrine thus communicated to him was sketched out in his inaugural dissertation, published at Edinburgh in 1779.

"Since that period neither facts nor arguments have occurred of sufficient force to weaken the conviction of its truth under which the author first published a new theory of dropsy of the brain: on the contrary, that theory can now appear supported by an added strength of evidence, which minute attention to the subject has enabled him to draw from books and observation in a variety of recent cases; he therefore does not hesitate to submit to the candid consideration of the medical world what he has been able to collect on the subject."

After all this introductory matter, and subsequent to the lapse of

eleven years since the publication of his thesis, we are presented with the following remarkable acknowledgment:

“Although it must be lamented that an effectual mode of cure is still to be sought for, yet a knowledge of the nature of the complaint having been established upon reasonable principles, much it is hoped may be done by way of prevention, particularly if an early and strict regard be had to such measures as have a tendency to counteract the cause; and if by such measures a single individual should hereby be rescued from impending danger, the author will feel himself amply rewarded for whatever labour it has required to collect and arrange with some degree of precision the matter contained in the ensuing chapters.”

Introductory to the new theory of dropsy in the brain, already more than once referred to, the author gives the following succinct view of opinions which had been previously entertained of some of its remote causes.

“It appears,” he observes, “that most writers on the subject, being led by supposed analogies between this disease and the other dropsies, have ascribed it to the same remote causes. Thus a serous colluvies of the blood, ruptured lymphatics, cachexia, suppressed discharges, &c. have been set down by Whytt and other authors as remote causes of dropsy in the brain. I must agree with them, indeed, in attributing to these and such like circumstances the origin of that disease to which, in the beginning of this treatise, it has been proposed to confine the name of hydrocephalus; that being evidently a chronic complaint, and in every circumstance of its phenomena a genuine dropsy. But when the appearances, progress, and duration of hydrocephalus are candidly considered; when it is recollected that the patients attacked by it are usually of very lively intellects and remarkably healthy constitutions, such in short as are the most remote from any degree of cachexy, a suspicion will necessarily arise that its causes are of a very different nature from those of dropsy, and much more closely allied to those of acute diseases. That this is really the case I shall here endeavour to prove, by deductions from an extensive series of facts, which I apprehend amount to a demonstration that the disease in question owes its origin to a morbid accumulation of blood in the vessels of the brain, sometimes proceeding to a degree of inflammation, and generally, but not always, producing an extravasation of watery fluid before death.

“In the first place, it is to be observed that at the period of the disease in which the headache is most acute, every symptom of fever arising from an increased action of the vascular system is evident; secondly, the majority of patients who are attacked by it exhibit on inspection strong appearances of plethora in the superficial vessels of the head; and in some instances they have been subject to bleedings at the nose previous to the attack.

“When these proofs shall have been strongly corroborated by arguments deduced from the phenomena which have presented them-

selves in three bodies, the theory, it is presumed, will no longer appear to be a matter of speculation."

In confirmation of his idea of acute hydrocephalus, the author proceeds to quote two cases in which the usual symptoms of that malady had been sufficiently recognised during the progress of the disease, and yet after death no effusion of aqueous fluid had been found; for in both cases, to the astonishment of those who were present, and prepared to find on dissection a redundancy of water within the cranium, none could be discovered within any part of the brain; but the bloodvessels were so unusually distended, that the whole of the cerebrum and cerebellum resembled an anatomical preparation in which the utmost force of injection had been employed.

In further confirmation of the same pathology, the reader is especially referred to the following cases:—"J. C., girl, ten years of age, of a cheerful temper, and uncommonly sensible for her age, about the middle of January 1780, began to lose her appetite, and appeared less sprightly than usual. She often complained of chilliness, and at times, especially in the evenings, vomited on taking food. On the 30th her forehead was somewhat bruised by an accidental fall; and on the 31st she complained of headache, which increased on the first of February, and became so severe on the second, as to confine her to her bed. From that day it continued without intermission to be almost intolerably attended with vomiting of every thing she swallowed. On the fifth, when I first saw her, besides the headache she complained of severe pains in her breast and belly. She had no stool since the first, and her urine was passed in smaller quantities, and with difficulty; the eyes appeared heavy, and somewhat intolerant of light, but without suffusion, and the pupils contracted well. The pulse was about seventy in a minute, rather full, and slightly irregular. She constantly lay on her left side, and was perfectly distinct in all her answers. She was immediately ordered to take five grains of calomel, triturated with ten of jalap, and an injection in the evening. She took the powder, and had a small stool, of a black colour and very fetid smell, without the assistance of the injection. She did not sleep, and her headache was not at all relieved.

"On the sixth, the pulse was as before: she was ordered to repeat the calomel and jalap, ten grains of each; she had four stools before she took the powder, the headache was a little relieved in the evening, but became as violent as ever towards night.

"On the seventh, the pulse was nearly as on the previous day, but she was weaker when she attempted to sit up, which soon made her giddy and sick: the vomiting continued: the powder was repeated in the evening.

"On the eighth, no stool had taken place since the sixth; the pulse was still at seventy, irregular and weaker than formerly. A blister was applied to the whole head, the calomel and jalap were repeated; at night she had two stools.

"It is reported on the ninth that the blister rose well. The sore was ordered to be dressed with blister ointment. Her headache was not at all diminished. The vomiting continued; a slight strabismus was observed; but the pupils still contracted well. The pulse was more irregular. She was sometimes delirious. A dram of the strong mercurial ointment was ordered to be rubbed on the inside of her thighs in the evening, and repeated at night. Her left temple was cupped, and a little blood drawn from it without any relief.

"Tenth. The patient has had three stools, with the last of which she passed a lumbricus fourteen inches long, but did not vomit: she had been frequently delirious, and her feet had been colder than natural. The mercurial friction has been applied three times since the last visit, and her legs were fomented at night without any apparent effect.

"Eleventh. She has become very indistinct in her answers, and her vision has begun to be impaired. Pulse about one hundred, weak and irregular. The mercurial ointment was applied as previously, and she took ten grains of the mercurial pill at mid-day, and the same quantity in the evening.

"Twelfth. She has lost her speech and become paralytic on the left side. Pulse about one hundred and ten, and considerably quickened by a little wine, which was given to her at times, and which she swallowed readily. As mercury had been used in three different forms without its producing any tendency to salivation, she was ordered in the afternoon to take six grains of the turpeth mineral, which vomited her slightly twice, and purged her once: the insensibility, however, was diminished, and the pulse became less frequent.

"Thirteenth. She took another dose of the turpeth mineral in the morning, and had one stool; about three hours afterwards she moved her eyes at the approach of light; but her pupils scarcely contracted. Her face was now flushed, and her tongue remarkably foul. The turpeth mineral was repeated at night to the quantity of ten grains without effect. At night she passed *fæces*, and involuntarily voided the contents of the bladder.

"Fourteenth. About mid-day she died without any previous convulsions.

"On the fifteenth the head was opened. The cranium was found to be uncommonly thin. The dura mater was found to be in its natural state. The tunica arachnoidea was amazingly thickened, several patches of inflammatory crust appearing on its surface, and under it was found a considerable quantity of fluid coagulable by heat. The left olfactory nerve was uncommonly large. About three ounces of pure water were found about the basis of the brain, and about one ounce in the lateral ventricles, from whence the other water appeared to have come through the infundibulum. The pituitary gland had no morbid appearance either as to its size or consistence. The choroid plexus had several granulated substances



like small hydatids attached to it. The cerebellum was less uniform in its texture than usual. Nothing more could be observed about the head; the body was not opened."

In the above interesting narrative, Dr. Ch. Quin has certainly established several important particulars, namely:—first, the fact that the malady described was undoubtedly a case of acute hydrocephalus. This is most obvious from the nature and consecution of the several symptoms during the patient's life. Secondly, he has made it appear probable that the occasional cause of the disease was accidental, and imputable to the fall and the slight bruise which the patient received on her forehead on the thirtieth of January, inasmuch as she complained of headache on the thirty-first, which became rapidly more severe, so as to confine her to her bed on the second of February. And thirdly, he has satisfactorily proved what appears pre-eminently important to the present section of my inquiry, that the proximate cause was an inflammation of some of the vascular tissues of the brain or its envelopes. This fact was made very evident by the examination after death. "The tunica arachnoidea was amazingly thickened, several patches of inflammatory crust appearing on its surface, and under it was found a considerable quantity of fluid coagulable by heat."

But with respect to the treatment of the case, he has proved equally satisfactorily to my mind, that the young lady, the subject of it, was lost to all intents and purposes for want of early and ample bleeding, which was not resorted to for its cure. If on the day of the first attack, she had been bled ad deliquium, that is, on the same scale that blood was abstracted from Master Alfred Willson, in the case already described in a foregoing note; and if other equally active measures had been adopted, there is no doubt in my mind but she would have recovered with equal certainty.

The second case adduced by Dr. Ch. Quin, was that of an acute hydrocephalus, in consequence of, and probably occasioned by, the irritations of a mania of about two years duration, in a gentleman of forty-two years of age. "Mr. ———, aged forty-two, died on the 11th of April 1781. He had been robust and remarkably athletic in his make, but for more than two years preceding his death he had been evidently maniacal, and as such had been consigned to the management of persons properly qualified to treat people in his situation.

"For about ten days immediately preceding his death, he appeared less lively than usual, and the people about him had reason to suspect that neither his hearing nor his sight was as good as usual. It was also observed, that although attempts were made every day to procure a discharge by stool, both by means of purgative medicines and by glysters, yet it could not be accomplished more than once in the course of several days. He so obstinately concealed any distressing symptoms which he might have had, and was so totally silent to any inquiries that were made about his health, that no farther particulars could be learned from him with respect to his

immediate situation. It was observed, however, by those who were about him, that his pulse at length became exceedingly quick and rather weak, and he shortly afterwards died without any convulsion or struggle whatever.

“On dissection, his brain was found unusually firm in every part of its substance. Mr. Hunter asserts this to be the fact in all maniacs whose heads he has examined.

“The blood-vessels throughout every part of the brain were exceedingly full of blood; there was a considerable effusion of watery fluid between the arachnoid coat and the pia mater, with some appearance of inflammation on the thalami nervorum opticorum; and about five ounces of water were found in the lateral ventricles. The appearances on dissection were precisely similar in this case to those which have presented themselves in the brains of patients who have died under all the symptoms of apoplexia hydrocephalica.

“During the life of this patient, however, it was impossible to ascertain what his feelings were. The vomiting, usually an attendant symptom of his complaint, could not have been concealed by any effort of his; and therefore it may be concluded that the tendency to it did not in this case exist: it is likewise probable that if the headache had been so excessive as it usually is in this disease, neither his resolution nor his obstinacy could have stifled all complaint. In this case, however, I think it probable that the want of irritability in the brains of maniacs might have prevented the accumulation of blood in the head from producing those symptoms which it is probable it would have done in a patient whose intellect had not been previously deranged.”

Such are some of the cases on which Dr. Charles Quin founded his new theory of acute hydrocephalus in his Treatise on Water in the Brain, published in the year 1793.

The reader will be kind enough to keep in his recollection the fact that the theory itself was suggested to him by his father, anteriorly to the date of his thesis published in Edinburgh in 1779; a fact which he himself very candidly and properly communicates in the treatise from which the above cases have been quoted. There is no doubt that the treatise was published in the year 1779, and we now see recorded that the two cases, one dated 1780 and the other 1781, which the reader has just perused, occurred subsequently to the publication of the thesis, and anteriorly to that of the treatise. It seems to me certain that the new doctrine was published intelligibly and freely enough in the thesis, but whether for want of confidence in its value, or from ignorance of the probable extent to which its principles might be advantageously carried into practice, or for whatever other reason, it is now impossible to predicate; but the fact is undeniable that neither of the Quins very materially improved his field of vision, in consequence of their new discovery. In the thesis, Dr. Charles Quin recommends bleeding as the first of his seven categories of treatment; and yet his treatise after the lapse of eleven years furnishes no evidence that he himself had recourse

to the abstraction of blood in a single case, excepting by the application of leeches to the temples in case seventeen and in case nineteen, in which two leeches were applied to each temple, and also excepting in case twelve, where the "left temple was cupped and a little blood drawn from it without any relief." It will be made to appear in the further developement of this tract, that the abstraction of blood on the miserable scale here ordered was much better calculated to involve the new theory in utter discredit and neglect, than to sustain its pretensions or to ensure for it the respect and adoption of practical physicians.

Failing to produce any vigorous influence at home, at head quarters, at the place of its languid nativity; what mighty agitations could be expected from it elsewhere in medical society generally, or in distant parts of the world? We accordingly find that almost as soon as promulgated, its great influential principle having been so tamely propounded, the new doctrine almost entirely failed to gain the public attention. What, let us inquire, are the essential facts of the new doctrine? The answer is supplied by Dr. Charles Quin himself, that the causes of acute hydrocephalus "are of a very different nature from those of simple dropsies, and are much more closely allied to the causes of acute diseases; and that in fact it always owes its origin to a morbid accumulation of blood in the vessels of the brain, sometimes proceeding to a degree of inflammation; and generally, but not always, producing an extravasation before death. Some post-mortem dissections, of which we have adduced two, are then quoted, furnishing unquestionable proofs, first, of overfulness and consequent morbid distention; and secondly, of a certain degree of inflammation of the cerebral surfaces.

This circumstance was proved by the appearance at the time of dissection of preternatural adhesions of the meninges by a partial opacity and increased sickness of them, together with patches of inflammatory crusts, very similar to those which are found in the abdominal viscera of persons whose death has been the consequence of enteritis, or on the lungs and pleura of those who have sunk under pulmonic and pleuritic inflammations. We have in Dr. Quin's list of cases appended to the volume published in 1790, at least two examples of acute hydrocephalus distinctly enough stated, especially with respect to their post-mortem appearances, which ought immediately to have strongly and prominently placed before his mind the practice which alone could have been considered sufficiently active to meet the demands of the theory. In one, or rather in several of those cases, we have an overfulness of blood in the vascular tissues of the brain. Does not common sense indicate in such a case, the necessity of abstracting from this plethora, the whole of the excess over and above the quantity which ought properly and healthfully to circulate in the vascular tissues of the brain? The answer is obvious, and it was given sufficiently intelligibly in Dr. Charles Quin's inaugural dissertation, by being placed first and foremost of all that gentleman's curative measures.

The second proximate state quoted by Dr. Charles Quin in connection with the overfulness of the vascular tissues of the brain already mentioned, was that of inflammation.

Patches of encrusted coagulable lymph, furnishing evidence of intense inflammatory action of adjoining tissues, and illustrated by Dr. Charles Quin by references to similar appearances in distant parts of the body, ought to have induced him without a moment's delay and without any hesitations or fears, to have had recourse to ample abstractions of blood in all the cases which he had subsequently the opportunity of treating. Do we ever hear of a remedy more frequently recommended or considered more absolutely necessary for the subduction of the inflammation of serous tissues, as those of the abdomen and chest, than bleeding on a large scale? On the contrary, is it not the usual practice in either of these inflammations to place bleeding among our first measures? Then how did it happen that the abstraction of blood was only recommended, and never in a single instance made a measure of active treatment by Dr. Ch. Quin himself? For it is a matter of recorded evidence, that in all the cases quoted in that gentleman's treatise of 1790, with one trifling exception in favour of cupping from the left temple (see case 12 in the Appendix, p. 139,) when a little blood was drawn without relief, he omitted general bleeding altogether. We may, I think, very well infer, that the treatment by active bleeding was not adopted in his practice generally, although recommended in the original thesis of 1779, by reason of its not being again recommended in the publication of the same gentleman in 1790, or at least not recommended more than once in the intermediate period of these respective publications. Dr. Ch. Quin having thus in reality denounced his own doctrine, by having in practice shrunk from fulfilling the most important indication which his theory required, could it be expected that so striking an innovation upon the received doctrines of his day should have been generally adopted, and become established as a most essential principle in the treatment of the disease? It may be mentioned perhaps as a reason in explanation of the conduct of the Drs. Quin, and to some extent in palliation of the desertion by them of their theory, that bleeding in pyrexial diseases was not a little out of fashion about the period of Dr. Charles Quin's publications: for it should not be forgotten that the period in question was identified with the heyday of the Brunonian system; when very little quarter was given by its friends to their professional opponents, the friends of active antiphlogistic practice.

In further opposition to the practice by depletion, there was prevalent at that period, as there is at the present day, a strong prejudice against any considerable abstraction of blood in diseases even of acute inflammation of very young children. Assuming that active practice by bleeding in inflammatory diseases, perhaps for the reasons already alluded to, or possibly for some others, became suspended, or almost totally suppressed, about the time of Dr. Ch. Quin's publications, it nevertheless does not follow that the new

theory of hydrocephalus did not produce some good results; and that it might not even in its state of abeyance as to one great branch of antiphlogistic treatment, exert nevertheless a valuable influence, by directing professional attention to the employment of divers other measures, having an indirect, although no doubt a subordinate tendency to produce similar results.

It is my opinion that the suspended influence of the new theory really had such an effect; for we find that many of the leading minds of the profession became interested about the time in question, or very soon afterwards, in the success of a variety of measures, subordinate indeed in my estimation to bleeding; but measures, nevertheless, to which considerable importance might be attached, as means of subduing the more active stages of acute hydrocephalus.

The application of large blisters to the head were amongst those means. I cannot say that I approve of the practice by vesicatories as being greatly to be depended upon for the cure of hydrocephalus, for reasons which I shall avail myself of a future opportunity to mention.

About the same period, or soon after, it became a pretty general practice in England, to have recourse to the use of mercury, in a variety of forms, to subdue active inflammation. 'To the exhibition of calomel and other mercurials on principles almost empirical, was proposed the addition of opium to allay irritation, by Dr. Percival and others; of digitalis, by Dr. Withering; and of fetid gums and other spasmodics of various pretensions, together with sundry other items of doubtful utility, selected with little discrimination by persons of inferior name from among the dead lumber, the *albiora Græca* of the profession.

But to proceed with our proof, that inflammation with pyrexial over-distention of the vascular tissues of the encephalon, terminating in effusion of one or more fluids into the ventricles of the brain, is the proximate cause of acute hydrocephalus. This fact is tolerably well made out in Dr. Charles Quin's Treatise. He gives altogether twenty-one cases of hydrocephalus, of all sorts and varieties. The first three are cases of chronic hydrocephalus. The fourth is also a case of chronic hydrocephalus, which, however, was originally produced by repelled scald-head. The fifth, extracted from Morgagni, was probably a case of acute hydrocephalus; for in his dissection he speaks of two different fluids which he encountered in different parts of the head. In the sixth case, which is also extracted from Morgagni, the author, in speaking of the fluid he found in the ventricles, describes it as *aquâ plenissima subfuscâ*. This was probably an admixture of the ordinary fluid with serum, if not also with coagulable lymph. But a statement to that effect is not made, and therefore the actual character of the case is left in some degree of uncertainty. The eighth case was also probably a result of inflammatory action. But it is left by Dr. Charles Quin in considerable uncertainty. See Quin's Treatise, p. 119. The ninth case is

given beautifully by Epiphany Ferdinand; and it was one attended by undoubted symptoms of acute hydrocephalus. But it is not accompanied by an examination of the head after death. By reason of such omission, it cannot be offered in evidence of any known proximate cause. Case No. 10, was professionally superintended by Dr. Charles Quin himself. On examination of the head after death, innumerable small hydatids of the size of grains of mustard seed were formed on the coats of all the blood-vessels on the surface of the brain, and a larger quantity than natural of serum was found in the ventricles. The consecution of the symptoms as given in the pathological history of the case admits of no doubt that it was a genuine example of acute hydrocephalus. The same may be said of the eleventh case, under the professional management of Dr. Henry Quin. But in that case, likewise, no dissection is given in illustration of the proximate cause. The twelfth case is well illustrated as to its proximate cause: but the treatment was as much mismanaged as if the physician had never in his life stumbled upon the idea of his own theory of hydrocephalus. The following are a part of the post-mortem appearances. "The tunica arachnoidea was amazingly thickened. Several patches of inflammatory crust appeared on its surface; and under it was found a considerable quantity of fluid coagulable by heat." . . . "About three ounces of pure water was found about the basis of the brain, and about one ounce in the lateral ventricles, from whence the other water appeared to have come through the infundibulum. The choroid plexus had several granulated substances like small hydatids attached to it." In the dissection of the thirteenth case, namely, that of the maniac who became the subject of acute hydrocephalus at the age of forty-two, there was observed the appearance of inflammation on the thalami nervorum opticorum. What precisely the appearance was, the reader is not informed. In the dissection of the sixteenth case, the proofs of inflammation are well sustained: see p. 146 of the Treatise of 1790. "The blood-vessels were remarkably distended. One side of the pia mater was preternaturally thick and opaque." The three following cases, Nos. 17, 18 and 19, were not examined after death. In the dissection No. 20, the blood-vessels of the head, it is simply stated, were remarkably full; and in the ventricles of the brain there were above four ounces of water as nearly as could be guessed. Of case 21, the head was opened after death; and an extraordinary quantity of water was found in the ventricles of the brain."

The intention of this essay, as stated in its title page, is twofold: first, to establish the fact that acute hydrocephalus is an inflammatory disease; and secondly, that it is curable by the same means and measures with other diseases of inflammation. The fact I fully acknowledge is not new. It was tolerably distinctly announced in Dr. Charles Quin's Thesis, and it was again communicated to the public by the same gentleman in his Treatise of 1790. But this latter communication was made not in a way to secure much pro-

professional attention to its merits; and it has been already seen that no system of effective practice was reared on its foundation for many years subsequently. We have moreover seen that an elderly metropolitan physician, of no inconsiderable reputation in his day, stoutly denied the truth of the new theory as late as the year 1814. See the *Treatise on Hydrocephalus*, published in the course of that year by Dr. Carmichael Smyth, already referred to at p. 21.

It is not many years since Dr. Carmichael Smyth practised in London, and was a physician of no little weight and authority. His opinions are yet far from having been exploded, and not having been publicly controverted, that I am aware of, the practical interests of the subject are such as to make it the duty of a subsequent writer to reconsider them with calmness and deliberation; and, finally if possible, to reply to and dispose of them. At the time of Dr. Carmichael Smyth, it was not so much the practice as it is at present, of medical men to urge the expediency of post-mortem examinations; nor was it at all events the practice of physicians to investigate the appearances presented on such occasions with much minuteness: and it may be added, that Dr. Smyth's position in the profession was not one to involve him personally under the obligation of being perfectly qualified to state the opinions which he maintained, with the tone of confidence with which he has recorded them. During a considerable section of my own professional life, I have had too many opportunities of witnessing post-mortem examinations, which furnished undoubted proofs of intense inflammatory action of the vascular tissues of the encephalon having been sustained during the pyrexia of acute hydrocephalus.

The following narrative is submitted to the reader as the result of the last opportunity of this kind which has occurred in the practice of my special department at University College Hospital.

Emily Nye, three months old, was brought to University College Hospital by her mother, who resides at No. 9, Sidmouth street, Gray's Inn Road, on the 28th February, 1840. The child, as stated by the mother, had been exceedingly delicate from her birth; and especially subject to bowel affections. The pupils were greatly dilated, and the general appearance of the eyes was such as to give the impression that she could not see; and having taken some pains to ascertain that point, I expressed my opinion publicly to that effect before the assembled students, and stated it as a reason for a highly unfavourable prognosis. The present symptoms were a constant diarrhœa with offensive slimy motions; morbid heat of the head, and more especially of the forehead, with occasional vomiting. The child lay with her head thrown back; and was the subject from time to time of fits of screaming. Her tongue was white, and the general surface of the body was somewhat raised in its temperature. The nature of the disease not having been suspected till this time.

Without entertaining any hope whatever that I should be able to effect a cure in so hopeless a case, I, nevertheless, considered that some good might possibly arise, in mitigation of the severe sufferings

of the little patient, from the abstraction of a small quantity of blood from the surfaces behind the ears by cupping. I accordingly ordered her to be cupped to the amount of three ounces and a half; presuming that it might relieve the symptoms, although it might not suffice to cure the disease. A third of a grain of tartar emetic, with six grains of the powder of ipecacuanha, were prescribed as an emetic, to be exhibited as soon as the child and her mother should arrive at their own residence. Eight grains of calomel and ten grains of the compound powder of tragacanth were ordered as a powder, to be divided into four portions; of which one was directed to be given to the infant every three hours. After this period the patient was visited frequently by my clinical clerk.

On the 22d of March the child was again brought to the hospital. The somnolency, of which the mother had only just alluded to without laying much stress upon it, had now greatly increased, and the child was seen to knock her head about in all direction without much intermission. In the further treatment of the case, the exhibition of calomel was persevered in, in the quantities first prescribed; and a blister was ordered to be applied to the nape of the neck.

On the following day the child's right arm was observed to be thrown about in bed, while the other remained unmoved. The breathing became gradually embarrassed; the infant's powers on this day obviously sinking, the respiration being more and more impeded by a mucous rattle, and on the following morning it expired in a slight convulsion.

It should be recollected that this was declared a hopeless case during the first visit.

Inspection of the head after death:—The skullcap was removed with great difficulty, on account of the firm adhesion between it and the dura mater: it was strongest along the course of the superior longitudinal sinus and opposite the torcular Herophili. It was also firmly adherent opposite the right parietal protuberance, where it was thickened, rather rough, and presenting a granular appearance. On removing the dura mater and the parietal layer of the tunica arachnoides, several patches of coagulable lymph were seen on the visceral layer of this tunic. The membrane itself likewise, in several different parts of it, was more or less opaque. The lymph was nearly equally diffused over each hemisphere. At the under surface of the brain there was a patch of fibrine observed upon the middle part of each middle lobe, which on the right side extended as far as the pons Varolii. Another collection of lymph, of a rather yellower appearance, was situated between the two lobes, at the median plain of the cerebellum. The medullary portion of the brain was nearly of natural consistence, but the cineritious portion of it was something softer; the several ventricles of it contained very little fluid; perhaps the quantity altogether not exceeding half a dram, and of this a very small portion had found its way into the theca spinalis.



This dissection was performed by my present clinical clerk, Mr. Humble, son of Dr. Humble, of Worthing, acting under the direction of my own son, Mr. John Hall Davis.

I have no inclination to multiply evidence in favour of the inflammatory origin of hydrocephalus, founded on results of cases which have from time to time occurred in my own practice, inasmuch as the majority of such opportunities are become simply matters of recollection to me, the post-mortem examinations of the last nine or ten years within my experience having been few and far between; the great majority of cases having yielded to the treatment adopted. The required evidence will, therefore, be supplied from other competent sources; from the united testimonies of writers of unquestionable eminence and authenticity.

The reader will please to recollect that it is a principal object with me to impress the profession with the fact that acute hydrocephalus is not an ordinary dropsy, but the result of an acute inflammatory disease of the vascular tissues of the encephalon. A notion of this kind somewhat doubtfully exists among some members of the profession. But the impression in question does not amount to a living practical faith in this country; if, indeed, we may venture to presume that it even approximates to a general opinion.

The publications in which the principal facts in support of it are to be met with, are very imperfectly known to the British medical public; and the facts themselves have been so over-burdened and oppressed with various irrelevant matters, that I am quite sure that many of the most important of them have never been placed advantageously and in a striking and convincing point of view before the English professional reader.

It should not be forgotten that Dr. Carmichael Smyth in 1814, asserted his confidence of the unsoundness of the doctrine now about to be maintained by counterfacts and experience, in as strong a language as could well be used. In referring to the testimony of two or three unquestionably competent writers on the subject in debate, I shall confine myself almost exclusively, in many cases, to brief selections from their post-mortem examinations. Whenever this intention may appear not to be strictly adhered to, the motive for its non-observance will generally be expressed at the time. In a certain proportion of the cases to be adverted to, a few of the principal facts of the previous history of the disease will be succinctly stated; in order to put the reader in more distinct possession of the subsequent pathological illustrations.

With this explanation, I proceed to invite the especial attention of my readers to the following selections from the pathological histories and dissections of Golis, an authority which even my old friend Dr. Carmichael Smyth himself, if he were now alive, would feel disposed to treat with unfeigned respect.

Case 1. The occasional cause of the malady was a fall down the stairs from the arms of a thoughtless maid servant. The child died in forty-eight hours after the concussion. The age of the infant at

the time of the accident was eight months. Dissection:—Marks of a previous bruise on the outside of the head were to be seen; and after taking off the skullcap, we found the bloodvessels of the membranes and of the brain itself enlarged, and turgid with blood; in the sinuses, particularly in the longitudinal sinus, the serum, lymph and the red part of the blood were distinct one from the other, and the two latter were seen swimming in the first. The coagulable lymph resembled an earthworm; the plexus choroides was pale, and on it sat many little balls of coagulable lymph; the colour of the medullary substance was reddish; the consistence of the brain was soft, as it always is when concussion is the cause of the disease. There was no extravasation of blood in the ventricles; there was discovered a small quantity of turbid serum,<sup>1</sup> scarcely amounting to a table spoonful; and there was likewise a considerable effusion of plastic lymph, which, not only covered the outer surface of the brain, but also that of the corpus callosum; and which moreover lined the cavities both of the cerebrum and cerebellum. The inner pericranium of the right parietal bone and of the squamous part of the temporal, where externally the bruise had been, was greatly inflamed.

The turbid appearance of the small quantity of serum found in the ventricles, we may with very little doubt ascribe to the violence sustained from the accident. See a parallel case in the Appendix to Dr. Charles Quin's Treatise on the Dropsy of the Brain, Part II. p. 136. In that case it is stated that "the tunica arachnoidea was amazingly thickened, several patches of inflammatory crust appeared on its surface, and under it was found a considerable quantity of fluid coagulable by heat." It is further stated, that—"about three ounces of pure water were found about the basis of the brain, and about one ounce in the lateral ventricles, from whence the other water appeared to have come, through the infundibulum." The above case is given by Golis in illustration of a certain variety of very intense hydrocephalus, to which he has given the epithet of tumultuous. It is one of great rapidity as to its progress, and speedily destructive of life as to its results.

2. This, case, although unfortunate, is full of interest; and as I shall probably have occasion to refer to it hereafter, I shall take the liberty of quoting the whole of it, together with its post mortem examination. A. D., fourteen months old, vaccinated, plump and strong, was seized one morning about five o'clock, after a night of great restlessness, with a violent fever and general convulsions. These tumultuous symptoms urged the father of this motherless infant to seek immediate assistance for his child; and in less than half an hour after the accession of this high degree of phrenitis,

<sup>1</sup> I have repeatedly had occasion to notice this appearance of turbid serum in cases of hydrocephalus which have supervened upon accidents similar to the fall, to which the disease is very reasonably imputed, in the above narrative.

four leeches were applied behind the ears, which drew more than three ounces of blood. Calomel, emollient medicines to drink internally, and mustard cataplasms applied to the feet, soon diminished all the symptoms of the disease. This improvement, however, was but of short duration; the fever soon increased, the convulsions returned, deafness and spinal cramps came on. Hemiplegia with spasmodic contraction of the pupil, blindness and distortion of the face followed in rapid succession, and in thirteen hours after the accession of the disease the child died.

Dissection:—The cranium, when its coverings, of which the vessels looked forcibly injected, were raised, was of a blueish colour; the sutures were separated; the sinuses contained much coagulated blood with separate plastic lymph; which were surrounded by a considerable quantity of serum. All the bloodvessels of the brain and its membranes were enlarged and turgid with blood. On the convolutions of the brain, on the surface of the corpus callosum, and on the surfaces within the lateral ventricles, was found a great quantity of coagulable lymph, like a preternatural membrane, as also at the basis of the cranium. The pale plexus choroides was covered by the same: and in the ventricles of the brain, the septum of which was broken through, there were found about three ounces of turbid serum.

The cases three and four of the same author exhibited at their post mortem examinations very similar results with those of cases one and two just described.

5. Matthew Sch, one year old, healthy, well nourished at its mother's breast, vaccinated, was seized with a violent fever, during which, in a few hours, there appeared on the surface of the body a pimply eruption like wind-pox, which soon burst, and left behind this part of the process, many gangrenous places, surrounded by broad inflammatory circles. This malignant cuticular disease sustained something of repulsion; and some of the severest symptoms of the water stroke soon supervened. I am sorry that I cannot afford either space or time to give the whole of this history. It is very interesting.

Dissection:—This opportunity could not be obtained till after the lapse of three days, and at some distance from the house of the parents. Much turbid serum and a very soft consistence of the brain distinguished this dissection. The latter circumstance may perhaps be attributed to the lateness of the opportunity seized to perform that duty.

6. This was the case of a feeble female child of nine months old, delicate and irritable. She had been vaccinated when only forty-two days old. She had sustained much inconvenience from dentition complicated with hooping cough; which was attended with much pyrexial irritation. In the midst of these symptoms the infant was quickly carried off in convulsions and spinal cramp.

Dissection:—The bloodvessels of the membranes and of the brain were more turgid than is common in the water stroke, and

the serous extravasation amounting to about two ounces; and yet there was found no membrane of plastic lymph, which frequently in acute hydrocephalus is seen to line the ventricles of the brain; but it was well enough seen effused into the spaces among the ridges of its convolutions.

7. This case was in all probability the result of an unfortunate vaccination. E. S., a year old, born of a sickly mother, forty years of age, of the Greek religion: but nursed at the breast of a young woman who was healthy, robust, lively, and blooming. The infant was vaccinated in the winter: the progress of the vaccine disease was regular for many days: and on the twelfth day after the insertion of the virus there was seen on the arm four beautiful cow-pocks; and on the same day there occurred a fever which was more violent than Dr. Golis had remarked in many thousand vaccinations. He attributed this appearance to the accession of dentition; but anticipated no bad result from it. Suddenly, however, the bright redness of the inflammatory circle round the pustules vanished: vomiting soon followed, and the child fell into a state of utter insensibility. This insensibility, however, ceased for a short time; during which the little patient furiously bit at every thing which came near her mouth. She was soon seized with spinal cramp and palsy of the left side. Inspection of the body after death was not permitted.<sup>1</sup>

8. J. B. and E. T., both blooming infants of six and seven months old respectively; each was suckled by its mother, who had afforded it a good supply. They both suffered the same fate as the subject of case seven, during the inflammatory period of the cow-pox. They were both seized, without the intervention of dentition, with violent fever, in which they unceasingly screamed for some hours, curving themselves piteously, but without biting; and also vomiting their milk and medicines. Violent convulsions made them insensible. Spinal cramps succeeded, and palsy of the right side. After the lapse of five and thirty hours they expired.

Dissections:—In both cases the results were the same, the serum was turbid and amounted to between two and three ounces. The substance of the brain was of firmer consistence than in the case number four, which occurred under circumstances of a similar complication.

9. This was a case of acute hydrocephalus, attended with symptoms of great severity, and complicated with much irritation from dentition. The infant was two years old.

Dissection:—After removing the skullcap, the vessels of the membranes, as well as of the brain itself, were less full of blood than usual; yet there was coagulated lymph in great quantities and in thick flakes, interspersed amongst the convolutions of the

<sup>1</sup> I have taken the liberty of quoting this case, although not illustrated by a post-mortem examination, on account of its remarkable interest and peculiarity; it being a complication which I have never seen in England.

whole upper surface of the cerebrum, as well as on that of the cerebellum. Even the ventricles of the brain, the corpus callosum, and the corpora striata, were coated or lined with membranes of coagulated lymph; seldom to be seen so distinctly as they were seen in this case. The quantity of fluid contained in the ventricles was between three and four ounces. The brain was soft, the pituitary gland natural; but the pale plexus choroides was covered with lymph. The sutures of the cranium were separated. Between their indentations was found, in very small quantity, a fluid tinged with blood; through which the projecting bones could be distinguished, just as on maps, the boundaries of two neighbouring countries are marked with coloured points. The lungs were full of blood. The abdomen, as in all who die of this disease, was quite fallen in: but on none of its viscera was any morbid appearance to be observed.

10. The subject of this case was four years old, and had been vaccinated. He was seized in October with an acute rheumatic fever, accompanied by a local inflammation of the velum pendulum, the uvula, and the tonsils. This little patient's mother, in expectation of improvement, suffered him to lie seven days without medicine, and without the requisite attention to regimen. It was not before the eighth day of the disease that any application was made in its behalf to the institute for sick children. The patient was then treated antiphlogistically, both as to the use of medicines and of external applications: but on the day on which he first took his medicines, he began to complain of pains of the head, occupying both the forehead and the occiput; and of inclination to vomit, followed by actual vomiting. His pulse, which hitherto was febrile, became slow, intermitting, and irregular. To those pathognomonic signs of the second stage of acute hydrocephalus, there soon supervened some additional symptoms indicative of the same period of the disease. All the usual remedies which I considered best adapted to the period in question, were employed methodically and in proper quantities; and after the lapse of twelve hours subsequently to the accession of symptoms characterising the second stage, several of those of the third stage made their appearance.

After the lapse of six days there was a return of consciousness and of capacity to see and to converse. But after suffering the symptoms of the last stage for thirty-six hours the patient expired.

Dissection:—With the exception of some traces of inflammation of the periosteum, of the petrous portion of the temporal bone, and of the sphenoid bone, and of the brain being very soft, all the other appearances were the same as are always found in dissections of this kind. The parts of the throat which had been inflamed were still very much so, and lined in many parts with a coating of coagulable lymph.

11. The subject of this case was an infant of eight months old, who had been regularly vaccinated. In the month of October she was seized with a tertian fever accompanied by symptoms of

arthritic inflammation of the lower extremities. She was taken to the institute for sick children at Vienna. Her health was supposed to have suffered greatly from a damp dwelling and from bad food. To these circumstances were now added measles and œdema of the feet and hands; on the accession of which the intermittent and other pyrexial affections vanished. The symptoms of a rapidly destructive hydrocephalus, even those of the wasser schlag, supervened.

Dissection:—The brain was so soft, that after removing the membranes it ran in different directions like thick pap; when a great quantity of water which was contained in the several ventricles made its escape. The sutures of the cranium were firmly closed. According to the statement of the mother, she had never exhibited any strong indications of mental talent. She had never been cheerful, never properly digested; she frequently returned her daily food; she had never grown as she ought to have done; and, upon the whole, there was reason to suspect that there had been for some time gradually accumulating a collection of water in the ventricles of the brain.

12. This case was one of a little girl of four years old. In the first year of her life she was vaccinated. Some short time subsequently, she suffered scrofula of the glands from improper quality and quantity of food. In the progress of her malady the abdomen swelled, and she lost flesh and strength. Symptoms of hydrocephalus supervened. The details of her case are given at considerable length. After a disease of great severity she died, much exhausted, without convulsions.

Dissection:—Permission to inspect the head could not be obtained until four days after death. The results were great fulness of the bloodvessels, a soft brain, a small quantity of coagulable lymph, together with about four ounces of the usual fluid in the ventricles of the brain. The plexus choroides was pale, and almost changed into mucus. The sutures of the cranium were firmly closed.

13. This case was one of a delicate child of five years old, who had been often subject to ailments such as frequently occur to children of weak powers of digestion.

Dissection:—The results were exactly the same with those of the foregoing case.

14. The subject of this case, a little girl five years of age, was delicate, irritable, full of talent and of good temper. She fell ill subsequently to having received a blow on the head. This, however, had taken place two months before. Her first observed symptoms were those of a gastro-catarrhal fever, which, after the lapse of a few days, were followed by decided indications of a head affection. The malady ran its usual course. But before the transition into the last period, there returned consciousness, speech, sight, voluntary motion of the hands and feet, together with thirst and appetite for food. The patient slept calmly, and for a long time,

and awoke collected out of her sleep. Her pulse was natural. She complained of languor, but of no pain. After all these false promises of amendment she relapsed, and sank into the calm of death.

Dissection:—The results of a post-mortem examination were very similar to those of many of the foregoing dissections, without any material difference. Evidences sufficient were exhibited of an inflammatory condition of the vascular tissues of the brain, together with an abundant effusion of the usual fluid into the ventricles. A circumstantial description of them would here occupy too much of the reader's time.

15. The subject of this case had been vaccinated. She was eighteen months old when she was admitted into the Institute. It appeared that during an entire month she had suffered from diarrhœa, and during the whole of a year she had been the subject of rickets from glandular disease of the abdomen. During the latter stage of the hydrocephalus, including full six days, the patient lay in an irrecoverable state of insensibility. That of palsy followed, and under the gentlest symptoms incident to that period of the disease, after the lapse of about three days, she quietly expired.

Dissection:—This was distinguished from the greater part of the foregoing dissections by the fact that between the pia mater and the brain, there was encountered a quantity of coagulable lymph. The brain itself was very soft. There was much of the usual fluid found in the ventricles. The plexus choroides, together with the pituitary gland, could not be discovered in the pap-like mass of the brain.

16. A case of very bad management in the bringing up of its subject, by the permission of all sorts of indulgences in eating and drinking; and of subsequent injudicious treatment of the disease after its first accession. The pathological history of this case is too long to admit of our entering at full length into its particulars; it being my principal object in this section of our inquiry to trace the proximate cause of the malady.

Dissection:—The post mortem examination was performed by two physicians and two surgeons. After removing the scalp, the cranium appeared in many parts of a dark blue colour, from its bloodvessels being very turgid. In the sutures, which were a little open, there appeared blood. The bloodvessels of the membranes, as well as of the brain, after removing the scullcap, appeared very much enlarged and in an unusual degree filled with blood. The sinuses, particularly the longitudinal, were full of coagulated blood, with here and there coagulated lymph floating in the serum. There were more than four ounces of the usual limpid fluid in the ventricles. The plexus choroides was very pale, and the surfaces of the ventricles were coated with plastic lymph. The consistence of the brain was pretty firm. It expanded, after taking off the cranium to such a degree that in a few minutes afterwards it could not be brought under the scullcap. At

the basis of the cranium lay much coagulated lymph, enveloping the nerves and bloodvessels.

17. A case of hydrocephalus of a little boy four years old. The accession of the head affection was the immediate consequence of sudden cessation of a discharge from an ulcer in the leg. Before the transition into the last period of the disease, there occurred in this patient, as in a former case already noticed, consciousness, speech, sight, the power of swallowing fluids, and appetite for food. But this happy change was but of short duration. Violent spinal cramps and palsy preceded an approaching death; which followed on the seventeenth day of the disease.

Dissection:—The appearances were the same as in several of the foregoing cases.

18. The subject of this case was an infant of one year old. He had been vaccinated in the fourth month of his age, and subsequently was well fed at his mother's breast. It became the subject, when remarkably full of flesh, of an appearance of little pimples on the back part of its fat neck, which, in consequence of its deep furrows on account of the child's fleshiness, ulcerated and suppurated profusely. This local affection was treated mildly and quietly. But from impatience of the slow progress of the cure, remedies were applied without the knowledge of the physician, which rapidly dried up the ulcers. Scarcely eight days after the drying up of these ulcers, the child lost his activity and his appetite; slept uncomfortably; began to hang down his head; to dislike strong lights; became constipated and voided very little urine. All these symptoms were attributed to dentition, and no physician was consulted. Medical assistance was not called till all the symptoms indicative of the inflammatory period had arrived, and that of effusion was already at hand, and could no longer be prevented. With violent convulsions and spinal cramp, the stage of palsy began; and on the fifteenth day of the disease death supervened.

Dissection:—Much coagulated blood at the basis of the cranium, great turgescence of the vessels both of the brain and of the membranes. The sutures appeared a little open and painted with the appearance of blood occupying the interstices. In other respects the results were similar to those of case sixteen.

19. As a caution to parents in respect to accidents, I shall take the liberty of transcribing the whole of the following case: "A young lady of eight years of age and very healthy, fell from the height of three feet with her head foremost against the ground. To avoid a scolding for her carelessness, she kept this accident a secret from her mother. Six weeks afterwards she became the subject of the first symptoms of hydrocephalic turgescence, which were soon followed by nausea, coated tongue, and vomiting. A hot forehead, severe pains of the head and nape of the neck, alternating with pains of the stomach, and great sensibility of the eyes to light, were the most striking symptoms of the disease. The physician who was



first called, and who seemed to be little acquainted with the frequency of acute hydrocephalus, explained these appearances as being symptoms of a gastric fever, and directed his attention merely to the abdomen, without paying any regard to the state of the head. He said that the inclination to vomit was a hint of nature, and that the headache was a sympathetic pain of which the cause lay in the stomach. The coated tongue served to corroborate his view, and determined him to prescribe an emetic. After this had operated, the symptoms of effusion soon appeared. Those were explained as symptoms of a typhoid fever, and for that reason were treated by strong internal and external stimulants. The symptoms of the last stage were, in this case, as they always are, where strong stimulants are employed in large doses during the first period of the disease, very violent.

“Dissection:—After taking off the general covering of the head, the cranium looked blue, the sutures were here and there separated, and a watery fluid, tinged with blood, appeared beneath. The vessels of the dura mater, of the other membranes, and of the brain, were much enlarged and overcharged with blood. In the sinuses swam the red part of the blood; and coagulated lymph was seen in the serum transformed into the shape of a worm. Coagulated lymph appeared also in great quantity in the ventricles of the brain, on the surface of the corpus callosum, and at the basis of the cranium. The quantity of transparent fluid contained in the ventricles was six ounces.”

20. This was the case of a fine boy of four years of age. He had been vaccinated. The disease, commenced in consequence of his having heated himself by running in a spacious garden. Covered with perspiration, he sat down with bare head and breast, at the same time exposing his back, with only a thin shirt on, to a pouring rain till he was wet through. Next morning he complained of a sense of weight of his head, and tension at the nape of his neck; transient lacerating pains in the forehead, sense of feebleness, with absence of thirst and appetite. There was slight fever, in which, however, the pulse was of natural quickness and fulness. But there was at this time some irregularity in the pulsations of the artery, inasmuch as some of them were scarcely to be felt, and others were entirely omitted. After a long attendance and several professional consultations, the child died on the forty-eighth day of the disease. This case was treated on the principles of the Brunonian system, but greatly in opposition to the advice and opinion of Dr. Golis. The dissection was attended by the physician who had insisted on the exhibition of bark in the first consultation, and by a surgeon who is described as a stiff Brunonian. The bloodvessels of the covering of the cranium were turgid, and its bones, when the scalp had been removed, were blue. The sutures were separated bone from bone to the distance of a line, and the interval was filled by a bloody extravasation. The bloodvessels of the membranes, as well as those of the brain itself, were uncommonly large, and turgid with

blood; as were also the sinuses in which cruor and much lymph floated in the serum. Between the pia mater and the brain, which was firm and elastic, there was a great quantity of coagulable lymph. On the corpus callosum there was a layer of the same material about as thick as the blade of a knife. It was equally thick at the basis of the cranium, where it enveloped the bloodvessels and nerves. The ventricles, in which more than six ounces of transparent fluid were contained, were lined by the same material through all their length and incurvations. The plexus choroides was very pale, and entirely covered with lymph. The pituitary gland was in its natural state, but nevertheless covered with lymph. The septum of the ventricles was broken through. The white substance of the brain was of a reddish colour. The viscera of the thorax and abdomen were perfectly healthy. The incredulous physician began after this to believe in the fact of acute hydrocephalus. Whether the surgeon, who soon after went to Russia, was converted, Dr. Golis had not been informed.

21. F. R., four years old, after an inflammation of the lungs, succeeded by a spasmodic cough, but having perfectly recovered his health and strength, fell out of a cart two or three feet high, with his head foremost, upon a stone pavement. Cold water was applied to the bruised part; and, fearless of worse consequences, neither a physician nor a surgeon was consulted. Soon after the accident in question, symptoms of acute hydrocephalus supervened, and the child died on the seventeenth day of the disease. Of the dissection, as given by Dr. Golis, the description is closed in the following words: "With this duty, my colleagues, who had taken hydrocephalus as a phantom of my brain, were charged; the results were the same as in case No. 20. After the examination was over, these gentlemen, at my request, informed the father that the disease had really been the acute hydrocephalus."

22. This was the case of a little girl of two years old. The cause was a severe and neglected dentition combined with a fever designated by Dr. Golis a mucous fever. At an advanced period of the disease Dr. Letl, a truly skilful physician, made an unfavourable prognosis, which was but too soon fulfilled. This child before the accession of the stage of palsy enjoyed a lucid interval; but she died on the eighteenth day of the disease.

The dissection was performed in the presence of the parents and of four physicians. The bones of the cranium were bluish and separated; and there was effusion in the interval of the sutures. The substance of the brain expanded but little, and was not elastic. The bloodvessels of the membranes appeared more turgid than those of the brain. The fluid effused into the ventricles weighed six ounces. The extravasation of lymph was insignificant. The substance of the brain was softer than is common when death takes place on the eighteenth day of the disease. The plexus choroides was very pale, and surrounded by a little lymph. The pituitary gland was

of natural appearance, but at the basis of the cranium there was found a great quantity of coagulable lymph.

23. This was the case of a child of four years old, who had all the indications of acute hydrocephalus. After having for some time been the subject of strongly predisponent symptoms, he was eventually attacked by those of the acute affection itself. The little patient went through the usual stages of the disease; and died on the fourteenth day subsequently to the accession of the acute malady. Dissection:—This differed from some of the former dissections in the firmness of the sutures; the softness of the brain; the great enlargement of the ventricles; the extraordinary quantity of the usual fluid; the slight extravasation of lymph; and in the pituitary gland being converted into a bladder. The choroid plexus was changed into mucus.

24. This case was an example of the tumultuous variety of hydrocephalus, designated by Dr. Golis the water stroke. Death occurred after the lapse of ten hours subsequently to the accession of the proper symptoms of the malady. The dissection gave no material differences of results from those of the first nine cases, as already recorded.

25. A case of complication of small-pox with hydrocephalus in a child of four years of age. The case ended in death in fourteen hours after the accession of hydrocephalus. Dissection:—Besides the appearances observed in the first nine cases there was also found between the pia mater and the brain a quantity of fluid which had the appearance of being a mixture of small-pox pus with serum.

26. Anna Maria Sch, 12 years old, vaccinated, suffered for many years with scald head, for which many powerful remedies were employed with more or less effect. The places under the thick crusts, which discharged and spread, began suddenly to dry up; and the patient felt all the uneasiness of a turgescence in the head. As frequently happens in the first stage of this disease, no assistance was sought for; and in the further progress of it, it was sought too late; the stage of effusion succeeded in due course, attended by the symptoms which usually indicate that period of the malady. This stage of the disease lasted a long time; and the sufferer had many very distinct intervals during which she recovered consciousness, speech, and sight. Under suitable palliatives, the symptoms of the last stage slowly approached; and death did not follow till about the thirtieth day of the malady.

Dissection:—The external vessels of the cranium, like those of the brain and its membranes, were not very turgid. The colour of the bones of the cranium, the sutures of which were firmly closed, appeared blue; the substance of the brain was very soft; the ventricles were large, containing much transparent fluid. Lymph was observed in great quantity only on the under surface of the brain and on the basis of the cranium. The pineal gland resembled a bladder.

27. "Anthony P., 7 years old, vaccinated, scrofulous, had suffered

a long time with a discharge from behind the right ear of a very offensive smell. As much on account of this local affection as for his general malady, the medicines prescribed were regularly given to him by his mother. After an attack of fever with severe pain of the side, the discharge from the ear vanished; but there was soon exhibited, although not with much distinctness, the symptoms of hydrocephalic turgescence. Over the ear which had formerly discharged, and was now violently painful and inflamed, emollient cataplasms were applied; mild almond oil was dropped into the ear; and all the remedies proposed for the stage of inflammation were resorted to with punctuality: but they were resorted to in vain. The disease ran through the two last stages, and on the fifth day death followed. The whole of the case has been transcribed verbatim from Dr. Golis's work, in consequence of the peculiarity and great importance of its contents. The dissection will be found to throw much light on the symptoms. Dissection:—Besides the common appearances, the periosteum of the ear was inflamed, and this inflammation extended to the basis of the cranium into the periosteum of the petrous portion, and was diffused over and around the same. Between the membranes of the brain was found a very great quantity of thin puriform fluid, forming a purulent meningeal dropsy; and in the cavities of the brain, which was neither firm nor elastic, were found between four and five ounces of a clear watery looking fluid, tinged with blood."

28. "A. W., six years old, vaccinated, suffered a violent concussion of the brain, which was followed in a few days subsequently by an inclination to sleep, a dulness of the senses, moroseness, great swellings of the parotid glands, accompanied by a considerable pyrexia, attended by several nervous symptoms. After having shown evident signs of a disposition to subside, together with a disappearance of a discharge from the ear, the several stages of hydrocephalus followed each other rather irregularly, and terminated in the death of the little patient on the thirty-sixth day of the disease, reckoning from the commencement of the head affection.

Dissection:—The post mortem examination was performed under very inconvenient circumstances, and after all too imperfectly. The cranium was in its natural state, unchanged as to both its colour and size. Scarcely had the first teeth of the saw penetrated the bone, when there flowed out pus of an intolerable stench. When we had sawed away the upper part of the cranium, we observed that the pus was chiefly collected in the neighbourhood of the petrous portion of the right temporal bone, where also the dura mater, to the size of a small coin, was destroyed. After we had removed the dura mater, we could at no point discover the substance of the brain. All was enveloped in pus, which filled the smallest and deepest convolutions, and appeared to have destroyed the whole of the pia mater. In the neighbourhood of the temporal bone were found many ounces of this puriform offensive fluid, and a still greater quantity had sunk into the under part of the cranium. The

medullary substance of the brain was dissolved, and without elasticity. The origin of the several pairs of nerves was surrounded with pus. Lastly, there was found in the ventricles eight or ten ounces of pure water. But on the parietes of the same cavity there was only a small quantity of plastic lymph. The choroid plexus was pale, and nearly in a state of solution. The pituitary gland exhibited nearly a natural appearance."

29. M. S., three years and a-half old, healthy, well-nourished, and strong, after having passed through the measles and small-pox, sustained a violent agitation of the brain, by falling over a table. This accident became a cause of acute hydrocephalus, which was gradually converted into chronic hydrocephalus, and occasioned the death of its subject in the eleventh year of its miserable life. Both the pathological history and the dissection are given with extreme interest; but as not bearing necessarily on our present subject, it would scarcely be proper to occupy the reader's time with the details of them.

30. Under this head are given two cases of hydrocephalus induced by concussion of the brain. In the event of both cases, the patients got well under circumstances of very active treatment.

31. A child of four years old, healthy and lively, fell from a height of three feet, with his head against a hard board, and wounded himself on the nape of the neck with a piece of a china pot, which in his fall he threw upon the floor. He lost from the wound a considerable quantity of blood. The child, however, soon recovered; but his good temper and docility changed to a stubbornness bordering on viciousness. The lids of the right eye were always swollen; the eye itself appearing deeper in the head, and smaller than the left. His gait was without steadiness, and he was apt to stumble. The digestive functions and the general habits of the patient underwent no change. In the course of the winter months he was attacked with croup, for which the most appropriate medicines were administered by two excellent physicians. The symptoms of croup suddenly ceased, and those of turgescence of the head supervened; and soon after, those of inflammation of the brain. On the succeeding day the patient died, the subject of a water-stroke.

Dissection:—This post-mortem examination exhibited the traces of violent turgescence and inflammation of the contents of the cranium. Lymph was found in considerable quantity at the base of the skull, whilst there was but little on the corpus callosum, in the ventricles, and other parts, with no watery fluid in the cavities of the brain. Instead of this the right ventricle was seen to contain a quantity of extravasated blood, together with an organised oviform growth, of the size of a pigeon's egg, which weighed two ounces, and appeared to be indurated lymph covered over with blood. The latter had probably its origin from the fall, and was the cause of the child's change of character.

32. The following was an example of hydrocephalus, of which

the cause was a retrocession of premature desquamation of the eruption of scarlet fever. Inasmuch as it furnishes the reader with an example of considerable activity of treatment administered by Dr. Golis, which was rewarded by a successful issue, I feel it my duty to give it verbatim, and without reduction either of its interest or of its matter. Charles Gerold was attacked in the month of December with scarlet fever. The eruption was mixed with another rash of a miliary character. The progress of the disease was nevertheless mild, regular, and benign; so that on the seventh day from its commencement no fever remained. Not so happily did things go on after the wane of the scarlet fever. No desiccation took place; and on the third day after the termination of the eruption, the left parotid gland began to swell and to grow hard, and the face, hands, and feet to become œdematous; the appetite lessened with the urine; and stools could only be procured by glysters or purgatives. Diuretics were taken without effect. Weariness and inactivity increased every hour; and ten days after the scarlet fever was over, there appeared giddiness, confusion of mind, increased sensibility of the eyes, and increment of temperature of the head; nausea, vomiting of every thing which was taken, with aggravation of those symptoms after every movement of the body; bitter complaints of head-ache, sense of tension, and shooting pains in the nape of the neck; pains of the stomach, alternating with those of the head; striking changes of countenance; falling in of the abdomen; an unchanged œdema of the hands and feet; constant somnolence; light respiration, but often interrupted by deep sighs; a pulse somewhat slower than was natural to the patient's age; a slight irregularity of the pulse; the skin was dry with partial sweats on the nape of the neck; constipation with little urine; great sensibility of the retina and quickness of hearing were the prominent symptoms which indicated the acute hydrocephalus. My principal attention being determined to the anasarca of scarlatina, I did not immediately remark the hydrophrenitic turgescence of acute hydrocephalus; at length, however, some of the above symptoms made the fact too evident to be doubted, and such means were immediately used as are usually considered proper for this period. Half a grain of calomel was given every two hours until it produced several green motions, which were attended with colic pains. Emollient medicines, by spoonfuls, were often repeated. By means of leeches behind the ears, four ounces of blood were abstracted; blisters were applied, and the vesicated surfaces were kept in suppuration. The forehead was bathed with cold applications.

As these remedies were not quickly followed by amendment, the pulse did not change, and the distressing pains in the head did not yield; leeches were applied again to the same surfaces, and four ounces more of blood were abstracted. The swelled parotids were covered with a mercurial plaster; because the patient could not bear the use of mercurial frictions. Under this treatment the increased heat of the head ceased, its pains diminished, the

vomiting subsided, and the pulse became more febrile. In consequence of these appearances, I made a more favorable prognosis; and Dr. Peter Frank, whose advice was also taken, approved of my treatment and corroborated my prognosis. The blisters were kept suppurating, and the cold applications to the forehead were continued. To the calomel a quarter of a grain of digitalis in powder was added; the emollients were continued, and all the signs of the inflammatory stage disappeared, although the calomel was given cautiously and in small doses; namely from four to six powders a day, each containing half a grain. There appeared on the tenth day from the commencement of its use, an unwished-for effect on the throat and mouth; it was consequently omitted; but the danger of effusion was already past, and the patient was only suffering that debility which was a necessary consequence of the treatment pursued. The digitalis with cream of tartar was continued; and with the emollients a light infusion of valerian was exhibited, together with a few drops of succinated spirits of harts-horn and syrup of fennel. Under the use of these means, the œdema of the hands and feet, together with the swelling of the parotid vanished. Light bitters restored the appetite. The patient ultimately recovered his flesh; and his powers of mind sustained no diminution from this severe affection of the head.

33. This case furnished an example of the ordinary practice of Dr. Golis in acute hydrocephalus. Topical bleedings proportioned to the constitution of the patient were resorted to. Blisters were applied to the calves of the legs, and cold applications to the head. Mustard cataplasms were not forgotten. The case happily terminated in recovery. Half a grain of calomel for four days night and morning were exhibited to prevent a relapse. For eight days before going to sleep, a salt foot-bath was used and a suitable regimen was prescribed, which was strictly followed.

34. "G. B., three years and a quarter old, vaccinated, lively, full of talent, but in feeble health, was taken very unwell in the month of December on the second day after an error of diet and exposure to cold; and having three weeks previously sustained a slight agitation of the head, became morose, irritable, complained of languor, shooting pains in the head, tension in the nape of the neck, pains in the abdomen, inclination to vomit, want of appetite and of thirst. He had passed two days without an action of the bowels. The urine was scanty, the skin was dry, the countenance and complexion were remarkably changeable. The consideration of the previous causes and the presence of several gastric symptoms led the physician to use slight eccoprotics and to order weak lemonade for drink. Low diet and moderate warmth were likewise prescribed. An aperient medicine was exhibited, which had the effect of causing much slime to be evacuated with undigested food, which had an unwholesome smell. The little patient, however, did not find himself relieved. His sleep, during which he moaned, was disturbed and interrupted by frequent whining.

“The pains and heat of the head, the sensibility of the eyes, and the inclination to vomit were increased; to which was added giddiness, and momentary confusion on sitting up in bed. The previously febrile pulse became slower than natural, unequal and intermitting; the breath offensive and the respiration interrupted by sighs. The patient turned continually from one side to the other in bed, had no relief by stool; but vomited every thing which he took, whether medicine or food. Turbid urine with the characteristic sediment, and a gradual sinking of the abdomen, were added to the other symptoms. Every question irritated and received peevish answers. There remained no doubt that the above symptoms indicated the malady to be acute hydrocephalus. Leeches were applied behind the ears, and four ounces of blood were drawn. Half a grain of calomel was given every two hours and emollients were exhibited by spoonful. It deserves to be mentioned that after the blood letting, Spanish flies were applied, and the vesicated parts were kept suppurating till all the symptoms of inflammation had vanished. The case terminated happily.”

35. “Anne v. Kreutzer, five years old, after a slight inflammation of the throat, which for many days was followed by a diarrhœa, fell into this fearful disease of the head. Determining my principal attention to the symptoms of the throat affection, I was not sufficiently soon aware of the symptoms indicative of turgescence of the vessels of the head, when suddenly those of the inflammatory period showed themselves. Leeches, calomel, emollients and blisters were immediately employed, and with such good effect, that the symptoms of inflammation entirely vanished within three days.” This case also ended in recovery.

36. The following narrative is quoted in proof of the occasional existence of hydrophrenitis in the adult. “A. v. R., 35 years old, small and thin, married, became the subject for the first time at the beginning of the year 1806 of a spitting of blood, which was immediately after followed by inflammation of the lungs; after which there remained a chronic cough, which was gradually removed by suitable remedies. Scarcely had the patient considered himself in a way to a perfect cure, when in the month of March 1814, he experienced a new and far more violent attack of cough, attended by a bloody expectoration, without any known cause; and the fair hopes of finding himself happy and healthy in the circle of his relations, were disappointed. Greatly debilitated after these successive illnesses, he went out, in order to strengthen himself in the fresh air of May, and sat down to rest himself on the cold earth in a damp atmosphere and a cutting north wind. This attempt to recover his strength had the worst effects. A violent attack of fever, with intolerable pains of the head, and sense of burning of the eyes, impatience of light, tension in the nape of the neck, threw the poor fellow immediately after his return home on a sick bed. He and his physician consoled themselves with the assurance that it was only an attack of fever which he had suffered



for many springs, and which, added to a jaundice, might soon be expected to pass over. Yet, after the lapse of three days, the febrile pulse became slower than natural, and intermitting; the headache and vomiting became more severe, and these were attended with incoherent talk, and faintings on the slightest movement. In short, all the symptoms which indicate the stage of inflammation in acute hydrocephalus, appeared with so much distinctness, that a less practical physician could not easily have overlooked it. This state lasted about seven days; and on the third day from the accession of the last stage of the disease he died."

Dissection:—As the progress of this disease was the same as what it usually presents in children, so the dissection disclosed no peculiarity of appearance. The man had died of a pure and uncomplicated hydrocephalus; hence the vessels of the membranes of the brain were turgid with blood; and the ventricles were found charged with eight ounces of the usual transparent fluid. It was only at the basis of the cranium that a small quantity of coagulated lymph presented itself.

37. Herman K., three years old, born of healthy parents, vaccinated, full of life and spirits, was seized in the month of February during a prevalent catarrhal constitution of weather, with symptoms of catarrhal fever, which, by proper regimen and remedies, was entirely subdued within six days. During this gradual convalescence, the mother remarked a striking change in his former good temper, as well as in his whole external appearance. I saw the child for the first time on the third day after the physician of the family had pronounced him free from fever; and I was able to recognise the well-known indications of a far-gone inflammatory period. I immediately had recourse to the most efficacious remedies, and with so good an effect, that the pains in the head and the nape of the neck ceased. The vomiting subsided, and the pulse became regular and much more febrile. The bowels were relieved, and urine was evacuated in considerable quantity; the elevated sensibility of the sight and hearing vanished; the sighing was no longer heard; the little patient amused himself cheerfully in bed, with his playthings, and ate and drank with a good appetite. For three days had this boy found himself well, and during three nights he had slept gently. I was therefore willing to give the happy parents the best hopes; but my expectations, which under similar circumstances had been so often deceived, made me postpone this prognosis till the fourth day. It was fortunate that I had so determined; for in the night of the fourth day the patient suddenly became restless and lay sleepless. All the symptoms of effusion, although moderate, manifested themselves. The patient was easily roused out of his insensibility, reached tremblingly after the things which were held up to his notice, swallowed medicines, and took drink and broth readily, had an action of the bowels from a glyster, and passed his urine unconsciously. He at length lost his speech, but his pulse remained, as I had never before remarked

it in the third stage, namely, febrile, regular, and not intermitting. After four and twenty hours there appeared some slight symptoms of paralysis, during which the right side was especially affected. Deglutition was impeded. This stage continued for six and thirty hours, when the patient finally expired.

The opening of the body gave the same results as this disease always exhibits, only there was found on the surfaces of the brain very little coagulated lymph, which circumstance had probably depended on the great evacuation of blood, and the free use of blisters which had been resorted to; for by the latter the calves of the legs and the back were excoriated and kept in suppuration till the last stage of the disease.

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#### FURTHER EVIDENCE OF HYDROPHRENITIS BEING THE PROXIMATE CAUSE OF ACUTE HYDROCEPHALUS.

From the above abstract facts of numerous dissections supplied by Dr. Golis of Vienna, it will appear, I presume, pretty fully proved that the proximate cause of acute hydrocephalus is an inflammatory condition of the bloodvessels of the brain and its membranes, in consequence of which a morbid transudation of a transparent fluid, to be noticed hereafter, together with lymph, and sometimes with other fluids, takes place into the ventricles of the brain, and into whatever other spaces they can find their way into, within the encephalon, even as far as the theca spinalis inclusive. But unfortunately, this pathology has been more of a tacitly admitted principle, which, however, has not been unfrequently denied, than a doctrine of an operative living faith. As the principle of this theory is most important, by reason of its practical tendency, and as the medical practitioners of this country are not much in the habit of consulting foreign professional works even of great merit, I shall now proceed to put the reader in possession, in confirmation of the same theory of the proximate cause of hydrocephalus, of certain valuable dissections published in this country by Dr. Cheyne, a year or two before the date of Dr. Golis's work. Many of Dr. Cheyne's cases are given with much apparent minuteness and truth; and for the most part they are full of interest. But my principal object at present is to confine myself to a brief review of his post-mortem examinations. This work is entitled "Essays on Hydrocephalus Acutus, or Water in the Brain." Edit. 2, by J. Cheyne, M. D., F. R. S. E. The pathological histories are entirely omitted, the number of the case being given without reference to any numerical consecution, with the initials of the patient's name and age as follows. The dissection is given at length with a reference to the page of Dr. Cheyne's Essays where it is found recorded.

S. D. C. æt. 8. p. 112. Dissection p. 115. Along the membranes of the surface of the brain, and lining the ventricles, there was

rather more venous congestion than usual. There were about four ounces of fluid in the ventricles.

14. p. 129. Dissection, p. 130.—There occurred unusual difficulty in separating the skullcap from the dura mater. This arose from an indissoluble adhesion, at the upper part of the lambdoidal suture, of a portion of the membrane to the bone. The adhesion was circular, and about an inch in diameter. It was evidently the effect of inflammation, but probably not of a recent date. The dura mater did not, at any other part, exhibit any great mark of disease.

The longitudinal sinus was but scantily filled with blood. On lifting up the dura mater there appeared on the brain the most incontestible remains of arterial action. All over its surface the florid bloodvessels were very abundant; and in the spaces between them there were effusions of vermilion colored extravasation in pretty extensive masses. Under the tunica arachnoidea there was a considerable quantity of serous effusion; but lodged chiefly in the interstices between the convolutions. The veins were not empty, but they were not by any means turgid. The substance of the brain was of a natural degree of firmness; and on dividing it numerous red spots of blood studded the cut surfaces.

The ventricles were but little dilated, and contained a quantity of serous effusion not exceeding an ounce. The aperture of communication between the ventricles was somewhat enlarged. The plexus choroides was coloured deeply with arterial blood; and the velum interpositum was beset with small red blood-vessels in great abundance. It resembled the appearance of the surface of the brain when the dura mater is removed.

The substance of the fornix was perfectly firm. All around the base of the brain, the surface exhibited the same marks of inflammation which were observed on the upper part of it. Yet there was no such appearance on the surface of the cerebellum; on the contrary, there was not to be discerned a single red blood-vessel upon it.

17. p. 137. Dissection:—On the surface of the brain there was no increased vascularity nor effusion. It was remarkably dry; nor was the substance of the brain vascular nor moist. It was firm. The roof of the right ventricle, which was uniformly distended, was elevated considerably above its level. The left ventricle was less distended; but all the ventricles were full of fluid; they contained about three ounces. All around the ventricles the brain was pulpy, without firmness or consistence. There was a very considerable mass of coagulable lymph lying under the optic nerves, which at first looked like a collection of fatty matter. Some fluid escaped upon slitting up the tentorium.

#### DISSECTIONS COMMENCING AT PAGE 147.

1. Dissection of a boy of six years of age who died of hydrocephalus.—The disease had lasted just twenty-one days; there was

rather more pain in the head than usual; in other respects it was a case presenting a fair example of the disease. The boy before the attack had been apparently in good health. After briefly referring to the state of the abdomen and its contents, the reporter states that the dura mater was found to adhere to the tunica arachnoidea in several places. The veins of the pia mater were full of blood, but not turgid.

On cutting off part of the brain, we found it firm and tough. On the cut surface there were numerous spots of dark, apparently venous, blood. On cutting into the left lateral ventricle, a colourless fluid flowed out, and the ventricle appeared to be considerably dilated; the veins on the walls of the ventricle were filled with blood; the plexus choroides had no redness in its colour; the vena galeni was full of blood; the edges of the fornix were fringed, and the substance of it was peculiarly soft; the other ventricles were in a condition similar to that of the lateral ventricle. The ventricles contained in all about three ounces of blood.

2. p. 149. On removing the skullcap on the dura mater, there was observed nothing very remarkable on the surface of the brain. The veins on the pia mater were filled, but not distended; the substance of the brain was firmer than natural. On cutting a pretty thick layer of the superior part of the brain, the lateral ventricles appeared to be much dilated; a fluid by tapping with the fingers could be distinctly felt, and it pushed up the roof of the ventricles; on making a small opening with the point of the knife, water spouted to some distance; the foramen commune, under the fornix, was much enlarged; the substance of the fornix was very soft, being nearly of the consistence of thick cream; the plexus choroides was quite colourless, and there were upon it several little papulous eminences; all the ventricles were much distended; the veins on the walls of the ventricles were full but not turgid; the vessels on the base resembled those on the surface of the brain. The quantity of fluid collected from the brain during the dissection was five ounces.

3. p. 150. When the skullcap and dura mater were raised from the upper part of the brain, there appeared to be some effusion on the surface, and lodged in the angles between the convolutions of the cerebrum. On puncturing the membrane on which it lay, the effusion was found to be serous. On the pia mater towards the back part of the head, there were marks of inflammation. On cutting away part of the brain, the surface presented was moist. The substance was of a moderate degree of firmness. On puncturing the lateral ventricle of one side, a quantity of watery fluid, about three ounces, flowed out. The ventricle was enlarged; and the veins on its sides were conspicuous. The plexus choroides had upon it vesicles filled with serum. When the fornix was raised, there appeared in the middle of the velum interpositum a vesicle of the size of a large pea containing serous fluid. The substance of the fornix was quite soft. The aperture between the ventricles

was enlarged; and both ventricles, which were emptied by the puncture into the one which was first opened, appeared to have been equally distended. The third ventricle was enlarged and contained fluid. In examining the base of the brain, the tunica arachnoides round the infundibulum was distended with a fluid of a light green or yellow colour. On puncturing it, a good deal of serous fluid escaped. Besides the fluid, there was on the pia mater at this place a considerable deposition, apparently of coagulable lymph, which lay in distinct clots. The fourth ventricle was enlarged and contained fluid. The quantity of fluid collected during the dissection was five ounces.

4. p. 152. On raising the skullcap there appeared to be on the dura mater an increased number of small red bloodvessels. The longitudinal sinuses and veins in the pia mater were filled with blood. There was a considerable quantity of serous effusion over the whole surface of the brain, and marks of increased action in the small arteries, with here and there spots of extravasated blood. Towards the back part and right side of the brain, there was a considerable secretion of coagulable lymph. The substance of the brain was firm. The left lateral ventricle was distended, and on opening it, a limpid and colourless fluid to the quantity of three or four ounces escaped. The ventricle was considerably enlarged. The right lateral ventricle corresponded in appearance with the left: the foramen under the fore part of the fornix was much enlarged; allowing the fluid which had been in the right ventricle at once to escape by the opening made in the left. The plexus choroïdes was free from blood and colourless. The substance and continuations of the fornix were very white and soft. The third and fourth ventricles were enlarged and contained a fair proportion of fluid. On the cerebellum, under the tentorium there was a deposition of coagulated lymph, but not of great extent. On the base of the brain was an effusion of serous fluid, and, at particular parts, of a thicker opaque lymph similar to what was observed on the upper part.

5. p. 153. The dissection was made about fourteen hours after death by Mr. Hewson, one of the surgeons of the Meath Hospital. The dura mater was healthy. Coagulable lymph in considerable quantity was interposed between the tunica arachnoides and pia mater; and it was also found on the base of the brain, and particularly about the optic nerves. On the sides of the middle lobe of the left hemisphere, two vesicles like hydatids were observed. The ventricles contained nearly six ounces of blood.

6. p. 154. The scalp was bloodless. The veins of the pia mater were turgid with blood, and the membranes slightly opaque. There was an effusion between the tunica arachnoides and the pia mater; and there were minute arteries of the surface of the brain florid and injected.

7. p. 155. The skull was very thin. The dura mater was unusually vascular, and the pia mater dry and vascular. There

was an effusion under the tunica arachnoides like whey. The substance of the brain was remarkably firm. The pia mater, which passed in between the convolutions of the internal surface of the left hemisphere, was of a bright redness; and there were many white bodies upon it, not unlike glands of the smallest size. The ventricles were uniformly enlarged and contained about four ounces of fluid. The plexus choroides was pale, as well as every part of the ventricles. The part of the brain which forms the ventricles was soft.

8. p. 157. Dissection performed twenty-three hours after death. There was a considerable effusion of turbid fluid between the tunica arachnoides and pia mater; with adhesion between the hemispheres of the brain, increased vascularity of the whole of the medullary substance of the cerebrum, rather more fluid than natural in the lateral ventricles: but with regard to this point there was some difference of opinion. There was fluid in the theca vertebrarum.

Appendix, Case 1., p. 160. Dissection:—On raising the dura mater, we were struck with the appearance of the parts presenting. On a superficial view, there appeared to be on the brain a quantity of a green coagulum like jelly in a layer of considerable thickness, in which the veins of the pia mater lay imbedded. These seemed to be coated with a white opaque deposit. What at first appeared like jelly, proved upon examination to be serous exudation between the tunica arachnoides and pia mater: it was in far greater quantity on the upper part of the brain than elsewhere; and it seemed pretty equally distributed on each hemisphere: it might be compared to a large flat vesication, the margin of which arose from the horizontal line which divides the upper and middle third of the circumference of the brain. Although beyond this part, the appearance of vesication did not extend; yet the veins on the pia mater all around the external part of the brain were nearly coated with what appeared to be coagulable lymph; at some places flakes of it lay in distinct portions. Hence the pia mater seemed as if converted into a thick membrane; in fact it was thickened, as became apparent on examining that part of it where the exudation on the surface did not exist: and here we found small red vessels and streaks of blood, such as appear on an inflamed membrane. The sinuses in the dura mater, and the veins in the pia mater were filled with blood. The substance of the brain was very soft. On cutting it, fluid transuded so as to moisten the cut surface. There was but little fluid in the ventricles, not exceeding half an ounce. The plexus choroides was nearly colourless, as if bleached. The substance of the fornix, as well as of the other parts of the brain, was very soft. There was little or no fluid in the fourth ventricles. The quantity of fluid collected exceeded three ounces and a half, of which three ounces were collected from the surface of the brain.

Appendix, 2, p. 163. Dissection twelve hours after death:—A thick layer of coagulated puriform matter of a pale green colour

between the tunica arachnoides and pia mater, particularly on the anterior and middle lobes of the cerebrum. The hemispheres were agglutinated together for about two thirds of their extent, down even to the corpus callosum. The medullary substance of the brain was more than usually vascular. The ventricles were distended, and contained two ounces of fluid. The choroid plexus was bloodless, and the foramen commune anterius was enlarged. The iter ad tertium ventriculum was capable of receiving a large goosequill. The third ventricle was distended and full of water. There was a considerable effusion of coagulable lymph between the laminæ of the velum interpositum. The pineal gland was softened in its structure, and surrounded with an effusion of puriform matter. The fourth ventricle was greatly enlarged and distended with fluid. The pia mater investing the cerebellum was sound. There was a great quantity of fluid in the theca vertebrarum, and some purulent matter on the sella turcica and pituitary gland.

Appendix C. 3., p. 167. Dissection by Mr. Crampton. Profuse flow of blood on dividing the scalp. Very firm connection between the dura mater and the bone. The veins on the surface of the brain turgid. A considerable quantity of fluid between the tunica arachnoides and pia mater. The tunica arachnoides thickened. Upon puncturing the tunica arachnoides, several drams of fluid escaping, showed that the gelatinous appearance of the surface of the brain was chiefly owing to serum under that membrane. The appearance of the substance of the brain was natural; there was about an ounce of fluid in the ventricles. The velum interpositum was turgid with blood.

I shall here close the evidence in proof of the inflammatory nature of acute hydrocephalus. The numerous forms of inflammatory results exhibited in the foregoing dissections will, I apprehend, be accepted by all candid and practical men as finally decisive of the truth of the first proposition propounded in this little work; namely, that acute hydrocephalus is an inflammatory disease. The second proposition has for its object to prove that acute hydrocephalus is curable, equally, and by the same means, with other diseases of inflammation. It is the truth of this proposition that we have now to proceed to demonstrate.

#### OF THE TREATMENT OF ACUTE HYDROCEPHALUS.

The greater number of acute diseases are inflammations; and the greater number of inflammations are curable by the abstraction of blood, either locally or generally; the quantities being proportioned to the period and violence of the disease. I am not aware that any disease of active inflammation, of whatever tissue, which might not require, or which at all events might not be benefited by the abstraction of blood, provided such a measure be opportunely resorted to. Entertaining no doubt of the highly inflammatory character

of acute hydrocephalus, I feel it my duty to place this great measure, the abstraction of an adequate quantity of blood from the tissues morbidly inflamed or congested, at the head of my system of treatment.

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ABSTRACTION OF BLOOD THE FIRST MEASURE TO BE ADOPTED  
IN THE TREATMENT OF ACUTE HYDROCEPHALUS.

Acute hydrocephalus really means a recent disease, having inflammatory action as a part of its character; and not indeed as a part only, but as constituting the very essence of its character. I may observe that the name of the malady which I have taken up for practical elucidation expresses only the result of the disease itself, the mere effusion of a watery fluid into the head. This name was furnished during the prevalence of the old theory; which taught that the fluid found in hydrocephalic heads was a simple effect of filtration, by reason of great debility and relaxation of the parts interested; without taking into the account any morbid action of inflamed or over-congested vascular tissues, which might be supposed to operate as the proximate cause of the malady. To express the simple fact of an effusion, thus accounted for, of a watery fluid into the head, the name of hydrocephalus was sufficiently well adapted and appropriate: but to furnish an adequate expression, both of the result and of the proximate nature of the disease, the compound hydrophrenitis would furnish a much happier, as well as a more correct designation of it.

This name, had it occurred to one of our earlier nosological nomenclators, might have led many a thinking medical practitioner to much more active practice than has been usually resorted to in the treatment of acute hydrocephalus.

But precisely correct names are not likely to be applied to objects of mind, before the things which they are intended to represent are distinctly understood. How did it happen that Dr. Charles Quin's mind *did not in a moment* see the proper application of his father's original conception, that acute hydrocephalus was a disease of inflammation? There can be no doubt that his mind must have been preoccupied by some previous, perhaps by long established, notions of practice, unfriendly to a full and unbounded adoption of the new theory. But previous notions unfounded on principles, or founded on false or unknown principles, should be considered only as so many prejudices. The prejudices which resulted from what he knew before, or from what he fancied he knew, exerted so powerful an influence over his habits of practice, that the legitimate and counter influence of his father's doctrine was all but suppressed in his application of it to the treatment of acute hydrocephalus.

I have already hinted that the new doctrine was suggested at a period most unfavourable to its universal adoption and rapid propagation. But independent of the prevalence of Brunonianism, it was moreover a strong prejudice of the time in question that young



people, and especially children, could not be considered proper subjects of active general bleeding; nor even of topical bleeding on any scale of adequate efficiency. I may advert to this notion as a prejudice of no inconsiderable magnitude in the present day: and in reference especially to the treatment of acute hydrocephalus, it has exerted a baneful influence on the convictions and practical habits of the physicians of this country during the greater part of my professional life.

It would startle my reader were I to make the statement that the theory of bleeding in acute diseases, and especially in the acute diseases of children, is very imperfectly known, even at the present day, among the physicians of this country. Such a proposition, however, it will become my duty in the sequel to prove, although it may seem ungracious even to announce it.

It accords with our universal experience that whenever it becomes our duty to recommend the abstraction of blood from infants or very young children in a way to ensure the efficiency of the operation, the proposition is sure to be received with coolness in the first instance, if not eventually with repulsion or positive non-compliance.

Hence no doubt the fact that even the idea of an ample abstraction of blood as a remedy for acute hydrocephalus was only doubtfully and feebly entertained by Dr. Charles Quin himself; however distinctly he thought it his duty to announce it in his new theory of the disease as published in 1779: hence the innumerable cases which we find recorded of acute hydrocephalus in the writings of the Fothergills, the Watsons, the Percivals, the Haygarths, and the Witherings of the last century, in the management of which not a word is said about bleeding excepting by means of leeches applied to the temples or some other part: hence, in the present century, the opinions of Dr. Carmichael Smyth and his contemporaries, in strong objection to the same practice; and hence, finally, the large amount of loss of life which has been sustained by the population of this country, including Scotland and Ireland, for want of correct professional knowledge of the treatment to be adopted for the cure of acute hydrocephalus from the period of Dr. Carmichael Smyth to the present time.

The only contemporary of Dr. Charles Quin who thoroughly understood his father's doctrine, for I am more pleased to call it his father's doctrine than his own, was Dr. Rush of Philadelphia.

If we peruse a few passages of that gentleman's paper on the subject of this essay, which he published intermediately between the dates of Dr. Charles Quin's publications, we shall see that he did understand it; and that he really was not a dilettanti, milk and water physician, as it was then too much the fashion and too much the practice of English physicians to aim at.

We are informed by Dr. Rush himself that his mind was much predisposed to entertain the new theory of the Quins before its publication actually reached him. "Having for many years," he

observes, "been unsuccessful in all the cases of internal dropsy of the brain which came under my care, I began to entertain doubts of the common theory of this disorder, and to suspect that, instead of being considered as an idiopathic dropsy, the effusion of water should be considered only as an effect of a primary inflammation, or congestion of blood in the brain. I mentioned this opinion to my colleague, Dr. Wistar, in the month of June 1788, and taught it in the winter following in my lectures. The year after I was confirmed in it by hearing that the same idea had occurred to Dr. Quin. I have since read Dr. Quin's 'Treatise on Dropsy of the Brain with great pleasure, and consider it as the first dawn of light which has been shed on the theory of this disorder. In pursuing this subject, therefore, I shall avail myself of Dr. Quin's discovery; and endeavour to arrange the facts and observations I have collected in such a manner as to form a connected theory of them, which I hope will lead to a new and more successful mode of treating this disease."

The following are abstracts of cases in which Dr. Rush prescribed bleeding in acute hydrocephalus. "The first case was that of a young lady of four years of age. I found upon enquiry that she had received a hurt on her head by a fall. I advised the loss of five ounces of blood, which gave her some relief. The blood was sizzly. The next day she took a dose of calomel and jalap, which operated twelve times. On the eighteenth day she lost four ounces more of blood, which was more sizzly than that drawn on the fifteenth. From this time she mended rapidly. Recovery."

2. "On the twenty-fourth of the same month, I was called to visit J. C., aged four years, who had been hurt about a month before by a wound on his forehead by a brickbat, the mark of which still appeared. He had been ill for nearly two weeks with coma, headache, colic, vomiting, and frequent startings in his sleep. The symptoms plainly indicated an internal dropsy of the brain. I ordered him to lose four or five ounces of blood. Three ounces were only drawn. On the twenty-fifth he lost five ounces of blood again. On the twenty-seventh the vomiting was troublesome, and his pulse was still full and tense, but irregular, and I ordered him to lose four ounces of blood. On the fourth of December he was ordered to lose five ounces of blood, and on the twenty-ninth six ounces of blood. Perfect recovery."

"Cases 3 and 4 were attended in March 1792. The patients were two young ladies, each of three years of age. They were each bled to four ounces, and they both recovered."

5. "In the months of July and August 1792, I attended a female slave of a lady from one of the West-India islands, who had an obstinate headache, coma, vomiting, and a tense, full, and slow pulse. I believed it to be a case of internal dropsy of the brain in its inflammatory stage. I bled her five times in the course of two months, and each time with obvious relief of all the symptoms of the disorder. Finding that her headache and a disposition to vomit

continued after the tension of her pulse was nearly reduced, I gave her as much calomel as excited a gentle salivation, which in a few weeks completed her cure."

"6. The daughter of R. M., aged eight years, in consequence of the suppression of an habitual discharge from sores on her head, in the month of April 1793, was affected by violent headache, puking, great pain and weakness of her limbs, and a full, tense, and slow pulse. I believed these symptoms to have been produced by an inflammation of the brain. I ordered her to lose six or seven ounces of blood, and gave her two purges of jalap and calomel, which operated very plentifully. I afterwards applied a blister to her neck. In one week from the time of my first visit to her she appeared to be in perfect health.

"7. A young woman of eighteen years of age, a hired servant in the family of Mrs. E. S., had been subject to a headache every spring for several years. The unusually warm days which occurred in the beginning of April 1793, produced a return of this periodical pain. On the eighth of the month it was so severe as to confine her to her bed. I was called to visit her on the ninth. I found her comatose, and when awake delirious. Her pupil was unusually dilated, and insensible to the light. She was constantly sick at her stomach, and vomited frequently. Her bowels were obstinately costive, and her pulse was full; tense, and so slow as seldom to exceed from fifty-six to sixty strokes in a minute for several days together. I ordered her to lose ten ounces of blood every day for three days successively, and gave her on each of those days strong doses of jalap and aloes. The last blood which was drawn from her was sisy. The purges procured from three to ten discharges every day from her bowels. On the twelfth she appeared to be much better. Her pulse was less tense, and beat eighty strokes in a minute. On the 14th she had a fainting fit. On the 15th she sat up and called for food. The pupils of her eyes now recovered their sensibility to light as well as their natural size. Her headache left her; and on the 17th she appeared to be in good health. I am the more disposed to pronounce the cases which have been above described to have been internal dropsy of the brain, from my not having been deceived in a single case in which I have examined the brains of patients whom I have suspected to have died of it."

"I believe, with Dr. Quin, that this disorder is much more frequent than is commonly supposed. I can recollect many cases of anomalous fever and headache in children which have excited the most distressing apprehensions of an approaching internal dropsy of the brain; but which have yielded in a few days to bleeding or to purges and blisters."

On perusal of the above cases we see the facts demonstrated that Dr. Rush, as far as concerned himself, was a founder of the new theory of acute hydrocephalus; that he had taught it to his pupils before he had heard of its publication by Dr. Charles Quin; and

that, very differently from that gentleman, he had himself vigorously practised what he taught. From what he has written on this subject as well as on many other pyrexial diseases, it is quite obvious to inference that he had arrived at a clear conception of the spirit and essence of his newly-adopted theory. For in every case of the supposed malady, he directs repeated general bleedings as his first great measure of treatment. We have, indeed, no evidence that he ever arrived at a complete mastery over the power which he wielded; and we have, moreover, several proofs afforded us in the above details that ever and anon he wielded it undexterously, if not unfortunately, for the interests of his patients. He himself acknowledges, and he could well afford to make the acknowledgment, (see the volume already quoted, p. 224,) that he had failed in five cases in which he had used the remedy of blood-letting in the inflammatory stage of acute hydrocephalus. But let it be considered that, at the period when he both wrote and taught, he was but a youthful citizen of young America, too remote in his position to derive much advantage from the sanctions and influences of the long-established medical institutions of Europe.

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#### ON THE THEORY OF BLOOD-LETTING AS A REMEDY IN ACUTE DISEASES.

The theory of blood-letting in acute diseases is indeed a doctrine of no trifling extent and variety of application. In the application of the practice of this great measure to the subject before us, I have now to consider the time most proper for the abstraction of blood as a remedy for acute hydrocephalus; the quantity or quantities of blood to be abstracted; and the methods or instruments by which we have to ensure the attainment of that object.

My first purpose is to indicate the time when a subject of acute hydrocephalus ought to have the unduly excited and congested blood-vessels of his head relieved by a direct abstraction of blood from the circulating mass.

That time, in my opinion, should be the first possible opportunity that could be made available under the particular circumstances of the case subsequently to the final and confident decision of the medical attendant or attendants as to the nature of the disease. It is well known that the inflammatory stage of acute hydrocephalus is frequently anticipated for some days; and in many cases preceded by a long train of premonitory or predisponent symptoms.

It might be asked whether it would be proper or not to have recourse to so formidable an operation as the abstraction of blood must be considered, as a measure chiefly of a prophylactic nature, and before the fullest establishment of the malady. I would answer, that during the pyrexia attendant upon the accession of an active fever, although its peculiar character might not be yet established, it could never be improper, but on the other hand a positive

advantage, to have recourse to an abstraction of blood, upon a competent scale, to effect a subduction of the pyrexial actions of the arterial system. There is usually attendant upon cases of strong predisponency to this disease an assemblage of symptoms which will be readily recognised by an experienced physician, and which, when presented to the calm consideration of parents and other attendants, ought to excite the alarm of all parties interested in the results of such cases. All that could be required to justify the decision of advising the abstraction of blood under the supposed circumstances, would be a state of pyrexia as already assumed; and whether it might prove in the further progress of its development a case of small-pox, measles, acute hydrocephalus, or of any other fever whatever, the operation of a timely abstraction of blood would be a measure of unquestionable advantage in the calculation of its proving a disease of any pyrexial importance.

In the event of the case being one truly, and without doubt, of genuine hydrocephalic fever, it would be impossible to avail oneself of too early an opportunity to lay it prostrate before the most active powers of the healing art. Of these powers, I have already stated that free and early bleeding should be considered incomparably of the first importance. The case might very probably require this great measure to be followed up by other items of treatment of indispensable importance; but bleeding, on a proper scale, would, at all events, prove, if not the *one thing, most certainly the first thing needful*. On the accession of any pyrexial ailment in a family, there would probably present themselves to the attention of some of the individual members of it certain circumstances not a little calculated to occasion some anxiety, or possibly some good grounds for alarm.

It should be made a matter of universal information among parents, that acute hydrocephalus is a disease of no unfrequent occurrence; and that the earlier it came within the cognisance of the medical attendant, provided he might be competent to discover its diagnosis and to superintend its treatment, the greater the probability or certainty, other things being equal, of the patient's recovery. The indications of the period of formation of the disease, which for practical purposes I have called the stage of turgescence, have been already partially detailed. In order to place parents in a just position relatively to the alarming character of the malady, even during its incipient stages, I shall again, under other forms of practical advertence to the same circumstances, remind them of their paramount duty to be accessible to all sorts of information which might lead to an early discovery of the fact and diagnosis of a disease so formidable, and unhappily so fatal, as acute hydrocephalus. The question here is not, whether the operation of blood-letting, in some form or other, is or is not to be had recourse to as a measure of treatment. I can well suppose cases in which it might prove of no use, and in the management of which it might not answer the end

of a useful policy in the physician to propose blood-letting. I may probably advert to cases of that kind in a future page.

My present object is especially to call the attention of my reader to the quantity of blood to be abstracted in the event of such a measure being determined upon. I know of but one useful, safe, and satisfactory test; and that I beg to propose to the consideration of my reader, as the result of an anxious, cautious, and most extensive experience, during a period at least of about ten years. It is to carry the first bleeding, provided the opportunity is given to prescribe it at the onset of the disease, to full fainting. It is not a state of faintishness that is wanted: it is full and decided fainting. It is that state of enfeebled and reduced circulation, which, together with an occasional suspension of consciousness is called *deliquium animi*. It is accompanied by an absence of all colour in the lips, and also in a great measure by a corresponding change of complexion of the whole countenance. The entire surface of the body, and especially of the forehead is suffused, during this condition of the circulation, with an excessive abundance of cold moisture.

Such, I believe, in every case is the condition of the circulation during general fainting; and it is the attainment of that point of reduction of arterial excitement, at least for a time, that I would recommend the abstraction of blood to be carried at the commencement of acute hydrocephalus.

The first general bleeding having been carried to the extent here supposed, it will rarely happen than any further considerable depletion of the same kind will be required; inasmuch as one good bleeding adopted at the very commencement of an acute disease, will almost always ensure the attainment of what can be fairly hoped for from so decided a measure; at least it will ensure a positive suspension of the progressiveness of the malady; and it will also in a great proportion of cases be followed up by the accession of a train of improved conditions, which we shall have no difficulty in recognising as those of a most promising convalescence. I beg to observe that one good bleeding carried to fainting is a much safer practice, as well as more economical of the patient's strength to bear this form of depletion, than several successive smaller bleedings at intervals of days, or even of many hours' duration. The reader will perceive that I here refer to certain results of bleedings which can only with propriety apply to what we usually call general bleeding. To produce the best effects of general bleeding it requires that the blood to be obtained should be abstracted in a short time, and in a full stream. This remark leads necessarily to a consideration of the patient's age and other circumstances.

At five years of age and upwards, fainting may be easily induced by dexterous management of the operation of ordinary venesection, by the usual incision of the median vein. At an earlier age it would be more convenient, with a view of securing all the benefits of the operation, to obtain the required quantity of blood, by cupping, from behind the ears.

The great advantage of this method of abstracting blood from the circulation of young children is, that it enables us to obtain the quantity required very gradually; and that the small oozing stream can be stopped in a moment at the pleasure of the medical attendant; without exposing the bleeding surface, as sometimes happens when leeches are employed, especially under circumstances of undexterous management, to an excessive loss of blood. It moreover ensures the abstraction of as much blood as may be wanted in a short time, which it must be obvious is an object of extreme importance to the successful treatment of a disease so rapid in its first advances, and often so obstinately determined in its progress, as are many cases of acute hydrocephalus.

It is moreover a superiority of cupping over leeches of incalculable advantage, that we can measure by that method the quantity of blood required to be obtained even to the weight of half an ounce or less.

In determining the quantity of blood to be abstracted in a given case, we must of course be governed by the age, constitutional strength, and previous state of health of the patient. The quantity to be taken from a child of one year old will amount to four or five ounces. If the operation be not performed till the second day of the stupor, and if the heat of the head be already considerably raised above the natural temperature of health, the required quantity will possibly exceed the measure here stated by, perhaps, half an ounce or an ounce. A little patient in my private practice was seized about a year ago with violent inflammation and intumescence of the side of the face and neck. He was a month old; but not more. This infant was living exclusively on the mother's breast, and was a thriving child for its age. I directed it to be cupped behind the ear of the affected side to three ounces and a half. It was convenient to me to be present when the cupper was expected to arrive; and the quantity drawn amounted to full four ounces; when the little patient fainted. The inflammation was speedily subdued; and the child's strength was not perceptibly injured by the operation. I mention this case, not because it was suspected to have been one of acute hydrocephalus; but simply to prove the very considerable quantity of blood, which, in cases indicating such an operation, may be safely abstracted from very young children.

From this early age forward to one year old, the quantity of blood to be abstracted should be from three to five ounces, according to the age and vigour of the child, according to the amount of heat of its head, and the degree of phlogosis already present. In cases of two years old, with an oppressed circulation of the head from teething, or from any other febrile cause, my quantity is seldom less than six ounces, and never less than five and a half.

In cases of between three and five years old, I usually prescribe the abstraction of between five and ten ounces of blood. At these ages, the best rule is to order bleeding to full fainting.

I never mean simply the disposition to faint, which the word

faintishness, or the expression of being faint, sufficiently well expresses, when I use the term fainting. That would leave too much to the misconstruction of the cupper, or of the little patient's friends.

Children between six and ten years old will require an abstraction of blood to an amount seldom less than from ten to eighteen ounces of blood, according to their sexes, habits, states of the constitution, amount and character of the existing fever, and other circumstances of presumed ability to sustain and to require the operation. Something of course must be left to the discretion of an experienced and competent physician.

Great boys seldom become the subjects of acute hydrocephalus, and young ladies much more frequently than adolescents of the other sex.

For all ages of advanced childhood and girlhood, venesection ad deliquium animi, will invariably furnish a safe rule, provided it be carried fairly and honestly to the full extent of the proper meaning of the expression.

A circumstance of great importance already lightly adverted to will require the practitioner's most attentive consideration. It is the stage and state of development of the disease at the time. If we suppose the malady to be so far developed as to have already produced much increment of heat of the head: such a case, other things being equal, would require the abstraction of a larger quantity of blood than might be necessary during the first attack, the first chill or cold stage of the accompanying fever. In a small proportion of cases, and especially in such as may have been neglected in the first instance, or for the relief of which the quantity of blood taken by the first operation may have been insufficient to produce the required results, it may become necessary to repeat the cupping once again.

The first cupping, however, in every case, ought to be made on a sufficient scale to obviate the necessity, at all events, of more than once repeating the operation. One good bleeding, it should be remembered, produces a much better effect as to its competency to reduce arterial action than two or three inconsiderable operations of the same kind. By an ample bleeding I do not mean an unnecessarily profuse shedding of blood; but a fairly sufficient bleeding. An actually sufficient bleeding, it should be observed, might prove a measure of actual economy in the decision of this important point of practice. Repeated venesections, or of bleedings of any other description, on successive days, is a practice now pretty well exploded in this country, and, in fact, it should never have been a practice at all in any country. It would be a hardship upon an infant of a year old, for example, to have to lose three ounces of blood by cupping, and again, in consequence of want of sufficient knowledge, or else of decision on the part of its medical attendant, or possibly by reason of indexterity of the cupper, to have to lose three or four ounces more on another day; whereas four or five ounces taken at



once, and in the first instance, might have abundantly sufficed to subdue, and finally to cure the malady.

I beg therefore to repeat that one sufficient bleeding at the commencement of an active inflammatory malady is an incomparably safer practice, than repetitions of smaller bleedings at successive and distant intervals. Unless, indeed, delayed too long, the former method is always a comparatively safe practice; whereas the latter, from many and various causes, is chargeable with much uncertainty as to its final results.

I have already more than once recommended the abstraction of blood as the first measure which I consider indicated in the treatment of acute hydrocephalus: but even this great measure—this supreme power of our art in the treatment of the malady in question, may not suffice to give us full assurance of success: for we have the experience of every day to convince us, and perhaps more frequently than in the case of any other remedy whatever, that it is resorted to too late; and if too late by a single hour, even that hour, being of the nature of time itself, may not admit of being recalled.

I have hitherto directed my principal attention to one mode of abstraction of blood; that by cupping. This method of taking blood from young children is so satisfactory, for many reasons, that I much regret that the practice of cupping is not more general in every province of Great Britain and Ireland than it really is in many of our larger cities and towns.

It would not a little surprise my readers were I to state the number of actually good cuppers, in the midst of scores if not of hundreds of pretenders, resident in this great metropolis. The number, at all events, is much smaller than is generally supposed; whereas there are many very considerable towns in the country which cannot boast of the residence of even one professed cupper. The duty is not unfrequently undertaken by general practitioners: but it is seldom well performed excepting by persons who exclusively devote themselves to that business by profession. The operation here recommended presumes upon its performance being in many cases, at all events, attainable in London.

For the country I would recommend the union and good feeling of all classes of medical men in a district, to accept and to act upon some such suggestion as the following. It is, that they would endeavour to select an individual of their own body, and give him their united sanction and encouragement to become a cupper for himself and all the rest of his brethren who might be disposed to promote his interest, residing within the extent of a population which might be considered a sufficient number of inhabitants to keep a professed cupper in tolerably good employment. In a town of fifteen or twenty thousand inhabitants as a minimum, with the good feeling of the profession in his favour, (but, alas, that is the great difficulty,) I fancy there might be furnished a moderate sufficiency of business for one dexterous cupper.

I profess not to be precise in my suggested proportions, nor rigid in my expectation of universal compliance with the principle of the suggestion itself. All calculations of this description in a great country like England must be indefinite and dependent upon endless diversities of condition and circumstances of the inhabitants of the different districts of the kingdom.

I should not be a little gratified to hear of a skilful cupper being appointed for every population of forty or even of fifty thousand inhabitants. But I must leave this suggestion with the leading members of my profession : I feel I have no right to urge it on their consideration beyond its fair claims to their attention, on the ground of its reasonableness and promise of great professional utility.

But I may be asked, in the event of my proposed arrangement for the location of professed cuppers in our principal provincial cities and towns not being eagerly embraced, and tolerably generally adopted; I may be asked what other method I might be disposed to recommend, as the best substitute for cupping in cases requiring abstraction of blood from children under four or five years of age? The question is very easily answered, provided the individual entrusted with the professional management of such a case possessed the required knowledge and adroitness to undertake the duty to be recommended, which is that of bleeding by incision of the jugular vein.

In general practice I have found the younger part of our profession somewhat indisposed to perform this very simple operation. This indisposition has no doubt arisen from not having been taught to practise it under the eye and with the assistance of their senior and superior, during their apprenticeship. Some years ago when I practised more extensively among the poor than I do at present, I was not entirely unaccustomed to perform this operation myself.

On other occasions, and since the period in question, when I have met with a little aversion from the duty, in the case, for example, of a young professional friend who had never before opened the jugular, I have from time to time felt it my duty to offer to relieve him of its anticipated responsibility. The precautions which require to be attended to in the due performance of the operation of taking blood from the jugular, are to have the child's neck well secured in a position easily accessible to the point of the lancet; to use a narrow pointed lancet which shall not necessarily make a larger wound in the integument than shall be convenient; and to be quick to know how, and to be provided with the means of instantly stopping the bleeding current upon having received into the tea-cup, or other proper vessel, the prescribed quantity of blood.

It is seldom that the temporal artery of an infant will bleed practically well enough for the purpose here required, although it might be sufficiently well incised. I therefore do not feel myself at liberty to recommend the attempt of obtaining blood by this method from infants of a tender age.

From the objections which, I fear, will always, at least for many years, be felt against opening the jugular vein as a measure of general practice; I find myself under the necessity of once more urging the proposition already submitted to the reader in favour of cupping.

In the present state of great inefficiency of that art, I know of no better method of obtaining blood from the general circulation of very young children than the very unsatisfactory one of having recourse to the application of leeches. The principal objection to the employment of leeches in the cases here supposed, is their practical inadequacy to ensure the abstraction of a sufficient quantity of blood in a moderately short time. Unless that is done, the object of permanently subduing arterial action is not easily, nor always really effected by means of leeches. The action of these operators is so uncertain, and dependent upon circumstances not easily controlled, that it is not always easy to give very precise instructions as to the number of leeches which should be prescribed in a given case. This, in my opinion, is the weak part of Dr. Golis's work. He appears to have an entire comprehension of the principle which ought to guide his practice in the medical management of acute hydrocephalus; for in the treatment of one of his own cases he speaks of the expediency of an *overwhelming* abstraction of blood.

But for want of the practice of taking blood freely, and in ample quantity, by cupping—an opportunity which I apprehend does not exist on the same scale of convenience and effectiveness at Vienna as it does in London—Golis has not been able, as it appears to me, to carry the principles of his theory into full effect in practice: otherwise I do not immediately see how he could have obtained the materials for charging his volume with so many fatal cases. It may perhaps be offered in explanation, that his treatise may contain the reports of that learned physician's practice for a long series of years; and that the number of fatal cases reported in his book, although considerable, may furnish no unreasonable proportion yearly for a long period of time.

The institute for sick children, if I mistake not, was opened at Vienna, in the year 1792, and Dr. Golis was appointed the first, or one of its first physicians. The explanation here suggested therefore has much force of probability in its favour; and I am quite willing to give it its fullest value.

I am nevertheless of opinion that many of the younger children's cases which we find reported in Dr. Golis's volume, might have ended more fortunately had the abstraction of blood by cupping been resorted to, instead of the very tedious and uncertain method of obtaining it by leeches. For this reason, I cannot help concluding and lamenting that this constitutes the most defective part of a work for which, by reason of its numerous excellences, I entertain the greatest respect. It is however much to be regretted that Dr. Golis has not dated his very important pathological

histories, which might have enabled his readers to arrive at least at some probably correct opinion of the success of his practice.

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#### OF THE USE OF EMETICS IN THE TREATMENT OF ACUTE HYDROCEPHALUS.

Having secured as much control over the morbid arterial excitement of an incipient case of acute hydrocephalus as one sufficient abstraction of blood can be expected to give, the first important measure to be adopted immediately afterwards, with the view of maintaining, or even of extending our control over the actions of the heart and arteries, should be to exhibit to the little patient, as soon as possible after his recovery from the fainting consequent upon the loss of blood, an active emetic. For a child of six months old, the proper dose should be a fourth, or a fifth of a grain of tartarised antimony, and about five grains of powdered ipecacuanha. This form and quality of an emetic will rarely disappoint the expectations of the practitioner; whereas the pleasant draughts and mixtures made with the diluted wines of tartarised antimony and ipecacuanha, usually prescribed as emetics for young children, are occasionally chargeable with that result. Whilst on this subject, it may not be improper to caution parents against placing any confidence in certain alarming and otherwise uncalled for observations of druggist's apprentices, and other young gentlemen occupied in shops of pharmacy, about the magnitude of doses of medicines intended for young children. The dose of the emetic powder, under the circumstances which I have now supposed, is the proper measure to be prescribed as an emetic for a child of six months old; and it may be exhibited with the utmost safety. It will no doubt make the infant very sick. But this sickness will have in no small degree the effect of subduing, and of keeping permanently subdued, the over excitement of the heart and arteries; of which the natural tendencies under the influence of the intractable disease which I have now to discuss, is gradually to return to their antecedent condition, both of rhythm and power; notwithstanding that in many cases the previous abstraction of blood may have been very considerable. It is therefore neither convenient nor safe to omit the emetic: and if it should produce an amount of sickness which may harass the little patient for some hours, the greater probability of its sufficient operation, the greater safety which may be reasonably anticipated from its exhibition; the greater, moreover, will progressively prove the reduction of the more alarming symptoms, and the more quickly attained will be our eventual triumph over the malady with which we have to contend.

To ensure the emetic action of medicines of this class, the patient should be made, if necessary by force, to swallow aqueous fluids at short intervals of time after their exhibition. In the management

of the greater number of children at the breast, the force here recommended will be found unnecessary, inasmuch as most children of such an age, if possessed of their consciousness, will usually take their natural aliment, their mother's milk, with sufficient readiness. If the consciousness is partly lost, by reason of stupor, they will nevertheless in most cases retain a sufficiency of it to enable them to swallow fluids upon the application of such fluids to the tongue and anterior fauces by means of dessert spoons or feeding boats.

But the actual rejection of the contents of the stomach should not be considered, in all cases, without exception, an uniform consequence of having administered the emetic powder just recommended. We meet with a certain proportion of patients of all ages, whose stomachs cannot be readily excited by the action of emetic medicines; although the subject of such treatment might nevertheless be made to sustain no little inconvenience—perhaps even more inconvenience—from the attendant sickness, than if the emetic action had been excited; and I am not certain that its sedative effects on the sanguiferous system is not quite equal, in many cases, if not greater than when the proper action of an emetic is produced. About fifty years ago, and subsequently, I have been told, it was no uncommon practice with a certain class of active practitioners of that period, to prescribe what they called dry emetics, for the purpose of diminishing arterial action by the production of nausea; and to repeat from time to time small doses of the remedy, to keep up for an indefinite number of hours, its depressing influence upon the actions of the heart and arteries. I mention this fact simply in the way of illustration; for I confess that I prefer the action of a full emetic, even were it necessary to repeat it after the lapse of an hour or two; than to expose a young infant to the thrice cruel sufferings incident to the continued action of dry emetics for twelve or twenty hours together. The emetic is to be exhibited as soon after the abstraction of blood as the child shall have subsequently pretty well recovered from its fainting. From this view of the subject, it will, I think, clearly appear that the intention of the emetic is not simply, nor even principally, to cause an ejection of the contents of the stomach; but to reduce the excitement of the heart and arteries, and to keep repressed the tone and rhythm of the arterial system. I wish my reader distinctly to understand the principle of this indication, whether practitioner or parent; for in that case the former will generally recognise with more satisfaction, and the latter will concur more confidently in the measures proposed, and be able to secure better attention from the nurses and servants to the minutiae of the very important services not unfrequently devolving upon them.

REDUCTION OF THE TEMPERATURE OF THE HEAD A MEASURE OF GREAT IMPORTANCE IN THE TREATMENT OF ACUTE HYDROCEPHALUS.

Due attention having been paid to at least two principal indications, I now proceed to recommend a third measure of treatment of scarcely less value than either of the others : it is, to effect a speedy reduction of the morbid temperature of the head. The proximate cause of the disease, it has been sufficiently demonstrated, is an intense inflammation of the vascular tissues of the brain. Where there is inflammation, there is always an inordinate development of heat in the part inflamed.

During an incipient stage of acute hydrocephalus—that is, during the first development of the formative period of the disease—there is, what may be appropriately enough called a stage of rigor of the invading fever ; which is sure to be followed by an increased determination of blood to the head, and consequently by a state of turgescence of its bloodvessels. This stage of congestion, indicated by an intense accompanying headache, is sometimes all but finally established before the rigor or chills of the extremities shall have ceased to be felt, and more or less distinctly expressed. Even then, when the infant shall appear pale, spiritless, and shrunk, as to the general expression of its countenance, there is often an easily ascertainable excess of temperature of the head. From this time forward the heat of the head rapidly accumulates until the disease shall have arrived at its destined fulness of consummation. The forehead is, perhaps, the part of the head most frequently raised in temperature during the earlier period of the stage of turgescence ; but I am not quite sure that the occiput is not almost as frequently the subject of this early phlogosis as the forehead, or any other part of the head. It is worthy of observation, that in most cases the principal locality of the vascular turgescence may be tolerably well ascertained by a very simple process ; that of applying our hands to opposite parts of the naked head. A competent physician, accustomed to this duty, will be able, in a few seconds, to fix on the principal seat of the vascular turgescence, about to become established in any given case of acute hydrocephalus. By means of his right hand and his left—instruments which he always carries about him, and without which he never visits a patient, he has it instantly in his power to arrive at an accurate practical conclusion relative to this most important point of practical inquiry. All impediments to this investigation, as of hats, caps, excess of hair, &c. must of course be partially or wholly removed, as the case may indicate, before the facts to be ascertained could be finally and confidently reported upon. The fact, or facts, here supposed, once carefully ascertained, there would be left no room for doubt, nor for a difference of opinion. There would be no room left for any indecision or uncertainty ; nor for want of straight forwardness of any kind on the part of a competently well informed practitioner.

He would be able to state his opinion, and his reasons for it, with such an air of sincerity and of certitude of conviction, as could not fail to ensure for him the willing belief and confidence of all parties. And why should an upright and candid physician ever feel it his interest to conceal and withhold from his patient's friends the actual facts of his case? Any gentleman who cannot perform this duty well and satisfactorily, whether for want of practice or for want of tact, (I think it is frequently the latter,) should call to his assistance the experience and tact of a brother practitioner, to say nothing of his other qualifications, experienced on a larger scale than himself. The precise temperature of a child's head, when the subject of acute hydrocephalus, is ascertainable, it is well known, by a small pocket thermometer. But if the fact in question cannot be ascertained sufficiently accurately for all practical purposes without it, I fear it will be of no great use to entrust the destinies of the patient to the issues of such merely artificial contrivances.

But we will next suppose the fact of the existence of too much heat of the patient's head already ascertained. It might be a state of excessive temperature of the head affecting chiefly the occiput, or the forehead, or some special locality of one or of both sides of the head: for in a certain proportion of cases the excess of temperature is confined to a particular part or parts of the head.

We have next, as a matter of course, the best adapted remedy for the reduction of such excess of temperature to seek. For many years I was under the necessity, in order to accomplish this object, to make use of bullock's bladders charged with cold fluids; such as iced water, and other solutions of water impregnated with a variety of salts, vinegar, &c. These impregnations were simply employed to lower the temperature of the water. Of late, I have laid aside this troublesome and noisome form of the practice, in consequence of accidentally learning that the house of Mackintosh and Co., of Charing Cross, have succeeded in supplying the public with perfectly water-tight water-cushions.

The mode of using this very convenient implement is to charge a cushion of this description to the extent of its entire capacity with the intended fluid, and immediately to allow one half of the whole fluid contained in the cushion to escape; and then suddenly to stop and to secure the valve so as perfectly to prevent the escape of any more of the cold fluid, and at the same time to bar all intrusion of atmospheric air. The cushion will then contain half its capacity of an intensely cold fluid, and no air. The little patient's head is to be laid with its occiput and nape of neck to repose on the middle of this cushion; which will have the effect of rapidly reducing the excessive heat of the head. The rapidity of this change of temperature will bear a direct proportion to the morbid excess of heat of the child's head, and the low degree of temperature of the iced water or other cold fluid within the cushion. The fluid contents of a cushion thus employed in a case of extreme phlogosis, will be converted into a perceptible degree of warmth in less than half an hour; as I have

often very distinctly ascertained : and this will make it necessary to recharge the cushion with a fluid of reduced temperature, as used in the first instance: and these changes of fresh fluid in the cushion will become repeatedly necessary in proportion to the rapidity, or the contrary, of reduction of the excessive temperature of the child's head.

As long as the head shall continue the subject of the excess of heat in question, so long the infant, if conscious, will hail the approach of a newly-charged cushion; whilst, on the contrary, it will express dislike of any interference with its previous state of repose, as soon as it will appear to anticipate a reduced change of temperature of its cushion with alarm. This will be an indication for suspending, at least for a time, the use of the cushion; or perhaps, as I have observed in many cases, for laying it aside altogether. The cushion must be used, or its use resumed *pro re nata*; as the excessive accumulation of heat might or might not return. I wish especially to recommend to the attention of the profession the universal adoption of Mr. Mackintosh's water-cushions in all cases of acute cephalic affections. Their employment for the reduction of excessive temperature of very young subjects of acute hydrocephalus, forms a most important addition to our power over the issues of that formidable disease.

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#### OF THE USE OF BLISTERS AS A REMEDY FOR ACUTE HYDROCEPHALUS.

I have not a high opinion of the use of blisters as a remedy for acute hydrocephalus; and as a first measure, and resorted to without a previous ample abstraction of blood, I have good reason to believe, that the use of blisters might be attended with a great aggravation of the symptoms. Some years ago I had the opportunity of witnessing the practice of an extensive ophthalmic hospital, and had occasion to observe, on a considerable scale of examples, that whenever blisters were applied to the temples, in recent cases of acute inflammation of the eyes, before ample general bleeding had been premised, they scarcely ever failed to increase the intensity of the inflammation; whereas, on the contrary, when venesection was made available as a first measure, and followed up speedily by emetics and active purgatives, it then appeared to me that blisters often materially co-operated with the other measures employed to mitigate the symptoms. The eye is an easily accessible and visible organ, and its comparative condition from day to day could always be easily ascertained and reported upon. The facts which then presented themselves to my attention made a great impression upon me; and led to a considerable modification of my views in respect to the consecutive use of bleeding and blistering.

In the practice of others, I have often known blisters of various



forms and sizes applied as a first measure, and without previous abstraction of blood. In such cases, I think I can speak positively that I never discovered that the blisters so employed produced any substantial good; but, on the contrary, that they had often been chargeable with a positive exasperation of the patient's symptoms.

I am aware, indeed, that an assertion to this effect must necessarily be made with some amount of vagueness and uncertainty; inasmuch as in the midst of a complication of dangerous symptoms it could scarcely consist with perfect candour, to attribute the exasperation of certain symptoms to the effect of any special remedy, rather than to the fatally progressive nature of the malady itself.

Should it be thought advisable to apply blisters as a second measure in the advancing progress of the disease, and subsequently to an ample abstraction of blood, I would advise them to be applied to the parietal regions of the head, and to be made of sufficient size to cover large tracts of the head on both sides. The surface of the occiput would be wanted for the application of cold, that being the part of the head to be laid on the cushion of cold water, as advised in a foregoing section; whilst the forehead and sinciput, generally, would be required to remain unvesicated for the purpose of having those surfaces constantly bathed with cold evaporating lotions. I scarcely need to observe, that the entire surface of the head must be closely shaved before cold can be advantageously applied either to the sinciput or occiput.

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#### OF THE USE OF MERCURY IN THE TREATMENT OF ACUTE HYDRO-CEPHALUS.

Mercury, it is well known, is a medicine of no little importance in the treatment of inflammatory diseases. As a remedy for acute hydrocephalus it has been recommended as a cholagogue, a purgative, and as a power capable of repressing inflammatory action. As a purgative, I am in the habit of recommending a combination of two or three grains of calomel, and sometimes twice that quantity, with six, eight, or twelve grains of jalap, according to the age of the patient, as soon as the sickness shall have ceased after the operation of the emetic, exhibited as prescribed in a preceding section. To prevent uneasiness and restlessness from griping, I seldom omit the addition of a few grains of ginger. In cases of known obstinate constipation, I have sometimes considered it useful to add a quarter or half a drop, and even more, when authorised by the age of the patient, of croton oil.

At the commencement of the disease I consider it a matter of great importance to obtain a state of perfect freedom of the bowels; which should include an early, and an effectual removal of all scybalous accumulations.

Another indication for the use of calomel is its remarkable

competency, beyond all other known powers, to act vigorously as a cholagogue or a purgative of the liver. It frequently happens that suspension of the action of the liver is an early accompaniment, and in no small proportion of cases a predisponent cause of the recognised symptoms of acute hydrocephalus. Lienteric or clay-coloured alvine evacuations are often enumerated among the first symptoms of a head affection. The state of the liver, under such a condition, is obviously one of suspension of its action, or, in other words, of great obstruction of its circulation. When suspended as to its action, or much obstructed as to its circulation, what then should become of the great quantity of blood which thus must be necessarily withdrawn from its vascular tissues? Whither more likely can it be determined than to the vessels of the head; which already, according to our theory of the disease, must be considered to be in a state of extraordinary distention and turgescence. To ensure the brisk action of calomel as a cholagogue, it would be best, in most cases, to exhibit it pure—that is, without any combination with it either of jalap or of any other active purgative. For this purpose calomel should be exhibited in doses of from one to three grains, every three hours.

Nevertheless, the state of the bowels should not be forgotten as to freedom, and it may frequently require the exhibition of purgatives of great activity to ensure a sufficiently frequent evacuation of their contents. Connected with this method of exhibiting mercury in conformity with its several indications, we arrive speedily, in many cases, at our third indication for its use; that of exciting an action of the salivary glands with a view to the subduction of an inflammatory condition of the vessels of the head. This power of mercury over the human system is frequently called its specific action; of which it is not now necessary to go into the explanation. When exhibited to the point of perceptibly producing this effect, the action of mercury is a powerful deobstruent, and an equally powerful resolvent, of inflammatory action. In many cases of hydrocephalus the absorbents are observed not to be very active in taking up mercury and transmitting it into the system; and we cannot always be certain, even when given in pretty large quantities, of its being actually conveyed into the circulation through the medium of the absorbents. It, moreover, has sometimes occurred that calomel has been exhibited rapidly, and in full doses, for a given period, that it has suddenly and unexpectedly been determined to the mouth with more than ordinary violence, and there produced such ulcerations, and such havocs of destruction of different tissues, as have ended in the death of the patient. Calomel, therefore, in full doses, requires to be exhibited with great discretion and constant advertence to this specific and inconvenient property of the medicine. The few cases of recovery from acute hydrocephalus which we find recorded as having taken place in the absence of early bleeding, are, I think, principally, if not exclusively, to be attributed to this constitutional action of calomel as a resolvent of inflammatory action. But this

power is rarely exerted to the extent of saving life. I never, myself, depend upon it; and, indeed, I seldom use it at all, in response to its assumed influence as a resolvent of inflammatory action, excepting as an auxiliary of the lancet, or as an almost hopeless substitute for its use, when considered too late to have recourse to adequate repeated abstractions of blood with any considerable hopes of a successful issue. On the whole, I look upon mercury, exhibited in conformity with this last indication for its use, a remedy of less value, as to its power over the issues of hydrocephalus, than any of the other active measures which, I trust, I have sufficiently discussed in the immediately preceding sections. This power, however, is nearly the whole that can be possessed by our profession, if mercury be administered on the system, and agreeably to the practice of the late Dr. Cheyne, of Dublin, and his colleagues; and I believe we may justly attribute the recoveries exhibited as the results of their few successful cases, principally, if not exclusively, to that mode of exhibiting calomel. The principal exception to this remark, was the seventh case, which was communicated by Dr. Edward Percival. That case was treated by considerable bleeding, amounting to sixteen ounces, taken by incision of the temporal artery, on the second day after the invasion of the malady; and in two or three days subsequently, by the application of twenty leeches to the hepatic region. But having made the above statement in disparagement of the practice adopted by Dr. Cheyne and his colleagues, with the exception of the case just adverted to, it seems but right to put my reader in possession of the principal facts recorded in the published reports of the cases in question. As they occupy a series of years in point of date, I shall distribute them according to the consecution of the several years of their occurrence. Following the date of the year, I shall append the number of the case, as given in Dr. Cheyne's book, for the sake of easy reference to that production.

1801. C. 11, C. D., æt. 14. The hydrocephalus was not suspected till about ten days before the patient's death. There was no abstraction of blood in any form prescribed: the practice actually adopted, consisting principally of opiates and cretaceous medicines, was attended with no benefit. Death.

1804. C. 1. A. M., age not mentioned. The subject was a fair and delicate girl. A case of simple congestion of the head, treated actively by mercurial purgatives.—Reported cured on the 16th of May, after its commencement on the 12th of the same month. See Dr. Cheyne's "Essays," p. 91.

1805. C. 2. p. 92. R. S., æt. 4, was languid and drowsy for about ten days; but was seized with active symptoms, such as vomiting, headache, slowness and irregularity of pulse, on the 12th of May. The medicines employed were mercurial purges with jalap. The case was reported cured on the 18th of May.

1805. May 12., C. 3. D. R., æt. 8, with dark eyes and complexion and coarse skin; a fine and intelligent boy. His case was

treated principally by calomel, given in the quantity of two grains every four hours, and by the application of five and six leeches once or twice repeated to the temples. He was first slightly, but afterwards considerably, salivated. He was convalescing satisfactorily; when on the 15th of May he sustained a relapse. He eventually recovered by the use of the same means after a severe salivation. The concluding report is dated on the 8th of July.

1805. June. C. 12. R. A., æt. 6. This boy, for more than a year, had not enjoyed good health.—Death. No dissection.

1805. C. 8. D. C., æt. 8., a boy at school. On the evening of the 6th of July four large leeches were applied to the temples, and on the 7th it is reported that the bleeding from the leeches continued four or five hours. On the evening of the 8th it is stated that four more leeches were applied to the temples; inasmuch as in the afternoon he had complained of his head. The pulse was then at sixty, and quite regular. No report is afterwards given of further bleedings either by leeches, or in any other way. The patient died. The dissection is given in p. 115 of Cheyne's "Essays."

1806. C. 10. Relapse of the patient J. M., dated originally May the 12th, 1804. She became a patient again in December of the present year. No age is mentioned in either history. On the 4th of December a mixture was prescribed, with the tincture of jalap, with no bleeding. On the 6th, the 10th, and the 11th, the patient was visited; but no abstraction of blood in any form was prescribed. Death took place on the 11th; but no dissection was allowed.

C. 13. The year is not stated (it probably occurred in 1805). A. S., æt. two and-a-half, a fair child, of a phlegmatic temperament, was seized with convulsions, &c. On the 9th of December, and on the 11th of the same month, and not before, four leeches were applied to the temples, and a blister to the scalp. No other useful treatment was adopted. Death. No dissection.

C. 14. Probably in the year 1805, which, however, is not stated. The report of this case is very unsatisfactory. The disease existed late in September, and the patient died on the 14th of October.

1806. C. 15. A girl about seven years of age became the subject of acute hydrocephalus, which ended in convulsions and death. The case is so feebly drawn up as to present no points of interest; it being scarcely deserving of criticism.

1806, June 30th. C. 6. Communicated by Dr. Kellie. Forrest Fair, a boy of between seven and eight years of age. Certain predisponent symptoms were observed during the two last days, such as headache, pains of the abdomen, moaning during sleep, picking of the nose, grinding of the teeth, vomiting, with flushing of the face, great heaviness and dulness of the eyes, the adnata being suffused and slightly inflamed, skin hot, abdomen tumid, and bowels costive. p. 130. The medicine prescribed consisted of two grains of calomel and twelve of jalap, to be repeated, if necessary. On the 1st of July there occurred great drowsiness, with severe pain of the head. On this day, for the first time, four ounces of blood were

taken from the foot. On the 2d of July eight ounces of blood were taken from the arm. Mercury was carried to salivation during the progress of the treatment. Symptoms of a very formidable character presented themselves during the greater part of the month of July, but on the first of August the patient is reported as being convalescent, and on the 5th as having actually recovered.

1806. C. 4. D. M., æt. 4, a fine looking boy, became the subject of treatment on the 26th of December; but he had vomited on the 25th, and been the subject since of great drowsiness, heat of skin, much pain of the head, with intolerance of light. Two grains of calomel were ordered to be taken three times a day, together with eight drops of the tincture of digitalis. On the 27th of December leeches were again applied, but their number is not mentioned; and subsequently, on the 6th of January, more leeches were ordered, but without any statement of their number. During the further progress of the treatment there were exhibited calomel, blue pills, tincture of digitalis, blue ointment, blisters, with a variety of purgative draughts. The treatment appears to have been very complicated; but on the 10th of January the patient was reported as gradually improving, and on the 16th he was stated to be without complaint.

1807. C. 5. April the 15th. A. S., æt. three years and six months, of fair and delicate complexion, and subject to habitual looseness of the bowels, has this day had rigors, followed by some delirium, heaviness of the eyes, and pulse of 120 in a minute. The other symptoms are a white tongue, brows contracted, constipation of bowels, startings during sleep, with much fever. On the 15th, a prescription, ordering calomel, with other purgative powders, was left at the patient's residence. On the 16th, six leeches were ordered to be applied to the temples. On the 18th, leeches were again advised to be applied, without stating the number. On the 19th, twelve drops of digitalis were directed to be exhibited three times a day, with instructions to add one more drop to each dose. On the 21st and on the 26th, leeches were ordered to be again repeated, and on the last day a large vesicatory to the forehead. On the 29th, ample blisters were ordered to be applied to the temples. On the 1st of May, some improvement was declared to have taken place; and on the 4th, medicines were discontinued. Recovery.

1807. C. 9. Communicated by Dr. Kellie. J. M., aged seven years and eight months, became the subject of acute hydrocephalus on the 6th of July, when he complained much of his head, which he was quite unable to hold up. He was treated with occasional doses of calomel, consisting of two grains each, and of jalap, fifteen grains each, to be given on the following morning. On the 8th of July, six leeches were applied to the temples; and on the 9th, when it was reported the leeches had bled well, they were ordered to be repeated. On the evening of the 10th, two leeches were ordered to be applied to the forehead. The pulse was then noted as being

112. No further bleeding was advised. The patient died on the 17th. No dissection.

1814. Jan. 20. C. 16, of a boy six years and a half old: said to have been seized on the 8th day of fever, with symptoms of hydrocephalus. Death took place on the 28th of January. No dissection.

1814. March 6. C. 17. *æt.* 12. This case was neglected, and therefore was not made a subject of treatment for some time before the 6th of March. On that day twelve leeches were applied to the temples; but a fine boy of twelve years of age ought to have been bled to fainting from the arm, without delay. On the 12th of the month he was, indeed, bled from the arm to ten ounces; but then, after the loss of six entire days the *v. s.* could not have been expected to have been of much service. Ten ounces was, moreover, too small a quantity of blood to have been abstracted, even if the operation of blood-letting had been more opportunely performed. The case proved fatal.

1814. Oct. C. 18. An infant of seventeen months old. This case was probably not recognised during the earlier days of the disease. When it was, it was treated by the usual routine of applying a few leeches to the temples, and of exhibition of medicines, consisting of calomel, James's powders, jalap powders, opium, powder of hydrarg. *c. creta*, mixtures with squills and senna, with all manner of miscellanies. Final recovery, after extreme danger.

1815. May 12. C. 19. A boy of five years old, after a severe blow on his forehead, became the subject of symptoms which indicated some danger of a head affection. He was bled to six ounces from the arm, and treated, in other respects, on the general principles of Dr. Cheyne's school; and although the bleeding was defective in quantity, it nevertheless laid the foundation of an eventual recovery subsequently to free purging.

1815. July 13. C. 20. A young gentleman of thirteen years of age, after bleeding from the temporal artery, and then from the arm, and subsequently by leeches applied to the temples, and by miscellaneous medicines, consisting chiefly of calomel, antimonial powders, and purgatives, recovered. The case terminated favourably, after the duration of about a week.

1815. July 15. C.—M. G. *æt.* 17. A case of successful treatment by bleeding from the temporal artery, and by the subsequent application of twenty leeches to the hepatic region, communicated, as already stated, by Dr. Edward Percival.

The above cases, of which the number amounts to twenty, were treated by Dr. Cheyne and his friends at Dublin, chiefly by calomel and jalap, and by calomel and digitalis with and without opium, when the specific effects of calomel were especially wished for. Of the entire number of twenty, ten are recorded as examples of recovery, whilst the remaining ten proved fatal. The first case of recovery, however, died of a relapse in two years afterwards. C. 4 is stated as one of somewhat imperfect recovery. C. 18 was very long

under treatment, and for many weeks balancing between life and death. C. 7 was an example of recovery in consequence of a pretty considerable bleeding from the temporal artery, and in two days subsequently by the application of twenty leeches, and after that of vesicatories to the hepatic region. This case is published as a communication from Dr. Edward Percival, who superintended the treatment. All the remaining cases, including the first of the recoveries, eventually proved fatal. The above cases, be it observed, of Dr. Cheyne, associated in the professional management of several of them with his professional friends in Dublin, were distributed over a period of fourteen years. It is a matter therefore of no very difficult inference, in my opinion, that the recovery finally of nine out of the twenty cases recorded, furnishes no mighty evidence of a successful treatment of acute hydrocephalus. The case of Dr. Edward Percival reduces the number of successful cases which occurred in the practice of Dr. Cheyne and his other friends to the number of eight examples of the disease in fourteen years; a proportion of successful treatment scarcely worthy of Dr. Cheyne's pretensions and of the high encomiums passed upon his works, at the several periods of their publication, for the striking peculiarity of his views, and the highly practical tendency of his labours.

After enumerating in the way of recapitulation some of the principal circumstances by which the parents, or other friends of patients, may be able to recognise indications of danger before the actual advent of hydrocephalus, I propose to conclude the present volume with the pathological history of a limited number of cases which occurred in the practice of University College Hospital in the months of April and May of 1839. As they are consecutive cases, and all of them cases which came under the cognizance of the hospital within the dates abovementioned, the reader will have the means of forming a pretty correct opinion of the proportion of that sort of practice which presents itself, unequally indeed, at different periods of the year, and of the success of the treatment of acute hydrocephalus at that important school of practical medicine.

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CIRCUMSTANCES INDICATIVE OF DANGER OF ACUTE HYDROCEPHALUS, WHICH SHOULD OPERATE AS A WARNING TO PARENTS AND GUARDIANS TO TAKE THE ADVICE OF THEIR MEDICAL FRIENDS IN GOOD TIME.

1. Convulsions during the period of teething is a source of great danger, and is one of the most frequent predisponent causes of acute hydrocephalus.

2. Difficult dentition, without convulsions, may be identified with a state of over-fulness of the tissues of the brain, which not unfrequently predisposes to convulsions, and likewise, therefore, to acute hydrocephalus.

3. Added to the above state of things, a perceptibly increased temperature of the head is an indication of the actual commencement of the disease itself, but in many cases curable at that incipient stage of the malady.

4. Children of from seven or eight months to the age of three years inclusive, who are liable to a convulsive variety of difficult breathing during the moment of awaking from sleep, and frequently at other times, followed usually by a loud cry commenced with difficulty and struggling, are especially liable to be seized with convulsions: and convulsions, as we have already seen, may, at any time, lay the foundation of a predisposition to hydrocephalus. The convulsive affection of the larynx here alluded to, has of late years been technically called laryngismus stridulus. I hope in the course, perhaps, of the next year, to submit to my professional friends and the public generally some practical observations on the subject of convulsions of young subjects.

5. Sickly, peevish, and discontented children, never looking happy, not thriving at the mother's breast, nor by the spoon-meat provided for them; children more than usually grave, morose, or miserable in the expression of their countenance, are frequently sufferers either from want of food, or from being compelled to subsist upon sloppy, gross, or otherwise indigestible food: all such children are more or less liable to the invasion of acute hydrocephalus.

6. Accidents from falls with the head foremost, or from violent application of force to the skull from hard bodies, in whatever position the head may be at the time, should excite the earliest attention of parents. Apparently slight injuries and contusions should be carefully examined, and their consequences regularly and anxiously watched, and, if necessary, reported without loss of time to the medical attendant of the family.

7. Children of a sanguineous temperament, and of fine transparent complexions admitting of the cutaneous circulation of the face and neck to present itself visibly to the eye, accompanied by a disposition to great activity both of mind and body, are usually considered especially liable to acute affections of the head.

8. Scrofulous children usually mismanaged as to their diet during the earlier years of their growth are more liable to become the subjects of acute hydrocephalus than their healthier little neighbours of the same age.

9. Severe eruptions of the skin, such as those of scald heads and small-pox, measles, impetigenous affections, &c. ought to excite the earliest attention of parents to get them speedily and properly cured. Intense chronic affections of the common integument are frequent predisposing causes to acute hydrocephalus.

10. The results of severe and long continued diseases, such as hooping cough, measles, scarlet fever, &c. are known frequently to predispose to acute hydrocephalus. In many cases the results of the diseases in question furnish evidence of their not having been well and efficiently treated. Lingering remnants of acute maladies and



a long duration of ailments of young children, greatly enfeebled in consequence of them, should not fail to engage the attention of parents, guardians, superintendents of school establishments, and all other persons who may have the health of young people entrusted to them. The circumstances severally alluded to are highly predisponent causes of acute hydrocephalus.

11. When children of a tender age become subjects of great vigilance, or of much loss of sleep for several successive nights together, such a state of things cannot exist excepting as an effect of some formidable cause; and the cause to be apprehended will, in many cases, prove to be a state of turgescence of the vascular tissues of the brain, frequently indicated and accompanied by an acutely severe pain of the head.

12. A state of great sleepiness or stupor is another circumstance which should excite the instant attention of parents to the duty of obtaining early professional advice. It should equally be considered a cause of overfulness and of excessive action of the vessels of the head with obstinate vigilance.

13. Frequent alternations of a severe headache with sickness and vomiting is an ordinary symptom of acute hydrocephalus already commenced; but admitting, in some cases, of being arrested by immediate and vigorous treatment.

To afford further assistance to the parent or medical friend towards an early recognition of the first actual symptoms of hydrocephalus, the reader's attention is requested to the following practical notices. They are early symptoms of cases which have actually existed and terminated fatally for want of opportune or in consequence of incompetent, treatment. They have long since become the subjects of recorded pathological history.

1. A case of hydrocephalus, in consequence of the fall of a maid servant with a healthy child of eight months old in her arms, down a flight of stairs, the result of which was, that the child's head sustained a dangerous concussion. The maid speedily recovered, but the child died of acute hydrocephalus.

2. A child of five months old had been the subject for a long time of a diarrhœa, which was not cured by the remedies prescribed. In consequence of laying aside the use of all medicines the diarrhœa suddenly ceased, and acute hydrocephalus almost immediately supervened, and carried off the patient.

3. Several cases are alluded to of fatal events of acute hydrocephalus in consequence of unfortunate vaccinations. I am happy to say that fatal cases from that cause have not occurred within my immediate experience.

4. A. D., four years of age, was seized with acute inflammatory affections of his neck, side of face, and the muscular tissues of the nape of the neck, accompanied by an inflammatory affection of his tonsils, uvula and velum pendulum palati. During the intensity of these inflammations, the ordinary symptoms of acute hydrocephalus supervened. The little patient eventually died.

5. W. H., five years old, became suddenly the subject of a catarrhal gastric fever, which was followed very speedily by the unquestionable symptoms of the stage of turgescence of acute hydrocephalus. It proved a case of great intensity of that disease, which ended fatally.

6. J. E., eighteen months old, was the subject of rickets for a twelvemonth. To this condition of an enfeebled state of constitution, there followed a severe diarrhœa of a month's duration; and on this there supervened, as a consequence, the usual symptoms of acute hydrocephalus, which terminated fatally.

7. J. M., aged seven years and eight months. Two of the other children of this family had died in their earliest infancy of hydrocephalus. During the medical attendant's first visit, the case under consideration was supposed to have become the subject of the same affection. The young gentleman complained much of his head, which he seemed quite unable to hold up. Although dressed, he was lying on two chairs, and was seized with repeated efforts to vomit when made to sit up. The pain of his forehead and temples, he described as exceedingly severe. His eyes presented a languid, heavy, and suffused appearance. His eyebrows were kept strongly knit. His tongue was white and furred. His skin was hot, and his pulse beat at the rate of one hundred and twenty strokes in a minute. The bowels were costive, and he voided much turbid urine, which upon cooling deposited a great quantity of a chalky coloured sediment. This case ended fatally.

8. J. M. again became my patient in 1806. She had not recovered a good state of health after her former illness in May 1804. During the intermediate period I was very often consulted about her complaints. She was frequently the subject of attacks of scrofulous ophthalmia, of swellings of the lymphatic glands in her neck, of disordered states of the abdominal viscera, of considerable enlargement of the abdomen, and of the occasional occurrence of a severe diarrhœa, when her alvine evacuations were usually of a dark colour, exceedingly offensive and putrid. When suffering, on one occasion, from the severity of these symptoms, she became the subject of a fatal acute hydrocephalus.

9. R. A., six years of age, had not enjoyed good health for a twelvemonth. In July, 1804, he had hooping cough, which left an extreme delicacy of constitution, and he was long without appetite. After the cold winter weather set in, he was affected all over the body with circumscribed tumours of about the size and shape of a nutmeg, which apparently formed in the cellular membrane, and which slowly suppurated, leaving scrofulous sores. One day, upon remarking that there was something peculiar in his look, his mother observed that she was afraid he was losing his sight. On examining him, I found that the pupils did not contract: one side was paralytic. He did not complain of any pain in his head, but in ten days he was dead; during that interval most of the symptoms of acute hydrocephalus were manifested.

10. A girl, of about seven years of age, who had been labouring under a continued fever, with morning remissions, with which three children in the same lane were affected, appeared to me to have got a crisis. She became cool on the fifteenth day of her fever. Her tongue was clean. On the eighteenth day I called again, and discovered my mistake. Her pulse was 80. Her pupils were dilated, and the iris was paralytic. She was blind and insensible. In this state she lay three days, and died after being in convulsions for some hours.

11. A remarkably intelligent, pale, fair-complexioned boy, and of rather a delicate texture of skin, became the subject of fever. During my first visit he was in the eighth day of the fever described. His bowels were then irregular, and his stools of a dark green colour. On the preceding day he had complained of his head, of which he had, indeed, spoken at the commencement of his febrile attack. There was obviously, during this visit, a slight squinting, with intolerance of light. He dozed much, awoke collected, complaining of much pain of his head, especially over the eye-brows, and of some giddiness. The pulse was unequal; at about 96. Hydrocephalus became unequivocally established, and the patient eventually died, under circumstances of great misery.

12. A promising boy, of about twelve years of age, became the subject of a severe attack of fever, with disordered bowels. He complained of intense pain and weight both of the forehead and of the vertex. He leaned on his forehead to ease the weight of it. His face was flushed; his eyes were red, and suffused with moisture; his pupils were large, although his sight was yet perfect. Noise and light greatly distressed him. He sighed deeply and frequently. He complained of frequent lancinating pains of the shoulder, nape of the neck, muscles of the back and loins, and even sometimes of those of the lower extremities, which alternated with that of the head. His skin was dry and burning. He was occasionally thirsty. His pulse was about 70, but increased to 100 on the least motion. His abdomen had been tense for some days; during which he had had no relief from his bowels. His urine was scanty and high coloured. With very little sleep, he was constantly in a state of agitation, frequently changing his position from the bed to the fireside, and from the fireside to the bed again. In the further progress of the case he eventually became the subject of the most formidable and characteristic symptoms of acute hydrocephalus. He died in two days after the accession of total blindness.

## CASES OF ACUTE HYDROCEPHALUS WHICH WERE MADE THE SUBJECTS OF TREATMENT AT UNIVERSITY COLLEGE HOSPITAL, DURING THE MONTHS OF APRIL AND MAY 1839.

Augustus Horn, five and three quarter years old, was admitted an O. P. of University College Hospital on the 17th of April, 1839. Complexion fair. Skin soft. Was seized first this morning, having been previously in perfectly good health, with drowsiness and throbbing pain of the back of the head: at the same time his face became flushed, and the skin generally was of higher temperature than natural: the forehead is hot upon the application of the hand to it; and when the boy attempts to stand he says he feels giddy. The pulse beats at the rate of 140 strokes in the minute; the bowels, according to the statement of the mother, are habitually costive; but this morning they have been purged by a senna draught, which she herself exhibited in the absence of all medical advice. Treatment. V. S. from the jugular vein carried to fainting: an emetic, containing half a grain of tartarised antimony and eleven grains of the powder of ipecacuanha, was exhibited immediately after recovery from fainting in consequence of the bleeding; and on the following morning a purging powder was administered, consisting of four grains of calomel, and twelve grains of jalap. This child sustained a similar attack, as we find reported, three months ago, which was removed by cupping from behind the ears, *to fainting*. He then, as now, became a patient of the hospital. The mother states that heretofore she had lost three children by acute hydrocephalus, but that in those cases, not one of the subjects of them being a patient of the hospital, the abstraction of blood had been effected in all the cases by leeches. On those occasions the mother states that the several children had died on the third or fourth day of the disease. Visit at the patient's residence on the 18th. The patient was much better in all respects, after having enjoyed some natural and uninterrupted sleep. The bowels have been freely moved by the calomel and jalap exhibited in the morning. From this time forward the case made good progress, and was dismissed cured on the twenty-fourth.

Upon the 22d of August, the above Augustus Horn was again seized by an attack of similar symptoms with those which he had experienced in April, and for which he was presented by his mother at the hospital. He then also complained of giddiness, and inability to stand or walk on that account, and of throbbing and shooting pains of the head, and more especially of the forehead. The same treatment was again adopted: but the case proving more obstinate than on the former occasion, required a repetition of the measures used at the onset of the attack. This time the head was shaved, and the cold water pillow was had recourse to, and four grains of hydrargyrum c. creta, exhibited every three hours; and this plan was continued until the symptoms had entirely yielded.

In about a fortnight from the date of this second attack, the child was dismissed, perfectly cured.

John Rumble, one year old, was admitted an O. P. of University College Hospital on the 20th of April, 1839. This child had begun to droop and look languid and sleepy early in the afternoon of yesterday. In the evening he became feverish and flushed in the face, and passed a very restless night, often screaming, and repeatedly putting his hands to his head, and rolling it from side to side on the pillow. At present the head is hot to the feel, as is also the skin generally. The pulse is full and hard: the tongue is very white and loaded, and there is extreme thirst. Treatment:—Abstraction of blood from behind the ears by cupping, to five ounces, which produced fainting. This was followed up by the exhibition of an emetic, consisting of half a grain of tartarised antimony and ten grains of the powder of ipecacuanha. A purgative, consisting of three grains of calomel, ten grains of jalap, and two of powdered ginger, was exhibited in about four hours after the emetic. Several of the symptoms of the former phlogosis having returned after the lapse of some days, this child required a second cupping to five ounces more. From that period the convalescence advanced prosperously, and the patient was dismissed cured on the 6th of May.

Caroline Newman, eight months old, was admitted an O. P. of University College Hospital, on Monday the 22d of April, 1839. This little patient had a wide and intensely distended fontanelle from chronic hydrocephalus of three or four months standing. She now has a ricketty shaped head and a sickly look. She began to be fretful on Friday, the 19th, having previously been lively and cheerful; notwithstanding the chronic enlargement of the head. The present symptoms are a pyrexia, attended with a screaming and drooping of the head; a rolling movement of it from side to side, on the mother's lap; a lifting of the hand to the side of the head, as if to complain of pain of it; great heat of the head; much restlessness and fretfulness. The pupils were of the natural size, contractile indeed, but not unusually contracted. Treatment:—Abstraction of blood was ordered from behind the ears to four ounces; this quantity of blood being considered sufficient for a child of a ricketty constitution, and of an unusually sickly appearance. Calomel was ordered to be administered in doses of two grains each, every six hours. On the following day, Tuesday, the 22d of April, the child was found in many respects much better. It was lively and smiling during the visit, with much less heat of the head, which was also observed to be held erect. The mother reports that the rolling of it from side to side has not returned since the cupping. The bowels have been once relieved this morning, after having been acted upon three times yesterday evening. Visit on the 24th. The child is fretful, but without any rolling of the head, and without any movement of the hand towards it. By reason of some increase of fever, an emetic, similar to the former, was ordered to be repeated and to be followed up by a purgative of

calomel and jalap. Visit of the 27th : The little patient is become the subject of a vivid erysipelatous inflammation of the face, accompanied by fever and much restlessness. For the removal of the erysipelas a saturated solution of the nitrate of silver was applied to the erysipelated surfaces. On this occasion ten grains of the cinchona bark were ordered to be exhibited three times a day, and two grains of calomel every six hours. Visit of the 1st of May : The erysipelas has disappeared, and the child has resumed her natural appearance and has enjoyed her accustomed amount of sleep. There is not, at present, any morbid heat of the head, but the anterior fontanelle is still elevated. The bark was continued for a week or two longer, and the child was restored to its former state of health. The chronic affection still remains.

William Henry May, nine years of age, was admitted a patient of University College Hospital on the 13th of May, 1839. At an early hour of yesterday, this boy complained of severe pain of his forehead : the mother, at the same time, perceived that that part of the head was hotter than any other tracts of it. It is now very hot. The forehead is prominent, and the child exhibits a state of imperfect general health. The expression of the eye is tolerably good, and the pupils contract naturally. The tongue is slightly loaded, and the mother states that the secretions from the bowels are black and offensive. The patient has been sick, and has frequently vomited since yesterday morning. The pulse is now 120, but not very strong. A severe headache is complained of. The mother states, that she has lost four children by water in the head, at the ages respectively of eleven weeks, one year, two years, and three years and a half old. Our present patient was ordered to be cupped behind the ears to full fainting, and to take half a grain of tartarised antimony, and fourteen grains of the powder of ipecacuanha, immediately after his recovery from the fainting to be produced by the cupping. A purgative, consisting of three grains of calomel, was ordered to be taken on the following morning. Visit of the 14th of May : Ten ounces of blood were taken from behind the ears on the afternoon of yesterday, after which the patient was very sick and fainted ; and after the lapse of about half an hour he fainted again. The emetic was taken as directed ; and this morning the patient has a much brighter expression of countenance. There is, however, still some pain of the head, with preternatural heat of it ; but much less than before the bleeding, as the patient himself states. The bowels have been once opened since the exhibition of the powder this morning ; the fæces are represented as having been of a dark, slimy, offensive character. There was considerable restlessness in the night, but much less than during the night previous to the bleeding. The patient was ordered, during this visit, to take two grains of calomel every three hours, until further orders. From this time he recovered rapidly, and was discharged, cured, in a few days.

Henry Hays, fifteen months old, was admitted an O. P. of

University College Hospital on the 14th of May, 1839. This little patient was seen a few days ago on account of severe teething, without, however, being accompanied by any symptoms of a head affection. Scarification of the gums was considered as being alone required, and was, at the time, effectively performed. The mother, however, now states, that yesterday morning she observed that the child's head was unusually hot; that he threw his head back, and kept it rigidly fixed in that position for some time; and that he made this movement repeatedly; and also put his hand to his head, and rolled the latter on the pillow, and ground his teeth. The child's bowels are generally constipated, although the motions are represented as being green and slimy. There is no drowsiness; but, on the contrary, extreme restlessness, with much increase of the heat of the head, and especially of the occiput. The pulse is full, hard, and velocious. The patient has cut six incisor teeth: no others are pressing. The head is large. His limbs are tolerably firm. The mother states that she had had another child similarly attacked some time ago, who, however, was cured at this hospital by a bleeding from the jugular vein. Cupping from behind the ears was ordered to four ounces, or more if found necessary, to produce fainting. An emetic consisting of half a grain of tartarised antimony and ten grains of the powder of ipecacuanha was directed to be given immediately after recovery from the fainting; to be followed up by a purgative consisting of three grains of calomel and ten grains of jalap, to be taken in four hours after the last operation of the emetic. Visit of the 15th of May: the improvement is marked in a better expression of the countenance: the little patient, however, still grinds his teeth, but only during sleep. The head is still too hot; although he rested better than the previous night. The bowels have not yet been moved this morning. Second visit at half past nine in the evening, in consequence of the child having been seized with two consecutive paroxysms of convulsions: The head is now excessively hot; but more intensely at the back part of it than at the forehead. The extremities are also much raised in temperature. The gums were again well scarified, and the outward incisor of the lower jaw of the left side protruded immediately in consequence. Cupping was again ordered to three ounces, or more if necessary. From this time forward the patient convalesced rapidly, and the case soon terminated in perfect recovery.

I am indebted for the reports of the above cases to my son, Mr. John Hall Davis, who was my principal clinical clerk at University College Hospital at the period of their occurrence.

Such are some of the most frequent predisponent causes premonitory of more or less liability of young people, to become subjects of acute hydrocephalus; and such also is a selection of a few cases of the actual disease, which terminated fatally in consequence of their early symptoms not being duly recognised by the family and friends of the patient, or else in consequence of the same symptoms

not being treated sufficiently early, or of not being treated with sufficient intelligence and vigour by the professional gentleman or gentlemen consulted upon such occasions. That a fatal termination is an inevitable result of acute hydrocephalus, is abundantly disproved by the events of the hospital cases which have been just reported, as well as by those of all the cases, with very rare exceptions, which occur from week to week, and from year to year, in the practice of the same public institution. Under similar circumstances of early application and competent practical knowledge of the subject, precisely similar results may be expected to follow, and actually do follow, in private practice, as in that of the public institution alluded to. This fact admits of being satisfactorily attested by a host of my best informed professional friends.



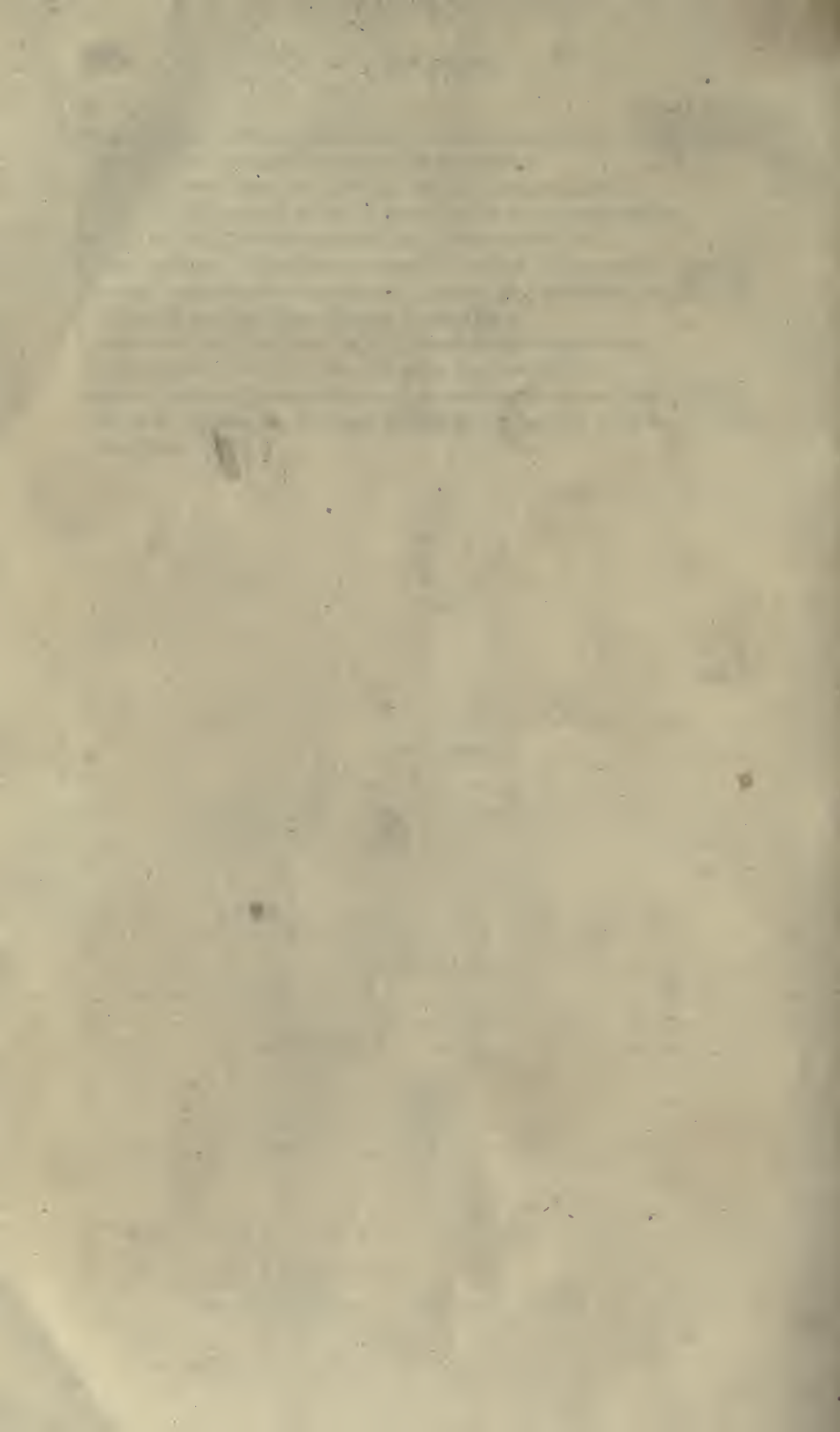
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THE END.















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