The water-cure : its principles and practice a guide in the preservation of health, and cure of chronic disease, of the stomach and liver, kidneys and skin, neuralgia, rheumatism and gout, spinal and paralytic affections, scrofula, threatening consumption, bronchitis, asthma, and the diseases of women and children ... / by James Wilson.

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THE WATER-CURE;

ITS

PRINCIPLES AND PRACTICE.

A GUIDE IN THE PRESERVATION OF HEALTH,

AND

CURE OF CHRONIC DISEASE,

OF THE STOMACH AND LIVER, KIDNEYS AND SKIN,
NEURALGIA, RHEUMATISM AND GOUT,
SPINAL AND PARALYTIC AFFECTIONS, SCROFULA,
THREATENING CONSUMPTION, BRONCHITIS,
ASTHMA, AND THE DISEASES OF WOMEN AND CHILDREN.

With Illustrative Cases.

ALSO AN EXPLANATION OF THE ORGANS AND FUNCTIONS OF THE HUMAN BODY, AND THE SCIENTIFIC DETAILS OF NUTRITION, DIGESTION, REGIMEN, AND DIET.

BY

JAMES WILSON, M.D.,

MEMBER OF THE ROYAL COLLEGE OF SURGEONS, LATE FELLOW OF THE ROYAL MEDICAL AND CHIRURGICAL SOCIETY, LONDON, ETC.

THIRD EDITION.

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TO

SIR EDWARD BULWER LYTTON, BART. M.P.

My dear Sir Edward,

I feel great pleasure in dedicating to you this Popular Treatise on the principles and practical details of the Water-Cure.

Nearly twelve years have elapsed since your "Confessions of a Water Patient" directed public attention to the merits and importance of hydropathy. Your liberal and enlightened advocacy did the cause much service, when it had many energetic opponents, and but a few indifferent friends. The violent antagonism which this new system at that time encountered has now considerably diminished, and many distinguished members of the Profession acknowledge, in private, its high claims to consideration, as an important branch of remedial art. This, when added to the popular appreciation it has already secured—as you witnessed in your visit here last summer—gives me every reason to anticipate that in the course of time it will receive from the Profession that cordial recognition to which it is so justly entitled.

Such a consummation may be distant, but I feel assured that the day will come when the medical men of this country will discover its inestimable value in private practice, and adopt it as their own; they will then give the "Water Doctors" credit for having established, in their generation, a system of treatment that had contributed the *best* and most *lasting* remedies to the resources of curative art and the practice of rational medicine.

Still, in glancing at the future, I cannot but see that posterity, when studying the medical literature of the 19th century, will regard the fact with curiosity not unmixed with incredulity when they find that the remedial agents most prized by themselves—the potent, safe, and simple remedies now used in the Water-Cure—were neither appreciated nor recognized by the great body of the profession, for more than 50 years after they had been fairly established in the estimation of a large and enlightened section of the people—*explained on scientific principles*—and their great curative value exemplified by practical proofs without number and without parallel.

If my anticipations are verified, another interesting passage will be added to the curiosities of human progress, and the more remarkable because in every sect and department of the profession—with all the great diversity of opinion that exists—there are many in each filled with an ardent desire for the advancement of rational medicine, and many who have already contributed their quota to the solution of that sublime problem, which is to teach us how best to save human life and mitigate its sufferings.

Believe me, my dear Sir Edward,

Very faithfully yours,

JAMES WILSON.

Malvern, January 1*st*, 1857.

PREFACE

TO THE THIRD EDITION.

It may naturally be pardoned in me, if I feel proud of the fact that I was the first who introduced into this country the practice of the Water-Cure, based upon the system of Priessnitz. But the reason why I congratulate myself more particularly is, because I feel assured, from all I have witnessed before and since, that if I had not gone to Græfenberg, or had failed to induce others of my countrymen to follow me there, the Water-Cure would, in all human probability, have been unknown in England to this day.

I had long suffered from ill-health; for after an unusually long professional education at home and on the continent, devoting myself to it as my great pleasure, as well as my business, I entered at once, without sufficient rest, on a rather large private practice, and, at the end of ten years, had become diseased myself. This pathological condition consisted in chronic inflammation of the duodenum, a congested liver, nervous dyspepsia, and psoriasis, with frequent attacks of neuralgia — an inveterate complication which scientific medical men know to be all but incurable, and quite so by any exclusive medicinal measures. Finding no permanent relief from the best medical advice, combined with nearly three years' continental travel, when I was first told of the bold and comprehensive treatment, which a man without any profes-

sional education had ventured to make upon the human body, mainly by the application of pure water, my informants seemed to consider that they were less citing a great discovery in remedial art, than a new instance of the audacity of empirics and the credulity of mankind. I had reason to think differently, and had often contemplated the possibility of a rational system of hydrotherapeutics. Soon after my matriculation at Trinity College, in 1825, having already studied some years at a large hospital, I heard from the lips of one of the greatest professors of the day the following remarkable words:—"*If men knew how to use water so as to elicit all the remedial results which it is capable of producing, it would be worth all other remedies put together;*"—knowing sufficiently the grounds upon which Dr. Macartney made this assertion, and coming from one who was then my Magnus Apollo, it made a more indelible impression, perhaps, on my mind than it did on any other of his large class of hearers; and now, after the lapse of many years, I heard of a non-professional man attempting to solve the problem indicated in the dictum of one of our most profound physiologists and best teachers. I did not hesitate to proceed at once to investigate these pretensions, and put them to the proof in my own person, for a period exceeding a year.

This treatment resulted in my returning to Italy in good condition, and in as perfect health as I had ever enjoyed. When I left Vienna, I weighed 9 stone 3 lbs., when I left the Water-Cure, 10 stone 12 lbs. At the end of three months' treatment, I could walk twenty miles, and eat hard cow beef with any man; for several years previously, a walk of two miles had been followed by exhaustion. This state of existence, as may be easily imagined, was a pleasing change when compared with the long period during which my diary had been the record of daily and nightly dosings, and of the disappointment experienced from the failure of the last kindly-advised course of drug medication,—often indeed undertaken to please

others, and contrary to my own opinion of its success. Nor should the remark be omitted, that after the first fortnight, the treatment by which I had regained my health was found to be, if not a positive enjoyment, at least a very agreeable pastime.

Even in Germany, little was then generally known of the results of this treatment, still less of the theories, upon which it was grounded. Staying at Vienna, I regularly visited its hospitals, and I was personally acquainted with many of the most eminent practitioners, yet I heard nothing there of the Water-Cure or Priessnitz; and when, on a second visit to that city, on my way to Græfenberg, I asked the medical men—whom I had consulted for my own maladies—why, seeing that those maladies had obstinately resisted all the orthodox remedies which had occurred to their science and experience, a trial of the Water-Cure had not been, at least, suggested to me; the answers I received were to the effect, that even if they had thought it applicable to my case, the Water-Cure had been but a passing whim of the day; and that they understood the establishment at Græfenberg had been already abandoned, or suppressed by government interference.

Thus wholly unknown in England, and its beneficial results but partially and obscurely recognized in that part of the continent in which it received its origin, as a regular system, was this great discovery, when I determined to introduce it amongst my countrymen, and make of it that rational medical practice for which I clearly perceived it had all the capabilities. I was deeply impressed with the importance of what I had to do, and equally prepared for the strenuous opposition which I saw was unavoidable. Few medical men would even listen to me, or discuss the *rationale* of the system; and, with one exception, all my own friends in the profession sought to dissuade me from the undertaking. An equally serious obstacle to success was to be apprehended in the prejudices of patients, as in those of medical men. The departure from previous

habits, the unqualified resignation of stimulants, declared by the doctor "best acquainted with their constitutions to be necessary to their support"—and of palliative drugs —which, though they did not cure, gave "a relief for the time"—vague notions, still represented in imaginative caricatures of bodies wasted to inanition by merciless sweatings, and gasping for breath under the headlong rush of descending cataracts—to say nothing of the "evident insanity of lying in wet sheets"—were not calculated to favour the rapid progress of an attempt unprescribed in the Latin of popular practitioners, and unsupported by the cheering advice of the family medical attendant.

Yet that the progress has been as rapid as that of any other important addition to the art of healing, none can deny; and *that* progress was owing, in the first instance, to the widely-circulated rumour of my great success at Malvern. It led, also, almost immediately to professional visits to Græfenberg, and to the formation of new establishments in this country, in Ireland, in America, and even in Germany. And this confirms the correctness of a remark made to me by a retired and celebrated German physician, mentioned in my first hasty brochure on the water-cure,—viz., that he lamented the blindness of his medical brethren to the great remedial adjuncts offered to them in this system, as well as being too old to begin the practice of it himself; but that he felt assured, if it succeeded in England, it would be received back from us with greatly increased favour and appreciation. The number of establishments founded within the last fifteen years, flourishing in Europe, and not least in Great Britain, attest the success with which more than ordinary obstacles have been encountered and overcome; and if I may with humility refer to my own instance in proof of the general fact, I have but to refer to the small house in which I first located myself with ten or twelve anxious and hesitating patients, to the establishment since built by me, for their accommodation, and often filled with above sixty

invalids,—besides many others who prefer to be treated in lodgings—submitting every variety of disease, with appreciation and confidence, to those applications of water formerly regarded with so profound a terror, and held to be suitable to so infinitesimal a minority of cases. For it must be remembered that for several years many of my patients came to me with grave and solemn remonstrances against their temerity, from their medical advisers or relatives—or both. I may also observe, that if I had listened to persuasion, or had chosen to adopt many of the arts, sometimes innocent and justifiable in themselves, so often used to make known, or propitiate favour for a new discovery, I could easily have doubled my practice.

For this success, steady and progressive,—not to be ascribed to the recommendation of members of our profession, nor to the predisposition of patients,—may I presume to think that there can be but one adequate cause,—viz., the cures and striking ameliorations that have been effected in cases treated for years without success by the best selected remedies of the most noted practitioners. It is the patients who send us patients. And in hydropathic treatment we have this advantage over all others not accompanied with a general regimen, enforced by example, and under the vigilant eye of the practitioner,—where, whether from the nature of the case, or more often, from the incapacity of the patient to spare from his vocation or pursuits the time requisite for a complete cure, a complete cure of the special malady is not obtained,—we rarely fail, if our treatment be judicious and rational, to improve the general health, add largely to the vitality in the system, and to encourage those simple and healthful habits, which, if persisted in, may suffice of themselves, in many cases, for ultimate recovery. Thus, even where the patient cannot assert that he left his ailments totally behind him, he still usually repeats to some anxious friend or fellow-sufferer, "that he certainly felt much better—that he regained a degree of

appetite, sleep, and power of exercise, to which he had been long a stranger; and that while he saw, during his residence amongst us, many cases to authorize the hopes of a despairing invalid, he saw none to justify his alarm."

At the same time it would be idle to deny that the Water-Cure, like every other remedial treatment, requires *experience* on the part of the practitioner, and co-operation on that of the patient. The duty of the last is indeed easy; it is but strict compliance with the regulations prescribed. But experience is a word of strong import when applied to a practitioner of the Water-Cure. In our ordinary modes of medical treatment the young practitioner has much to assist him in the formulæ and doctrines transmitted through a succession of predecessors. He learns, for instance, by rote, when cathartics, diuretics, sudorifics, or bleeding and blistering are necessary, and of what drugs the doses may be composed. But the medical practitioner who devotes himself to the Water-Cure must learn for himself, by sustained and patient examination of individual cases and the analogies to be drawn therefrom, by what modification of treatment he can dispense as much as possible with the above-mentioned remedies, and obtain from the simple agencies at his disposal the object he requires to effect. It is not enough to prescribe a sitz bath for a case in which the sitz bath is beneficial—the question is, what shall be the duration of the bath, and what the temperature of the water. And though I may assert that it requires a more than ordinary degree of rashness and mismanagement to make the Water-Cure in any way dangerous in cases where vitality is yet strong and no organic disease exists, yet its skilful adaptation necessitates a certain amount of aptitude, with a nicety of judgment which can only come from a long familiarity with the application of its processes to the varying phenomena of disease, and the various idiosyncrasies of constitution. And after a more lengthened experience, I still deem it of sufficient importance to repeat the advice I

wrote in 1840, viz., that he who purposes entering on the practice of the Water-Cure, should *familiarize* himself with the different processes, by submitting his own person to their application, for a sufficient length of time to understand their effects. No valid objection can be made to this excellent practical study,—if the student be ailing or out of condition, his time will be spent with a double profit; if he be already in health, it will be found an agreeable undertaking. I have frequently heard it remarked, by medical men under my care, that an intelligent non-professional patient, after a week's treatment, had a more clear and just appreciation of the Water-Cure than all their medical friends, and that they were surprised to find how erroneous had been their own preconceived notions.

In the meanwhile, no greater benefit can be conferred on this system than the addition to our knowledge on the subject, by principles drawn from facts submitted to personal knowledge. I have, therefore, given a sufficient number of cases, so authenticated that the facts cannot be doubted by the most sceptical or unwilling. In the majority of instances cited, the patient relates his own case, affording the reader an opportunity whereby he may judge of the impressions produced by the Water-Cure treatment on a variety of non-medical invalids. Every science and every art must have its appropriate literature. Hence I have given up my leisure for several years to the composition of this work,—partly with a view to illustrate the principles upon which the hydropathic treatment is founded, —partly for the use of my patients here, as well as the many with whom I correspond,—partly to afford the assistance of an extended experience of its operations to those who may undertake to administer it, with defective opportunities for acquiring the preliminary knowledge. For it must be owned that the Water-Cure is subjected to this peculiar disadvantage; ignored by the great body of the profession, it is liable to fall into ignorant or empirical hands: a man little instructed by a professional educa-

tion, sometimes,—since drugs are supposed to be dispensed with,—holding it unnecessary to be instructed at all, resolves to set up for a water doctor. He passes, perhaps, a few weeks at a Water-Cure establishment, familiarizes his eye to the mechanism of the processes, —well if he condescend to do so much—and fancies he has only to find some convenient spot where good water can be had for nothing, in order to advertise for patients, and when the patients are found, to wrap them snugly in wet sheets,—request them to seat themselves twice or thrice a day in a vessel of cold water, —wear a compress—and imbibe a certain number of quotidian pints from the spring. Lamentable will he find his error; more lamentable still will be the error of many of his confiding patients. It is true, that even thus he may not produce serious or irremediable disorder, but rarely indeed will he blunder upon a cure, when the cure is not within easy reach.

Experience is the first requisite; but that experience must, as a general rule, be acquired by a man who has learnt how to use it by disciplined observation and physiological studies, —studies not to be left with his books on the shelves of his library, but for common use at the bed-side, and in his daily intercourse with his patients. It is true that the genius of an inventor, for which there is no law, enabled Priessnitz to discover many of the secrets by which Nature operates in curing and arresting disease through the agencies of water; and his singular penetration, aided by the vast range of his practice, often stood him in lieu of a scientific education. But it is no ungrateful irreverence to so great a benefactor to say that he would have been saved from many serious errors, and accomplished still more triumphant results, if he had united to his natural genius a professional education. And this indeed he practically acknowledged, since every year he saw the necessity of modifying his original treatment; and he was to the last improving his practice, upon principles

which would have been familiar to him in the first few years, had he learnt all that we know of the machinery and functions to which his excellent remedial processes were applied. Instead, therefore, of exclaiming with the inconsiderate, "If Priessnitz could accomplish such results without elementary professional knowledge, why should not any man equally unscientific undertake the same."—we should rather say, "What should be the results in the hands of well-informed medical men of talent and experience?" The uneducated Arkwright might hit upon an invention which has added infinite millions to the wealth of nations, but that is no argument in favour of the neglect of science; and to carry on the invention of Arkwright, science, on the contrary, sharpens its training, and increases the circle of its disciples.

I must acknowledge, however, that Priessnitz had some advantages in aid of his genius, and counterbalancing the defects of his education; his mind was not warped by the all but unavoidable, and sometimes unconquerable prejudices of too exclusive an education. In the many patients who sought his aid, he saw only the injurious effects of drugs; of their uses and remedial properties he knew little or nothing; he had, therefore, no alternative in any difficulty, but to seek the aid of water, and find out the mode of application which would produce the effect desired. This state of matters necessarily quickened his intuitive perceptions and inventive genius, and he ventured with perfect safety and success on different applications of his one remedy, which a man differently placed would not have dared to attempt. During one of our conversations I elicited from him the remark, that he believed he would have fallen short of his actual discoveries, had he persisted in listening to the reading of medical works. He said their contradictions confused, and would have deterred him from using his own faculties, in studying the simple book of Nature, and the remedial power of water.

He had, besides, advantages on which no Englishman

can count; an evident one was in the remote and little accessible situation of his establishment; they who undertook a long and difficult journey were prepared to give his treatment a full and lengthened trial; if he mistook the right treatment in the first instance, he had ample time to repair the error; and in chronic disease time is required to cure, however well chosen and administered the remedies may be. In this country, barely one in a hundred ever gives the Water-Cure a fair chance, and therefore few know the extent to which its remedial effects can be carried when judiciously applied. Another advantage was in the general character of his patients. The class of invalids most difficult to treat, and for which treatment requires the nicest care, the most thoughtful consideration, and perhaps the most refined knowledge of physiology and pathology, is as rare in Germany as numerous in England;—it is the class comprised in the appellation of "nervous patients,"—those in whom the nervous centres and digestive organs have passed from a physiological to a pathological condition. Every phase of civilization engenders, to a great extent, its own complaints. Our forefathers, living much in the open air, but overtasking the stomach with wine and heavy food, had a certain amount of condition, with obtuse nerves and well-developed muscles, but they had the maladies of gluttons, and the diseases induced by excesses of alcohol. Our contemporaneous generation has reformed the excesses of the table. The three-bottle man has disappeared; drunkenness is no longer the boast of the gentleman, it remains as the vice of the ignorant, or of the unfortunate whose once temporary relief has become a confirmed habit; but in our day the *head* is overtasked.

We see that in proportion as education has increased the range of competition and the stimulus to rise in the world, energies are strained, and emotions excited, to the circumference of a circle constantly expanding. The passion of contest, and the ambition to succeed, which were formerly

confined to a few, now extend wherever man, no longer contented with his position, can strive for reputation, or speculate for gold. To one kind of philosopher there is in this change but a pleasing symptom of the activity and intelligence of an improved social state;—he sees its results in the augmented wealth of nations, in the triumphs of science, and the increase of national power. To the reflecting medical man the prospect is more alloyed. He sees how dearly the body pays the penalty exacted by the labours of the mind; how its tissues degenerate in structure; and how complicated nervous disorders begin to occupy a prominent rank in the catalogue of human sufferings. Happy would it be for man if he could task his brain as a machine separate from his abdominal viscera. Love is not the only passion which controls the pulse and usurps the heart; ambition is as imperious a tyrant over the emotions, and it often exercises a sway as absolute over the small tradesman toiling for the plate-glass windows to his shop, and looking forward to his rank in the municipality of his native town, as over the higher grades possessed with worldly ambition.

Thus hope and fear are constantly preying on the system: and Fear, mixing its thick darkness with the radiancy of Hope, begets the uncertain hue of anxiety;—the inexorable anxiety which lies down with its victim at night, and walks at his side by day. Persevering competition is one state of chronic nervous excitement. It is clear that the number of such brain and gastro-hepatic sufferers must be in ratio to the social circumstances which influence the causes of competition,—to the freedom of institutions, to the spread of education, to the command of monied capital in commercial enterprise and adventurous speculation, to the degree of respect afforded to the gains of wealth and the acquisition of worldly station. It is no wonder, then, that in America and in Great Britain nervous disorders should pre-eminently flourish—luxuriant in the crop and infinite in the variety—from the dulness of that hypochondria in which

the patient feels mournfully ill, he knows not how nor where, to the iron gripe of the *neuralgia*, which fastens on a spot and makes existence a torture.

It is but just now that an intelligent American patient has been saying to me, that if I visited the new country I should find an unlimited field for the study of genuine *ramollissement*, or softening of the brain and spinal chord, with insanity, paralysis, and neuralgia, in all their varieties; to these are added all the formidable conditions of disorders of the digestive organs; but business cannot be arrested—the man of progress or ambition must go ahead;—but so that he succeeds, he heeds not the shortening of an existence already sufficiently brief. As soon as he can, he bolts his food, and hastens to his store; there, with the indomitable perseverance of the Anglo-Saxon, however suffering he may be, continues his work,—and, to enable him to do this, alcohol in every shape is poured down to smother for a while the torments of *dyspepsia*.

The Anglo-Saxon is the active civilizer of the globe, and the Anglo-Saxon is more particularly the nervous patient. Patients of this kind, however, were not so largely known to Priessnitz, and he failed to recognise, as he might have done, this class of complaints. It was soon evident to me, that he had not much *affinitive sympathy* with them. Hence, as I have observed in the course of this work, his treatment was deficient. In the list of his remedies, he overlooked the restorative anodyne of *repose*,—few, indeed, turn it to account, or appreciate all that the word comprises. He went on too resolutely with stimulants and reactions, and the patient must always be labouring too much to get well; he did not understand sufficiently that nature would often help him the best, in many of these cases, if treated quietly, and left more to herself.

My attention has been naturally directed to this large class of complaints, and I believe I have been the more successful in their treatment, inasmuch as I have experienced and studied in my own person the very ailments I

have so often cured, and know what delicacy of management is required by the unstrung and aching nerves, which it is as injudicious as fruitless to attempt to bully into tone. The ills that the infinite variety of moral and physical fretting often produce in the nervous centres and digestive organs, can no more be cured by exaggerated and unreasonable water-treatment, than by high feeding and physic-taking.

Priessnitz, in his self-taught theories and practice, set out on one broad principle, admirable indeed in itself, but which he often carried to an extreme. In the treatment of chronic disease, his leading idea, it appeared to me, was to restore the whole man,—to give him new flesh and blood; and if he could accomplish this, he trusted that all local diseases and their symptoms would disappear. He did not apply himself, therefore, as much to the disturbing cause as he should have done, but too often rested satisfied with the exclusive endeavour to build up a new system in the whole patient. Hence, he did not examine the tongue, or understand its indications—indispensable to accurate diagnosis,—nor did he feel the pulse. He looked steadily into the eye; he noted the condition of the skin; he showed great experience in computing the amount of vital power to which to proportion his treatment, and he went to work at the reconstruction of the patient on sound general principles. If he did not discover the precise seat and nature of the diseased condition which impeded the reconstruction, it gave him but little anxiety; "the water," he said, "will find it out, and help nature to produce a crisis of her own." It must be conceded that this theory, aiming not so much at the repair of any part as the rebuilding of the whole body, would often produce striking and permanent results, when the patient could spare the time. But now we are enabled, by directing our first attention to the removal of the disturbing cause—the diseased condition itself—greatly to abridge the process of recovery, to lighten the efforts of nature for her own

relief, and, in the majority of cases, to avoid that revolution of the system which he classed under the general appellation of crisis, and to which his patients were accustomed to look as the wished-for and necessary evidence of a cure.

In short, it was the natural error of a self-taught man like Priessnitz, who had so long witnessed the wonderful changes from disease to health, produced by his simple treatment, to regard the Water-Cure in some measure as the alchemists regarded the elixir of life—all that were curable were equally to be restored to health and to vigour, provided only the elixir was sufficiently administered.

It is the great object of physiological and pathological science to remove from the system of the original inventor the charge of empiricism, to ascertain the disease to be dealt with, and to apply the various modifications of treatment with nicety and skill, according to the true principles of *rational* medicine. And it is in order to prove that this can be done, and in what way physiologically the principles of doing it are to be enforced, that in the course of my work I have given a comprehensive explanation of the principles of physiology and pathology, and the details of hydropathic treatment. It is my desire to make clear to non-professional readers the laws by which the Water-Cure becomes a *really curative art*, according to that interpretation of the laws which well-educated medical men will, I venture to hope, admit to be scientifically correct.

The Water-Cure is not an incongruous prescription incomprehensible to a layman or a physiologist, nor is it a patent medicine the ingredients of which are to be jealously concealed. Its advocates court inquiry into all its mysteries. And here I may mention, that its curative results, far from being confined to chronic diseases, will be equally found in the treatment of acute cases. In the treatment of the former, it may be said, not without justice, that pure air, appropriate diet, exercise, and early hours, combined with a lengthened period of scientific management,

contribute their important quota to the cure; but in acute cases, requiring vigorous measures and prompt treatment, these adjuncts do not come into play.

In the treatment of acute cases, Priessnitz was very judicious and successful. I have seen him treat fever, apoplexy, and phrenitis; he always seemed assured of a happy termination, and I have not known of his meeting with a disappointment. Besides having witnessed the successful treatment of many acute cases by the Water-Cure, I have also had sufficient personal experience to enable me to give an opinion with confidence. I have treated myself when suffering from gastric fever, and in two attacks of laryngitis, so rapid in their progress, that a few hours' mismanagement would most probably have been followed by a fatal termination. I treated my wife and daughter when in scarlet fever; the former in the midst of a fatal epidemic. I have also had cases of formidable erysipelas, scarlet, gastric, and rheumatic fevers; inflammation of the lungs, croup, apoplexy, and delirium tremens; and the results have been such, that I feel assured the Water-Cure treatment only requires to be introduced into private practice, or into our hospitals, under the eye of a candid medical man, in order to ensure its recognition amongst the most important discoveries which our age has added to the triumphs of intellect for the relief of humanity.

I have already lived to see its value partially, at least, acknowledged by several of the most eminent of my medical brethren. In some instances, my patients have been sent to me by their recommendation. In a recent medical work, highly esteemed by the profession, the efficacy of hydropathy, as a part of *rational medicine*, has been admitted. I am contented. It is not to be supposed that many medical men will soon renounce the exclusiveness of their prescriptions, or pass a comparative interdict upon drugs; nor, while I unite with the most enlightened of my professional brotherhood in denouncing the dread

abuses of polypharmacy, which every succeeding year tends to mitigate, would I expect that all mankind are to rely alone upon the Water-Cure, or that the pharmacopœia is to be blotted from the records of science. We cannot altogether dispense with medicines; they are, in certain cases, a great aid, and indispensable.

At the commencement of my undertaking to introduce the Water-Cure into this country, I had to encounter the inevitable fate of all innovators; every fact I alleged was to be disputed; every argument I advanced was in the teeth of a prejudice. The early stages of such a controversy are ever liable to be embittered by the zeal of the innovator and the scoff of the assailant. Time and success permit me to regard the points yet in dispute with a calm and hopeful temper, since so many points at first disputed have gradually disappeared from the contest. And I do confidently assert, that no member of the profession is more earnest than myself in the wish that the Water-Cure should be firmly united to physiological and pathological science, divorced from all empirical theory and practice, examined by careful reference to the laws on which the art of all rational medicine must depend, and tested by its practical results in the hands of those who combine a comprehensive medical education, with a special experience of the system to which our more advanced medical knowledge is to be applied.

J. W.

Malvern, January 1st, 1857.

In order to make this volume of the cheap and portable size I intended, I have been obliged to omit my popular treatise on pathology. It will be found, however, in a larger edition, published by Mr. Churchill, of New Burlington-street.

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THE WATER-CURE.

PART I.

PRELIMINARY MATTER, RELATING TO THE PRESERVATION OF HEALTH AND THE CURE OF DISEASE, BY WATER, AIR, EXERCISE, DIET AND REPOSE, &c.

"If men knew how to use water so as to elicit all the remedial results which it is capable of producing, it would be worth all other remedies put together." *MS. Notes of Dr. Macartney's Lectures at Trinity College*, A.D. 1826.

"The practice of hydropathy, when based on physiology, and its doses graduated, is entirely in accordance with the principles of RATIONAL MEDICINE. There is no question but that it might be made an useful handmaid to RATIONAL MEDICINE."—*Dr. T. K. Chambers, Physician to St Mary's Hospital.*

"It more than doubles our power of doing good. Of course it will meet with much opposition, but none, come from what quarter it may, can possibly prevent its progress, and its taking firm root. It is like Truth, not to be subverted."—*Herbert Mayo, Esq., Senior Surgeon of the Middlesex Hospital.*

"The principles of the Water-Cure treatment are founded in Nature and Truth. We have in our power a new and most efficacious agent for the alleviation and cure of disease in various forms; and in proper hands as safe as it is effectual. I should be no friend to humanity, nor to medical science, if I did not give my testimony in its recommendation."—*Sir Charles Scudamore, M.D., F.R.S.*

"Its paramount virtue is that of preserving many a constitution from pulmonary consumption."—*Dr. James Johnson, Editor of the Medical Quarterly.*

"At the Water-Cure, the whole life is one remedy. If it cures your complaint it will assuredly strengthen your whole frame; if it fails to cure your complaint, it can scarcely fail to improve your general system."—*Sir Ed. Bulwer Lytton, Bart., M.P.*

"To give you the praise and the virtue of the Water-Cure, concentrated in one short phrase,—it is the re-establishment of the domination of the Physiological Laws. Any medical philosopher will tell you, no matter what his practice may lean to, that such must be the best, and a beneficent agency mighty to cure."—*J. W.*

THE WATER-CURE.

PART I.

PRELIMINARY MATTER, RELATING TO THE PRESERVATION OF HEALTH AND THE CURE OF DISEASE, BY WATER, AIR, EXERCISE, DIET AND REPOSE, &c.

My DESIGN in the following pages has been to give a scientific, yet popular, exposition of the laws and functions on which the Health of the Human Body depends, the philosophy of its cure when diseased, and the methods in which the latter has been applied by me with success, in my long practice of the Water-Cure Treatment in this country. I have, by the desire of many of my patients, and on deliberation, been led to adopt the form of dialogue as a more convenient vehicle of thought and medium of discussion. It seems to me not only to invite to a more lucid method and a more popular style, but, by facilitating the introduction of objections, pertinent queries such as my patients often propose to me (finding no answer in severe, unbending systems)—it seems to enable me to present principles in many new and practical attitudes, which but for some such earnest, though imaginary, discussion with a non-professional reader, I could not have succeeded in doing. And although I am not without the hope that many of my medical brethren, superior to petty infirmities, and only anxious to welcome truth from any quarter, will seek and find in my pages much that is at once "*new and true*," temperately enforced and practically illustrated; it is, as I have hinted, for the intelligent layman that this book is more especially intended. And it would be well, perhaps, if my medical brethren more often addressed a similar

reader—if they recognised more generally the growing intelligence of the age and the absolute necessity for more confidence and sympathy, less mystery and form. For I am firmly impressed with the conviction, that if mankind are to be more signally benefitted by the science and art of healing, it can but be when its practitioners shall no longer write only in esoteric phrase, for the members of their own profession, but, rising to a higher function of their calling, shall themselves teach and advise the many, how to avoid disease, by unfolding in clear and simple language its causes, its sources, and its remedy. Indeed, if the science of medicine, and a *rational curative art*, have not advanced *pari passu* with the march of other sciences, arts, and institutions, it is in a great measure because of the temptations of idleness and luxurious refinement on the one hand, and of the jealous dignity and politic half-spokenness of a professional caste on the other. The first has given unhealthy habits, enfeebled constitutions, and *chronic diseases;* it has also given an impatience of slow but permanent results, an unwillingness to make apparent sacrifices in order to regain health, a shrinking from self-denial, from simple living after natural laws—with unstimulated activity—and, by an unhappy consequence, an ignorance of their exquisite pleasures and rewards. The last or *professional system* has been shaped to the prevailing spirit, and has reacted on it; hence the alluring facilities of cure, the fatal concessions to expediency, the wonder-working nostrum, the cabalistic forms, the mysterious priesthood, the want of honest teaching and bold re-assertion of Nature's violated laws. But the tide is already setting to better things. Public opinion is no longer so wedded to tradition; it is every day more eager to examine, to discover, to apply. The Harveys and the Jenners could not now be called upon to lead the "forlorn hope" of truth against the citadels of ancient error; rather would they march under the banner of a sufficiently widespread sympathy for their aims, and with the murmured applause of a large and enlightened section of the people. Active opposition there must ever be to any bold negation of what has long seemed to be true; but now it is not the crushing omnipotence of schools and bigots; it is the equal trial of the tourney on the fair field of impartial public judgment, the healthful violence of the wind which snaps the withered bough, and gives strength to the newly budded sapling.

So it has been with the discovery of the curative virtues, latent in the scientific application of water, to the complicated maladies of the human body. This, and the old and simple yet eternally new and beautiful rules which Nature gives us for the enjoyment and preservation of life—these, which from their happy combination, for the first time, have been known under the name of the Water-Cure, are at length rising into the real importance they deserve. It has had to emerge slowly but steadily through the ordeal to which all new truths are subjected—all innovations which thwart general prejudices or interfere with special interests —all departures from venerable but effete systems towards something simpler and higher. Neither the daily-increasing facts of cure nor the theoretic principles which led to them, have yet been confuted either by private writers, or the avowed organs of medical men. It was easy, as it has always been, to hail the first announcement of a novel doctrine with derision, or dislike, or affected pity for its professors. But, although shrewdly politic in the budding of some important discovery, such attempts do but recoil on their authors, when time and experience have set their seal upon it, and its virtues have made themselves a home, so to speak, in the memory of a grateful people. The thing can be no longer disowned. But, with ever-ready resources, the *laudator temporis acti* changes his ground, and captiously challenging the novelty of the notions he has just been treating with contempt, claims them as feathers borrowed from his own plumage; they are his own patent ideas which at first he did not recognise, so ingenious were their changes and concealments. Still it would be well if opposition stopped here, and personal abuse never degraded an arena which should be sacred to the search after knowledge, and kindly endeavours for human welfare. But with these onslaughts the scientific practitioner of hydropathy has now nothing to do. If he values his belief and desires its diffusion, he must patiently wait until professional prejudice gives way, relying only on the calm and slow but majestic and resistless march of truth, and the public appreciation of it. True, he cannot assert some of his principles and their applications without condemning, by unavoidable implication, many of the old ones, they are, in his view, fitted to supersede. But the unwilling testimony of a "cloud of witnesses," could be gathered in the highest ranks and organs of the profession, which have the air rather of violent

attacks and deep-rooted indignation, when compared with the temperate expressions of opinion which can be drawn from the teaching of the advocates and practitioners of the Water-Cure.*

* Lest this should be laid to the charge of general assertion, I subjoin here for the reader's instruction or amusement, as the case may be, a short string of medical opinions that could be infinitely multiplied by any student of medical literature :—

Dr. Paris, president of the College of Physicians, says—"The file of every apothecary would furnish a volume of instances where the *ingredients* of the prescription were *fighting away in the dark.*" (Decomposing or neutralising each other.)

Dr. James Johnson, many years editor of the "Medico-Chirurgical Review," and who made a fortune by practice in London, says, in the last work that he wrote, that it is "His conscientious opinion, founded on long experience and reflection, that if there was not a single physician or apothecary, or man midwife, or druggist, or drug in the world, there would be less mortality amongst mankind than there is now."

Dr. Reid says, "More infantile subjects are perhaps diurnally destroyed by the pestle and mortar, than in the ancient Bethlehem fell victims in one day to the Herodian massacre."

Dr. Billing, physician to the London Hospital, says, "I visited the different schools of medicine, and the students of each hinted, if they did not assert, that the other sect killed their patients."

Franks says, "Thousands are slaughtered in the quiet sick-room."

The celebrated Dr. Rush says, "We have multiplied diseases—we have done more, we have increased their mortality."

Abernethy said, "There has been a great increase of medical men of late years, but, upon my life, diseases have increased in proportion."

The celebrated Dr. Baillie, who enjoyed, perhaps, the largest and most fashionable practice that ever fell to the lot of any physician in the world, declared, after forty years' experience, "*that he had no faith in physic;*" and on his death-bed, he frequently exclaimed, "*I wish I could be sure that I have not killed more than I have cured.*"

"In Hoffman's dissertation 'On the Seven Rules of Good Health,' the last and most important of these is, 'Fly doctors, and doctors' drugs, as you wish to be well;' and this precept of that great physician is inculcated by the most successful practitioners (or non-practitioners) of ancient and of modern times. Celsus well expresses it :—*Optima medicina est non uti medicina;* and I have heard a most *eminent physician* candidly confess, 'that the best practice was that which did nothing; the next best, that which did little.' In truth, medicine, in the hands by which it is vulgarly dispensed, is a curse to humanity rather than a blessing; and the most intelligent authorities

Leaving these matters to the meditation of those it may concern, we now turn to other and more grateful inquiries that claim our attention. Of the Water-Cure, the practitioner and the patient may, and do, with calm confidence truly say, that it has great advantages over every other system hitherto practised. In the work before us I have endeavoured to explain that these pretensions are supported,—

1. By its strict accordance with the ascertained chemistry of life and phenomena of disease—the facts of physiology and pathology.

2. By the peculiar fitness of its agency to fulfil the ends and indications of treatment which our more mature knowledge of health and disease points out.

3. By a strong array of unquestioned and unquestionable *facts*, cases of cure, and cases of relief, where cure was considered hopeless, and relief appeared impossible by the best remedies of drug-medical practice.

The paramount error of all medical treatment hitherto has been, to do too much or to do too little—either to leave morbid processes unchecked or unmitigated—as in the purely expectant method, that is, by leaving Nature to her own resources; or by *incessant* or alternate depletions and internal stimulations, as in the revulsive method; to leave no place, or hardly any place, for Nature to do her own work;—at once to baffle her sanative operations, and to diminish the powers of resistance, by undermining the constitutional stamina, to which she trusts for carrying her subject through tedious morbid processes;—or, if a present recovery is accomplished, to do it at the expense of an increased liability, in too many cases of an actual foundation laid, for *future maladies*. Under the Water-Cure, its safe, salutary, and nature-like treatment, things are differently managed. No exhausting depletions are permitted. The life-blood is not drained. The delicate organization of the

of the profession, from Hippocrates downwards, agree that on an average their science, at *least its practice*, is a nuisance, and 'send physic to the dogs.' The Solidists, indeed, promptly admit that the Humorists were homicides by wholesale for above fifteen centuries: while homœopathy is a recoil against the *murderous polypharmacy* of the Solidists themselves."—Sir William Hamilton's "Discussions on Philosophy."

mucous membranes and sensitive surfaces of man's inner parts, the core of man's vitality, and the sources of his restoration, are respected.

The inference to be drawn is clear, and scientific practitioners are beginning to see the difficulty. Of all parts of man's curiously wrought mechanism, the stomach and bowels deserve the first to be rescued from the agencies of disorder, and to be maintained intact and unimpaired. In their integrity lies the greatest chance of restoration for the diseased body. Instead of this, by excessive and exclusive internal medication, morbid causes resident in the digestive organs, are often aggravated and confirmed; because the already suffering stomach is further abused by being made the vehicle of irritating medicines, that even in a state of health outrage its sensibilities and overwhelm its functions. The heaviest blow and greatest discouragement to Nature, that can be inflicted, is by making the stomach and bowels the exclusive field of warfare against disease.

In a favourable critique on the Water-Cure, in the *British and Foreign Medical Review*, October, 1846, the eminent and learned Physician of her Majesty's household, Sir John Forbes, holds similar opinions to those already expressed, as will be seen by the following *extract*:—

"The Water-Cure is a *stomachic*, since it invariably increases the appetite.

"It is a *local calefacient* in the wet sheet covered by dry blankets.

"It is a *derivative*; cold friction at one part, by *exciting increased action there, producing corresponding diminution elsewhere; the compress* frequently acting, if not like a blister, at least *like a mustard poultice*.

"*It is a local as well as a general counter-irritant.*

"*It is essentially alterative* in the continual removal of old matter: its renewal is shown in the maintenance of the same weight.

"An important hydropathic principle is, that almost all its *measures are applied to the surface*. One of the most *formidable difficulties* with which the ordinary physician has to contend is, that nearly all his remedies reach the point to which they are directed *through one channel*.

"The only means of relieving certain diseases *is by inundating the stomach and bowels with foreign and frequently* to them *pernicious substances*.

"Hydropathy employs a system of most extensive energetic general and local *counter-irritation*.

"A fifth physiological feature of hydropathy is the number of coolings. The *generation of caloric has been traced to its right source*. It results from the burning up of waste matter, which by accumulation would become injurious.

"It is singular enough that almost all arguments used *against cold bathing* are the strongest theoretical arguments *in its favour*. Dr. Baynard, a most sarcastic writer, gives us the following anecdote :—

"'Here a demi-brained doctor of more *note* than *nous*, asked, in the amazed agony of his half-understanding, how 'twas possible that an *external application* should affect the bowels, and cure *pain within?* 'Why doctor,' quoth an old woman standing by, 'by the same reason that, being wet-shod or catching cold from without, should give you the gripes and pain within.'

"If a rude exposure of the surface to cold and wet is capable of producing internal disease, there is no *doubt that a close relation exists between these agents and the morbid* conditions of internal parts."

After a long and favourable review of the Water-Cure, showing its value, he ends, "After what has been said and written in favour of hydropathy, judgment must therefore be entered by default against its opponents, and hydropathy is entitled to the verdict of harmlessness, since cause has never been shown to the contrary."

The skin and lungs, Nature's great eliminators, evacuating more worn out elements or morbid materials than the bowels and kidneys—these, with the digestive organs, receive the water-doctor's first attention, as, with their restored integrity of function, few diseases can linger in the system, or long baffle the practitioner. The salutary and cleansing effect of pure water, taken as a remedy internally, will be found sufficiently explained; then comes the pleasure, under this system of treatment, of being *enabled* to take sufficient exercise, with the zest given to the daily routine by the exhilaration consequent to the hydropathic processes. Add to this, the thorough relish of three wholesome meals a day—the copious relief which follows with certainty after breakfast, and the sound and refreshing sleep. It is easy to conceive the effect on the *nervous system*, and therefore on the whole organism, of a daily repetition of this scientific system; namely, the making of *rich blood*—the acquisition

of *solid flesh* and of strength, the elasticity of physical feeling, the buoyancy of spirits, and the vigour of mind, which impart to the patient a consciousness of renovated existence —in common parlance, of a new lease of life.

The phenomena of the generation of animal heat help, in some measure, to explain the rapid cures both of acute and chronic diseases accomplished by the water treatment. The *vital changes of matter* within the system are the necessary conditions to the development of animal heat. It is a law of chemistry, that when bodies enter into new states or combinations, when changes are effected in their composition, or in the arrangement of their ultimate particles, *heat* is evolved. Such changes cannot take place without heat being set free. It is the same with the living body. The more the body is duly and justifiably tasked to develope its animal heat, the more rapid and extensive are the transformations of the structure,—old materials are thus broken up, and enter into combinations with the oxygen of the air, which removes them out of the body; or they are drained off by the other excernent outlets. The result of this state of things is, that the powers of nutrition are largely called upon, to supply *new materials* to repair the extra waste. *Absorption* is increased, *Digestion* is promoted. *Assimilation* is quickened; and a corresponding activity reigns in all the functions. *Vitality*, in short, is augmented. The constitutional powers are in a manner renovated. The poor dejected dyspeptic, with pallid skin, weakened limbs, and shattered nerves, is often, in a few weeks, transformed into a man of strength of body and decision of character; the dyspeptic stomach is incommoded *now* by no food; the paralysed, gouty, or rheumatic limb is set free; and the prostrate fever patient is saved, with a *short* convalescence. Skin diseases, for which no remedy could be found, are cured. Diseased conditions of *liver*, that had resisted the most approved treatment, are restored to healthy condition. All affections of the lungs derive benefit beyond the most sanguine expectations of the patient, and often a perfect cure, when the case seemed barely to admit of it,—all save tubercular consumption. In this disease, *when advanced*, I have witnessed no cure, in an experience of 25 years. Yet in many of these deplorable cases, the amelioration of symptoms is so great, that, during a long period of treatment, sanguine hopes are often entertained by the patient, and inexperienced practitioner. This description

of the effects of the Water-Cure is not hyperbolical, but is realised in the experience of those who treat patients on the new system, and may be witnessed and verified by any professional enquirer.

The exercise enjoined, the water-drinking prescribed, and the frequent abstractions of heat by the various baths, under the water regime, promote very essentially the rapid change of matter, in the due activity of which health consists; the worn out tissues are more speedily broken down and removed from the system, and greater place is left for the substitution of healthy for unhealthy structure. Hence four great points are gained for the invalid:—1. The ability to do with much less clothing; and 2. The power of converting to nutrition additional supplies of food. 3. The greater play for the functions of the lungs, the capability of receiving into the system additional *oxygen*, and of excreting additional *carbon*. 4. As the result of all, an increase of muscular strength, of nervous power, and of mental energy.

As to the special or *artistic* processes of the water-cure, they are capable of being so handled and modified as to produce more effectively, and safely, the peculiar agency often falsely claimed for drugs. The organic action that is too weak, is exalted by the most powerful, yet the least noxious of all stimulants. The organic activity, on the other hand, that is too great, is quieted down by the safest and most easily graduated, of all sedatives. One simple agent—pure water—*properly modified* in its appliances by the water-cure processes, and effectively wielded, is found capable of attaining *nearly* every end that can be desired in the treatment of disease. The foundation of the water-cure is the admitted fact that it is not art or its implements, neither physic nor the physician, but the innate powers and properties of the organism, the vis medicatrix naturæ, exerted with the least impediment from injurious agencies from without or within the body, that stay the progress of disease, and repair its ravages.

The principles of physiology, Pathology, and Therapeutics, on which the Water-Cure is founded, and the received theories of the functions of health and of the actions of disease, may be easily grasped by the mind of an unprofessional man. They satisfactorily account for the extraordinary cures, as they explain the *modus operandi* of the water-cure practice. They may be stated in the following simple way, as preparatory to further elucidation.

Organized structure is continually wasting, and is as continually renewing. The very play of its functions wears down its materials, and exhausts its vitality: renovation is appointed and sought for in *food*, *water*, *air*, and *rest*. To introduce the new materials, those of *supply*, and to give exit to the old materials, those of *waste*, a digestive apparatus and lungs are necessary on the one hand, and a system of eliminating organs, instruments of excretion or evacuation, are indispensable on the other. The change of matter from dead to living, and again from living to dead, the alternate or simultaneous decomposition and recomposition of structure, is the fundamental characteristic of animal life.

The derangement of the balance between supply and waste, the one in excess or defect relatively to the other, in the whole or in any part of the system, is the most tangible idea that I can give you of the state called DISEASE. In the spontaneous efforts of the functions to restore this balance, that is, to equalize waste to supply, and supply to waste, in the whole or in a part, consists the self-preservative power of the organism,—the *vis medicatrix naturæ*. Inasmuch as these efforts are often inadequate or shackled, the resources of the medical practitioner are called in to second Nature, to remove the obstructions in her way, to stimulate her flagging energies, to restrain her too impetuous efforts, or to recall her deviations into the right path.

The process of *supply* and *waste* are carried on in the *capillaries*, minute hair-like tubes, which are the terminations or prolongations of the arteries and veins. The *tone* of these capillaries, that is, their due contractile power, depends on the integrity of the *organic nerves* which supply them. Any cause that impairs this nervous energy diminishes the contractile power of the capillaries. Their diameter expands; their walls relax. Hence the volume of blood in them is increased and its current slackened. These are the characteristic features (technically the *proximate causes*) of the morbid states denominated *congestion* and *inflammation*. The *immediate result* of this state of things, in any part of the animal structure, is disturbance of its functions, the *ultimate* consequences are *organic alterations*, either a softening or a hardening of the affected tissues, a drying up, or a profusion, or an acridity of the usual secretions,—an undue absorption or deposition in parts, or nerves rendered either too sensitive or too blunt,—in short, the balance between waste and supply which con-

stitutes health is lost. The loss of this equilibrium, and the impairments of function, or alterations of structure flowing therefrom, constitute DISEASE. The diversity of these alterations determines the specific varieties of disease. This is about the shortest and plainest account of the matter that can be given to one not versed in the technicalities of physiology and pathology.

The diminished action of the capillaries of a morbid locality is associated in all acute, and in many chronic diseases, with an excitement of the nervous centres, and of the circulating system. This constitutes the state called *fever*, the constitutional disturbance induced by any impaired tissue or vitiated system of the economy. The effect of the continuance of this general excitement is to use up and exhaust the vital endowments of the structure, that is, to diminish their irritability and sensibility, to produce sooner or later exhaustion, and then death.

The *organic nerves*, that is, the nerves that preside over the vital and *involuntary* functions, circulation, respiration, digestion, absorption, assimilation, secretion, are the first implicated in diseased action, the first parts of the living machinery whose energy is impaired. The capillary vessels over which they preside, feel, of course, the withdrawal of a wonted and necessary stimulus. Their tone is destroyed, their walls relax, the blood in them accumulates, the surrounding tissues redden and dilate. The tender extremities or radicals of the sensitive nerves are pressed upon, their sensibility is exalted. The *chemical* or *destructive action* prevails over the *vital* or *conservative*; the change of living into dead matter is greater than the repair, and the heat of the part is accordingly augmented. Consumption of the part goes on rapidly. A great, an unusual development of animal heat takes place as the result. Hence we have all the characteristics of inflammation—*redness*, *swelling*, *pain*, *heat*.

To rescue the body from these states of disorder, to *set* to rights these deranged organic nerves, to rectify these impaired capillary vessels, to remedy local congestions and inflammation, to equalize the circulation of the blood, to diminish excited sensibility, to correct morbid secretions, and to curb or to spur excessive or defective constitutional action, constitute the *whole art of healing*. To attain these objects is the be all and end all, of all the countless remedial agents—the sum total of therapeutics.

All the resources and implements of the art of medicine, whether *drugs*, *bleeding*, *blistering*, *irritating ointments* or *lotions*, *issues*, *setons*, are all reducible, in their ultimate action, to the simple and unique object of increasing the tone of the nerves and capillaries. Their aid is employed either to stimulate deficient action, or to restrain excessive action. Hence they are all resolvable *en dernier analyse* into the two grand heads of *stimulants* or *sedatives*. *Physic* acknowledges no other objects. When it has gained these ends it has discharged its functions. The ministry of the medical practitioner has then done its utmost. The rest is left to Nature. If the needful aid be not too long delayed, she will soon restore the balance of waste and supply; the general harmony and easy play of all the functions—the well-being of body, and the elasticity of spirit, which constitute health.

The best stimulants are those that most powerfully and speedily excite without exhausting the nervous centres. Alcohol or intoxicating drinks, and opium, strongly excite, but these exhaust nervous power, as well as muscular activity. Neither are they immediate in their action; we must often wait for their absorption into the circulation The increase of nervous energy is very often more than compensated by the corresponding torpor and collapse that follow; not to speak of the positively noxious materials introduced into the circulation, which go to poison the fountains of health, gratuitously expend the vital energy, and to produce also a great variety of *chronic* and *acute diseases*.

Far different from all this is the operation of the Water Cure processes. They produce a permanent exaltation of the vital energies, without any morbid collapse; their impression on the nervous extremities on the surface of the body, produces a strong sensation at the *nervous centres*, a stimulation augmenting nervous energy; not to speak of the salutary effects on the *skin*, promoting its capillary circulation, and favouring its exhalations.

The aid of sedatives is required in the commencement of acute diseases to reduce excessive vascular action or nervous excitement. They are technically called *antiphlogistics*, as removing the corporeal conditions of inflammation. The sedative action of water, as it is applied by the experienced and educated Water-Doctor, can be demonstrated to be the most powerful antiphlogistic. It promptly allays morbid sensibility; it constringes the capillaries, and compels them

to urge on their contents; it thus diminishes the vascular fulness of local inflammations and congestions, and moderates the excitement of the heart and arteries, that accompany and keep up the local mischief.

In the exclusive, combined, or alternate use of stimulants and sedatives, consists the whole "*art* and *mystery*" of physic.

That drugs are found but very imperfectly to attain these ends is confessed by the constant search after *new specifics*, and the eager modification of old remedies. The practitioners who understand the remedial powers of water, profess to have found the object so long and in vain sought after.

The grand desideratum of medical science, as well as the longing desire of humanity, is a remedy easy to procure and safe to administer, which may be so *modified* in its appliances, as unerringly to bring about every degree of stimulation or sedation required in the treatment of diseases. On the score of power, certainty, and safety of action, in the attainment of these ends, the cure of the most intractable chronic diseases, exemplifies the superiority of the hydropathic remedial measures, over any and all of the thousand articles and compounds of the Pharmacopæia.

The very simplicity of the water-cure agency, and the fewness of the tools worked with, demand the greater skill in the workman. To treat disease with success, not only must the *original causes* of the malady cease to operate, but the action of water in its varied applications must be thoroughly comprehended, the power of reaction and the stamina of the constitution must be accurately measured; the nature, extent, and locality of disease exactly appreciated by the scientific modes of diagnosis; both the eye and the ear must be trained to detect and read the alterations of the outward man, the changes of physiognomy, attitude, gait, air, or utterance, which bespeak the varied phases of disease.

The dangers of the Water-Cure are a mere bugbear, and only attach to its administration by the most incompetent persons. Even then I can prove to any candid physician, that the mischief that may accrue, under the most unfavourable circumstances, is infinitely less, than what takes place every day under drug administration.

In a popular introduction to a new system of medical treatment, so much *misunderstood* by the profession and the public, it will be well perhaps here to lay before the reader the opinions of a *non-professional* enquirer, one who

writes from personal experience, and known as an acute and disinterested observer, viz., Sir Edward Bulwer Lytton.*

"A little reflection taught me that the members of a learned profession are naturally the very persons least disposed to favour innovation upon the practices which custom and prescription have rendered sacred in their eyes. A lawyer is not the person to consult upon bold reforms in jurisprudence. A physician can scarcely be expected to own that hydropathy will cure diseases that have resisted an armament of vials.

"The first point which impressed and struck me was the extreme and utter innocence of the Water-Cure in skilful hands—in any hands, indeed, not thoroughly new to the system. Certainly when I went, I believed it to be a kill or cure system. I fancied it must be a very violent remedy—that it doubtless might effect great and magical cures—but that if it failed, it might be fatal.

"Now, I speak not alone of my own case, but of the immense number of cases I have seen—patients of all ages—all species and genera of disease—all kinds and conditions of constitution, when I declare, upon my honour, that *I never witnessed one dangerous symptom produced by the Water-Cure*, whether at Doctor Wilson's or the other Hydropathic Institutions which I afterwards visited.

"And though disagreeable results might occur from gross mismanagement, and have so occurred at some establishments, I am yet convinced that water in itself is so friendly to the human body, that it requires a very extraordinary degree of bungling, of ignorance, and presumption, to produce results really dangerous; that a regular practitioner does more frequent mischief from the misapplication of even the simplest drugs, than a water-doctor of very moderate experience does, *or can do*, by the misapplication of his water processes.

"And here I must observe, that those portions of the treatment which appear to the uninitiated as the most perilous are really the safest, and can be applied with the most impunity to the weakest constitutions; whereas those which appear, from our greater familiarity with them, the least startling and most innocuous, are those which require the greatest knowledge of general pathology and the indi-

* "Confessions of a Water Patient." By Sir Ed. Bulwer Lytton, Bart., M.P. London: Bailliere, 219, Regent Street, and H. Lamb, Malvern.

vidual constitution. I shall revert to this part of my subject before I conclude.

"The next thing that struck me was the extraordinary ease with which, under this system, good habits are acquired, and bad habits relinquished. The difficulty with which, under orthodox medical treatment, stimulants are abandoned, is here not witnessed.

"Patients accustomed for half a century to live hard and high, wine-drinkers, spirit-bibbers, whom the regular physician has sought in vain to reduce to a daily pint of sherry, here voluntarily resign all strong potations, after a few days cease to feel the want of them, and reconcile themselves to water, as if they had drunk nothing else all their lives. Others, who have had recourse for years and years to medicine,—their potion in the morning, their cordial at noon, their pill before dinner, their narcotic at bedtime, cease to require these aids to life, as if by a charm.

"Nor this alone. Men to whom mental labour has been a necessary—who have existed on the excitement of the passions and the stir of the intellect—who have felt, these withdrawn, the prostration of the whole system—the lock to the wheel of the entire machine—return at once to the careless spirits of the boy in his first holiday.

"Here lies a great secret; water thus skilfully administered is in itself a wonderful excitement, it supplies the place of all others—it operates powerfully and rapidly upon the nerves, sometimes to calm them, sometimes to excite, but always to occupy.

"Hence follows a consequence which all patients have remarked—the complete repose of the passions during the early stages of the cure; they seem laid asleep as if by enchantment. The intellect shares the same rest; even the memory grows far less tenacious of its painful impressions, cares and griefs are forgotten; the sense of the present absorbs the past and future; there is a certain freshness of youth which pervades the spirits, and lives upon the enjoyment of the actual hour.

"Thus the great agents of our mortal wear and tear—the passions and the mind—calmed into strange rest,—Nature seems to leave the body to its instinctive tendency, which is always towards recovery. All that interests and amuses is of a healthful character; exercise, instead of being an unwilling drudgery, becomes the inevitable impulse of the frame braced and invigorated by the element. A series of

reactions is continually going on—the willing exercise produces refreshing rest, the refreshing rest willing exercise.

"The extraordinary effect which water taken early in the morning produces on the appetite is well known amongst those who have tried it, even before the Water-Cure was thought of; an appetite it should be the care of the skilful doctor to check into moderate gratification; the powers of nutrition become singularly strengthened, the blood grows rich and pure—the constitution is not only amended—*it undergoes a change.*

"The safety of the system, then, struck me first;—its power of replacing by *healthful stimulants* the morbid ones it withdrew, whether physical or moral, surprised me next;—that which thirdly impressed me was no less contrary to all my preconceived notions. I had fancied, that whether good or bad, the treatment must be one of great hardship, extremely repugnant and disagreeable. I wondered at myself to find how soon it became so associated with pleasurable and grateful feelings as to dwell upon the mind amongst the happiest passages of existence.

"The rise from a sleep sound as childhood's—the impatient rush into the open air, while the sun was fresh, and the birds first sang—the sense of an unwonted strength in every limb and nerve, which made so light of the steep ascent to the holy spring—the delicious sparkle of that morning draught—the green terrace on the brow of the mountain, with the rich landscape wide and far below—the breeze that once would have been so keen and biting, now but exhilarating the blood, and lifting the spirits into religious joy; and this keen sentiment of present pleasure rounded by a hope sanctioned by all I felt in myself, and nearly all that I witnessed in others—that that very present was but the step—the threshold—into an unknown and delightful region of health and vigour; a disease and a care dropping from the frame and the heart at every stride.

"But here I must pause to own, that if on the one hand the danger and discomforts of the cure are greatly exaggerated (exaggerated is too weak a word)—so, on the other hand, as far as my own experience, which is perhaps not inconsiderable, extends, the enthusiastic advocates of the system have greatly misrepresented the duration of the curative process. I have heard of chronic diseases of long standing cured permanently in a very few weeks. I candidly confess that I have seen none such. I have, it is

true, witnessed many chronic diseases soon relieved and perfectly cured—diseases which had been pronounced incurable by the first physicians.

"It is as the frame recovers from the agitation it undergoes, that it gathers round it powers utterly unknown to it before—as the plant watered by the rains of one season betrays in the next the effect of the grateful dews.

"I had always suffered so severely in winter, that the severity of our last one gave me apprehensions, and I resolved to seek shelter from my fears at Malvern. I here passed the most inclement period of the winter, not only perfectly free from the colds, rheums, and catarrhs, which had hitherto visited me with the snows, but in the enjoyment of excellent health; and I am persuaded that for those who are delicate, and who suffer much during the winter, there is no place where the cold is so little felt as at a water-cure establishment.

"I am persuaded also, and in this I am borne out by the experience of most Water-Doctors, that the cure is most rapid and effectual during the cold season—from autumn through the winter. I am thoroughly convinced that consumption in its earlier stages can be more easily cured, and the predisposition more permanently eradicated by a winter spent at Malvern, than by the timorous flight to Pisa or Madeira. It is by hardening rather than defending the tissues that we best secure them from disease.

"And now, to sum up, and to dismiss my egotistical revelations;—I desire in no way to overcolour my own case; I do not say that when I first went to the Water-Cure I was afflicted with any disease immediately menacing to life—I say only that I was in that prolonged and chronic state of ill health, which made life at the best extremely precarious—I do not say that I had any malady which the faculty could pronounce incurable—I say only that the most eminent men of the faculty had failed to cure me. I do not even now affect to boast of a perfect and complete deliverance from all my ailments—I cannot declare that a constitution naturally delicate has been rendered Herculean, or that the wear and tear of a whole manhood have been thoroughly repaired.

"What might have been the case had I not taken the cure at intervals, had I remained at it steadily for six or eight months without interruption, I cannot do more than conjecture, but so strong is my belief that the result would

have been completely successful, that I promise myself, whenever I can spare the leisure, a long renewal of the system.

"These admissions made, what have I gained meanwhile to justify my eulogies and my gratitude?—an immense accumulation of the *capital of health*. Formerly, it was my favourite and querulous question to those who saw much of me, 'Did you ever know me twelve hours without pain or illness?' Now, instead of these being my constant companions, they are but my occasional visitors. I compare my old state and my present to the poverty of a man who has a shilling in his pocket, and whose poverty is therefore a struggle for life, with the occasional distresses of a man of £5000 a year, who sees but an appendage endangered, or a luxury abridged.

"All the good that I have gained, is wholly unlike what I have ever derived either from medicine or the German mineral baths: in the first place, it does not relieve a single malady alone, it pervades the whole frame; in the second place, unless the habits are intemperate, it does not wear off as we return to our ordinary pursuits, so that those who make fair experiment of the system towards, or even after, the season of middle age, may, without exaggeration, find in the latter period of life (so far as freedom from suffering, and the calm enjoyment of physical being are concerned) a second—a younger youth! And it is this profound conviction which has induced me to volunteer these details, in the hope (I trust a pure and kindly one) to induce those, who more or less have suffered as I have done, to fly to the same rich and bountiful resources.

"We ransack the ends of the earth for drugs and minerals—we extract our potions from the deadliest poisons—but around us, and about us, Nature, the great mother proffers the Hygeian fount, unsealed and accessible to all. Wherever the stream glides pure, wherever the spring sparkles fresh, there, for the vast proportion of the maladies which Art produces, Nature yields the benignant healing.

"Those cases, in which the Water-Cure seems an absolute panacea, and in which the patient may commence with the most sanguine hopes, are, First, rheumatism, however prolonged, however complicated. In this the cure is usually rapid—nearly always permanent. Secondly, gout. Here its efficacy is little less startling to appearance than in the former case; it seems to take up the disease by the

roots; it extracts the peculiar acid, which often appears in discolorations upon the sheets used in the application, or is ejected in other modes. But here, judging always from cases subjected to my personal knowledge, I have not seen instances to justify the assertion that returns of the disease do not occur. The predisposition—the tendency has appeared to me to remain. The patient is liable to relapses—but I have invariably found them *far* less frequent, less lengthened, and readily susceptible of simple and speedy cure, especially if the habits remain temperate.

"Thirdly, that wide and grisly family of affliction classed under the common name of *dyspepsia*. *All derangements of the digestive organs*, imperfect powers of nutrition—the *malaise* of an injured stomach, appear precisely the complaints on which the system takes firmest hold, and in which it effects those cures that convert existence from a burden into a blessing.

"Hence it follows that many nameless and countless complaints proceeding from derangement of the digestive organs, cease as that great machine is restored to order. I have seen *disorders of the heart* which have been pronounced *organic* by no inferior authorities of the profession, disappear in an incredibly short time—cases of incipient consumption, in which the seat is in the nutritious powers; hæmorrhages, and various congestions, shortness of breath, habitual fainting fits, many of what are called improperly nervous complaints, but which, in reality, are radiations from the main ganglionic spring; the disorders produced by the abuse of powerful medicines, *especially mercury* and *iodine*, the loss of appetite, the dulled sense, and the shaking hand of intemperance, skin complaints, and the dire scourge of scrofula—all these seem to obtain from hydropathy relief—nay, absolute and unqualified cure, beyond not only the means of the most skilful practitioner, but the hopes of the most sanguine patient."

The *humoral pathology* will have a fair investigation in the work before us. It is no fiction or mere idealism; disease cannot be explained without it; modern chemistry has shown how suspended secretions and retarded excretions, vitiate and poison the general circulating mass of fluids, and in this way impair the integrity of the solids. In proportion as the circulation is languid or arrested in a part, the due chemical decompositions of the blood, and change

of vital structure and the removal of waste structure, are prevented or impeded. Hence these retained matters impair the general integrity of the circulating mass.

The *blood* is a vital fluid. Moses declared it to be *the life*. The vitality, however, is only retained so long as it is in the living vessels, and under the influence of the nerves of organic life, which preside over the vessels. When it is drawn from a vein into a basin, it soon separates, forming a firm clot floating in the serum or watery part. This separation is the last act of its vitality. The precise degree of its *vitality* also is regulated by the amount of vitality existing in the organic nervous system and vessels. In the state of these nerves and vessels is to be sought and found the explanation of the phenomena of disease. The controlling nervous energy residing in the vessels may be impaired or destroyed in a variety of ways. 1st. Through simple excess of blood in the system. 2nd. Through simple deficiency of blood. 3rd. Through poisonous matters absorbed into the circulation. 4th, and lastly. Through influences that primarily act on the organic nerves, paralysing more or less their energies. In these ways is diseased action established in the animal system; apart from these we can have no idea of the existence of diseased action in the living organism.

Whatever lessens the energy of the organic nerves, lessens the intrinsic vitality of the blood. This truth cannot be too much kept in mind. With lessened vitality comes of necessity lessened power of resistance to the causes of derangement, disease, and death.

The essence of the vitality of the blood lies in the innumerable *globules* which are held in solution in the *serum* or watery part. The serum can be considered in no other light than as a mere aqueous menstruum in which to float and circulate withal the globules.* *Letting blood*

* Dr. Stokes, the eminent Professor of Medicine at Trinity College, states as an exemplification of a part of the medical practice of the 19th century he had witnessed, that "there was hardly a morning at the Meath Hospital, that some twenty or thirty unfortunate creatures were not phlebotomised largely; the floor was running with blood. It was dangerous to cross the prescribing-hall for fear of slipping. Patients were seen wallowing in their own blood like leeches after a salt emetic; and this erroneous custom continued for many years."

"Leeches were applied, and over and over again the patient died

is, therefore, draining a man of his vitality, and was a barbarous proceeding in the way it used to be practised; it was as sane a proceeding as battering the walls of a house, and mining its foundations, in order to kill vermin in the cellars, or to extinguish a fire in the attics. Letting heat, by the sheet packing and friction in the shallow-bath, is like drowning both the one and the other, without injury to the furniture or destruction of the building.

It is a great law of Nature, that *the germs of all vitality—the elementary principles of living beings*, from the seeds of plants to the ova of animals, *are contained in investing membranes*. The *final* cause of this, no doubt, is to insure all such *germs* against the results of their contamination by commingling with foreign, incompatible, or denaturalising principles in the circulating fluids of the animal, or in the soil or matrix on which they are deposited, and wherein they are destined to grow. The *blood-globules*, being the vital parts of the circulating fluid, and containing the germs of every corporeal structure, are not exceptions to this *law*. They are protected by the same expedient, a membranous covering, from the injury they might sustain from circulating in immediate contact with foreign or noxious elements. Without such a guard as this, the fountains of life would be constantly liable to be poisoned. But this is only one of many beautiful provisions which physiology teaches us, the Divine Architect of our frames has had recourse to, with even a studious care, to prevent the sacred principle of life from being vitiated and denaturalised by anything foreign to itself. Otherwise half compounds of life, half compounds of something else, would be of daily occurrence. MONSTROSITY is not the consequence of perverted life in itself, but of its perverted development. Man, by injuring his organism, weakens its vitality, and he transmits that weakened vitality to his offspring. He transmits also his organic peculiarities, that is, the predominance of certain of the fundamental structures of his frame, as a highly developed, and therefore morbidly sensitive nervous system, in other words, a nervous temperament, and the tendencies such a temperament inherits; or a developed muscular system, or

while the leeches were on his temples; and an eminent apothecary assured him that there was then hardly a week that he was not summoned to take off a large *number of leeches* from the *dead body*."—*Medical Times*, 1854.

vascular system, or cellular system, all of which are the foundations of the temperaments philosophically analysed. But vitiated fluids man does not, cannot transmit. Nature, as has been seen, has too securely guarded the sacred precincts of life, to permit this result. Even when his fluids reach that point of contamination that the vital principle languishes, his power of transmitting his feebleness ceases. The tendency to gout, to insanity, to cancer, &c., is propagated not through the medium of any gouty, insane, or cancerous *humours*, as is popularly credited, but by the transmission of certain predominant organic structures and tendencies. The evil humours of the man, therefore, are his own acquisition, not his inheritance; and they die with him, if not removed by the power of healing. This, it appears to me, is the splitting and exact apportionment of the truth between the partizans of the *solid* and those of the *humoral* theories of disease. The bearings of the portions of truth that belong to both parties have, as already stated, received further development in the work before us.

From what has been explained of the nature and office of the blood globules, it will be at once apparent, that no matter what quantity of water may be drunk and absorbed into the circulating system, it cannot injure their integrity, nor even diminish their relative amount. Hence the futility of the allopathic objection that "water thins the blood." Only a given amount of water can be *detained* in the vessels. This is, 1st, partly for the simple purpose of bulk, to afford one of the necessary conditions for calling into play the contractions of the vessel; and, 2ndly, partly as a mere diluent and vehicle of circulation, a menstruum in which to dissolve and carry out of the body foreign or noxious elements introduced by diet, drinks, or drugs, into the current of the circulation.

Water, therefore, never "*mixes*" with the blood globules, never can incorporate with them, nor break them up. Their electrical* affinities and relations may be altered. They

* Whatever changes the chyle may experience in the *lacteals* and *thoracic duct*, certain it is that once introduced to the lungs, it *there* acquires the *red* investing membrane of its globules, and the highly vital properties that characterise it while coursing in the arteries. This colouring matter of the blood, you must remember, is *iron*, the element *par excellence* endued with *magnetic properties*. Hence the peculiar adaptedness of this covering to shield the vital globules, to

may cohere one to another, but they cannot incorporate while in their vessels. In morbid stasis or arrest of blood, (congestion) they cohere. The vital controlling power (the organic nerves) that maintains to each globule its due charge of electricity is repressed or depressed for the time. With the exaltation of the nervous power, by-and-by their normal vital properties are restored, and the circulation is re-established. By a *lightning stroke* they are killed, their electricity is discharged off, nor is enough left to make them cohere, and form a clot either in the vessels of the dead body, or when drawn away from it. All other blood when drawn from the body coagulates; firmness of clot is in proportion to the exaggerated or lessened vitality of the individual. In malignant fevers, in ague, in cholera, &c., the vital endowment of the organic nerves is lessened or destroyed, and the amount of elctricity with which they are charged almost null. The repulsion between them ceases more or less, in other words, the *blood globules* attach to each other, and remain virtually dead in the vessels. The *serum* in which they swam exudes, drains off by *exosmose* (as it is called) or the simple capillary action of inorganic tubes. Hence in cholera, when the blood all retreats from the surface and retires to the interior, it thus oozes off spontaneously, constituting the rice-water dejections and vomitings, characteristic of the disease. Hence the patient's un-

enable them to repulse all contact with extrinsic and uncongenial matters, and to retain such affinities with the intrinsic and congenial structures, as it shall easily coalesce and amalgamate with them, whenever the wasted particles of the body call for new vital deposit. By the discharge of their electricity, the globules lose their tunics, and leave their rudimentary state, and so become incorporated with the living fabric, in the same way as its elementary gases unite by electrical discharge to form water. The *iron* of the blood, like its phosphorus, its sulphur, &c., is a product of the vital economy from its elements introduced into the food. Most probably it is elaborated in the lacteal vessels and glands, where a higher vitality is given to the absorbed chyle, which vitality is at length consummated or perfected, when the chyle mixes and becomes one with the blood in the heart and lungs. What becomes of the *iron*, on the expulsion of the blood globules to unite with the tissue needing repair, it is hard to say. Probably in another shape, or in other elements, it may go to form the new structure. The destiny of the oxygen with which the iron was combined (the peroxyde) is clearer. It unites with the liberated carbon and hydrogen of the decomposed structure forming carbonic acid and water.

quenchable thirst, which cannot even keep pace with the sieve-like operations of his intestinal mucous membrane.

That so great a variety of secretions should be produced from one fluid, the *blood*, cannot but appear extraordinary to a non-professional man. The nature of the secretion is determined by the functions of the part on which it is poured; thus tears and humours for the eyes; wax for the ears; oil for the skin; mucus for the open cavities and passages; serum for the shut sacs; synovial fluid for joints; saliva, gastric juice, pancreatic fluid, and bile for digestion, &c. Some of these are for purely excrementitious purposes, are provisions made to eliminate impurities out of the blood; as the pulmonary and cutaneous exhalations, and the secretions from the kidneys and bowels. The vital solvent fluids of the several stages of digestion, the salivary, gastric, and pancreatic juices are not from the merely aqueous or excrementitious portions of the blood. The function of the *liver* and of digestion generally, are treated in the section devoted to the discussion of *nutrition*, *diet*, and *regimen*, &c. How the vital constitution of each specific gland determines its peculiar secretion, we know no more than how cold freezes, and heat thaws.

The improvement of *nutrition* and the *secretions*, that takes place so soon under Water-Cure treatment, is one of the important facts that first strikes the medical enquirer on entering a Water-Cure establishment. I must not, however, omit to mention that the majority of the patients having *chronic complaints of long standing*, live too well and abundantly in these establishments, many of them should be dieted more carefully, especially as regards quantity. It is a law of the vital economy, that when the *waste* of the body exceeds the *supplies*, and when pressed to make up the deficiency, putting nature as it were to her shifts, that absorption first removes the least vital parts, as fat, cellular tissue, *morbid accumulations* and *structures* of all sorts. Hence the salutary influence of restricted dieting combined with water treatment, when judiciously carried out *It does not follow that diminished weight argues diminished vitality*, often quite the contrary, for the *reduction of disease* has been the greater. In the *initiatory* treatment of many chronic diseases in Water-Cure establishments, were this more attended to, the *cures* would be *more speedy*. When supplies fail, and the adipose and other tissues of the body are absorbed, and circulated for nutritive purposes, the

lymphatics assume a sort of assimilating power, in order to vitalize anew or more highly, the decomposed particles.

In the treatment of *chronic disease*, the foremost ideas in the mind of the pathologist and physiological practitioner are the reduction of irritation, local and general, and *normal support* and stimulation. On these important points too great stress cannot be laid. The same observation equally applies to *fever* and all *acute* diseases.

The phenomena of *fever* are of the greatest interest, and much misunderstood. The late Dr. Graves, much lamented, and one of the most gifted physicians of our time, used to say that he desired no other *epitaph* than the following, viz., "*He fed fevers*," that is, he sustained his patients in fever by as much nourishment as he could safely introduce. A greater and more honourable distinction will be for the hospital physician, who shall say, Let my epitaph be, "*He treated fever with the wet sheet packing and its adjuncts.*" I will now give a brief explanation of *the final cause of fever*, in other words, of the *nature*, *action*, and *ends* of fever, and it will not fail to strike the reader when again reading the *Water-Cure processes*, that they are the common sense, as well as the *physiological* remedies, for this pathological condition.

FEVER is never a primary or independent morbid state or action. It is the result generally of visceral disorder, or interior inflammation or congestion, an excessive or *above par* action of the nervous and vascular systems of the body; but it is always consequent to a state of local depression or *below par* action. The essence of this local morbid action consists in, 1st. The impression of a morbid agent, irritating and thereby impairing, the organic nerves of the tissue; 2nd. Morbid vascular action, inflammation, or congestion; 3rd. Arrest of the function of the organ in part—defective vital changes, and consequently retained chemical elements; 4th. Roused sympathies in near or remote parts; and hence, 5th, and lastly, Perverted sensibility of the organic nerves, and abnormal sensations of the animal nerves. This state of matters is the local essence of the general state called *fever*. It lasts, or is burning, a certain time—a few hours or a few days.

The first lesion in fever is the impairment of the function of digestion, chiefly because it is either first directly implicated, or suffers indirectly by sympathy with the brain or other organs. Under the first assault of disease, whether

it proceed from a disorganizing accident, or a small patch of inflammation, under such shock or morbid impression, the first want of the economy is not *food*, but the counteraction of the morbid impression. In fever all desire for food, and in a great measure the ability to dispose of it, is wanting. In the state of fever, great heat is extricated, and great waste of the corporeal fabrics thereby effected, and a great drain of the fluids. The primary requirement is then for *water*. *Thirst*, and a burning parched condition, is set up to demand these supplies. Febrile movement or febrile reaction is nature's mode of counteracting interior congestions and morbid impressions and action, by throwing the load on the surface. For the effect of all interior morbid action is first, to centralize the circulating fluids, to recall them from the *circumference* of the body to the *centre*, and thus to induce undue accumulations in the grand viscera of life.

Ubi irritatio ibi affluxus, is a sound pathological principle.

The fact of a central vital part being the seat of a morbid excitation, determines thither a flux of fluids to the part where the struggle with the unfriendly agency is going on. The result of this state of matters is to rob the exterior parts of their due share of blood. This is indicated in the first instance by *chill shivers* (rigors), sometimes headache. This is characteristic of the outset of all diseases that are sudden in their attack, and of such as are permanently *acute*, as it were carrying on a secret destructive process (as psoas abscess, phthisis, scrofulous ulceration of the joints, &c). Febrile movement or reaction then, is the inordinate excitement of the heart, blood-vessels, and nerves, as an effect of self-protection on the part of the economy, to counteract the tendency of the blood to accumulate in the vital central structures, by *determining to the surface* and *extremities*: to keep the vital fluids in action when they otherwise would stop; in other words, by *operating a revulsion* from the *interior* to the *exterior*. The circulation is then carried on by means of the innate *irritability*, or original muscular and nervous endowments of the circulating powers. The rapidity of the exhaustion of this, is in proportion to the rapid ebbing of life. Hence the rapidity of the circulation increases with the approach of death. This exalted nervousness and vascular excitation is the best condition for reinducing secretions and rapid chemico-vital changes, and

so evolving retained morbid elements, and restoring the lost equilibrium.

In this view of the matter it may be asked, then, why does fever so often overdo its work? I reply, *because of man's unnatural, artificial, anti-physiological habits and modes of life.* He often counteracts the salutary efforts of fever in his behalf by close apartments, too warm coverings, and the use of noxious internal irritants. If in his febrile state he had pure air and perfect rest, was frequently *refreshed*, and above par action normally restrained by the different Water-Cure modes of applying water, and took it also in proper quantities internally, giving his stomach little work to do, from food or physic, till the febrile movement had done its work, then he would generally be cured, unless indeed he had grossly violated nature's laws in other respects, and so left himself no chance, and given nature no scope to save. This will be the case with the healthy receiving morbid impressions, or subjected to morbid agency; the *sickly*, the *weakly constituted*, the *diseased*, will often sink. Hence the chief victims of epidemics are the constitutionally weak from any cause; the *drugged*, the *stimulated*, the *exhausted*, the *dissipated*, the *destitute*, the *careworn*. They cannot have a *crisis*, or have it imperfectly, because the vital energies necessary thereto are wanting.

When the important matters under consideration are clearly understood I have no doubt that the Water-Cure treatment, at least of *fever*, will sooner or later have a fair trial in competent hands. And I am equally sure, that such an event taking place in any large hospital, would lead to its general adoption. For great uncertainty and diversity of opinion still exists in the minds of medical practitioners when called upon to treat acute or chronic diseases. The following remarks by Dr. Macleod, in a letter to Professor Simpson of Edinburgh, exemplify the statement I have made. He writes:—

"Formerly, there were several wards in the Edinburgh Royal Infirmary, of which three Fellows of the Royal College of Physicians had the charge. One physician had the top ward, another the middle ward, and a third the low ward. It happened that, on the same day, three young persons of nearly the same age, ill of typhus fever, were admitted into the hospital. The disease was of equal severity in each, and the stage of complaint the same in all. What was the treatment pursued in those three cases, by the three Fellows of the college? Of course it should have been the same, at least if the

system be correct; for the physicians in question would choose the best. But, Sir, it was not the same. He in the top ward bled his patient with lancet and with leeches. He in the middle ward treated his patient with drastic purgatives. He in the low ward, again, gave whisky, wine, and opiates. What was the result of such deplorable freaks? I refer you to the statistic book; I have no doubt you will find it there! In the University formerly, two professors used to lecture, on alternate days, on clinical medicine. It happened once that each had, at the same time under his care an acute case of *pericarditis*. The Professor, who lectured on his case on Monday night, said, in substance, as follows:—'Gentlemen,—As to the treatment of this disease, it has been the practice *to give large doses of mercury* so as to bring the constitution under its action; and to effect this as rapidly as possible, small quantities of opium are usually combined with it. *The practice I*, however, *believe to be erroneous*; for I have observed the progress of the *disease unchecked*, even during *profuse salivation*. The most efficient remedy—in fact our *sheet-anchor*—in this disease is *tartar emetic*. You will have noticed the large doses I have given of this remedy, and yet the patient seems not to suffer from it. In fact, the constitution in this disease, as in some others, has a remarkable tolerance for tartar emetic.' When the lecture was finished, I left the hall, fancying I had learned some great truth, and knew better than an hour before, how to save life. On Wednesday evening, during the same week, in the same hall, and to the same students, the other Professor lectured. The lecture was devoted to the acute case of *pericarditis* under his care in the hospital. After describing the case, and giving a sketch of the character and progress of the disease, he spoke, in substance, as follows:—'Gentlemen,—It is a remarkable thing that there should be any difference in regard to the mode of treatment to be pursued in a disease such as this, I believe it is the Italian and French Schools which advocate so very strongly the employment of *tartar emetic*; but I would strongly urge you *to put no confidence in this remedy*; for if you do so, you will lean on a *broken reed*. Our *sheet-anchor* in this disease is *mercury*; under the action of which you must bring the patient as soon and as freely as you possibly can—even bleeding is of little importance in comparison with the use of mercury. The two combined, *i.e.* mercury and bloodletting, is of course best, but at all events use *mercury*, and NEVER TRUST TO TARTAR EMETIC.'"

After duly reflecting on the perilous situation—surrounded by such deplorable doubts and difficulties—so faithfully described in the above quotation, it might be left to any candid practitioner to say whether, if called in as umpire, he would not decide that a case was made out for a trial of the Water-Cure; backed as his decision would be by the authority of so enlightened and accomplished a physician

as Dr. T. K. Chambers, who in contradistinction to *empirical* medicine, fairly states that, "the practice of hydropathy when based on physiology, and its doses graduated, is *entirely* in accordance with the principles of *rational* medicine."

The following case is an illustration of the system of treatment I advocate and practise.

CASE OF IRITIS OF BOTH EYES TREATED BY LEECHES AND THE HYDROPATHIC PROCESSES.

A few months past, I had under my care a young gentleman (Mr. — of L— Castle), with iritis of both eyes. He had, on a former occasion, been laid up for many weeks in London with a precisely similar inflammation. He was then severely mercurialized, his whole system was affected by it. His eyes were saved, but he remained for a long time in a shattered condition, with acute pains in the limbs. The pain was so severe in one leg as to produce complete lameness. These pains still continued when the second attack of inflammation of the eyes commenced.

It was of the greatest consequence in this case that the constitution should be spared from any more mercury; not to mention other morbid effects, I have reason for believing that rapid consumption would have been the probable result.

With the aid of a few leeches, and the antiphlogistic operation of the packing (or body poulticing), followed by sedative baths, the cure was safe and speedy. The only medicine given him was three doses of castor oil. I have seen many cases of iritis, and this was as severe a case as any I have witnessed. But a matter of no small importance, which must be mentioned, is the following:—The same water treatment which arrested this dangerous inflammation was continued, but modified to meet his progressive condition. It quite re-instated his health, and he is now a robust young man.

IN REFERENCE TO THE CONJUNCTION OF OTHER REMEDIES AND MODES OF CURE IN AID OR COMPENSATION OF THE ACTION OF THE HYDROPATHIC PROCESSES.—On this head I have been so often questioned that the opportunity of making some brief observations, as a general reply, must now be taken, stating at once that I reject no remedial adjunct, medicinal or otherwise, come from what quarter it may, in its fitting time and place, or when the indication is clear and satisfactory.

One of the best and most eminent teachers of his day, Dr. Macartney of Trinity College, to whom many medical men now living owe so much, and still remember with gratitude, laid the greatest stress on the necessity of the medical mind being kept free from *prejudice*. He would often repeat in public and in private, that "it was the bounden duty of a medical man, really deserving the name, to go any distance, and at any cost or privation, to discover a remedy, or to learn how to use it." He added, "A prejudiced medical man is as dangerous a character as any that can be inflicted on society; the longer he pursues any pernicious practice, the more he is wedded to his errors; and the more he is in the wrong, the more he will be found opposed to any new discoveries or improvements in treatment, that require some intelligence or effort to comprehend."

The proposition of "*a conjunction of other remedies*," has often been the subject of discussion with many of the many medical men (now nearly 100) who have lived with me at Malvern during the last fourteen years, under Water-Cure treatment. After more experience and deliberation, however, it has not failed to surprise these gentlemen to find how seldom they could point out to me, in their own, or in any of the numerous cases under their observation, a fair opening for the beneficial use of any drug. There are comparatively few indications for the administration of any medicines under Water-Cure treatment; but cases occur in which they afford important aid in making the cure more certain, as well as in the saving of time. I have already given an illustration.

It should be remarked that hitherto most of the patients at the Water-Cure have been cases of chronic disease of long standing, and often of a grave character, in which every kind of drug treatment had been tried, under practitioners the most celebrated for the treatment of each particular complaint. In the minds of many of these patients

a strong conviction existed, that their maladive condition had been confirmed, or greatly aggravated, by the courses of medicine they had undergone, and it often required persuasion to induce them to take some simple doses, even when the motives could be satisfactorily explained.

The safety, and restoration to healthy condition of the digestive organs, and of the blood, being one of the evident and paramount advantages that characterize hydropathy, it has not failed to attract a numerous class of patients, who regard that fact alone as a sufficient motive for its adoption. Sir John Forbes, as has been seen, is also much impressed by the fact, and fairly states that "*one of the most formidable difficulties with which the ordinary physician has to contend is, that nearly all his remedies reach the point to which they are directed through one channel; and the only means of relieving certain diseases is by inundating the stomach and bowels with foreign and frequently to them pernicious substances.*"

In Dr. Headland's admirable prize essay, "*On the action of medicines in the system*," there are many valuable observations that might be introduced here in support of the preceding argument, but a brief extract from his introductory remarks is all that the limits of a popular introduction will allow. He states:—

"There have been, more or less, in all ages, two systems or schools of medical treatment, of which the one prevails among ignorant men, and in rude states of society, but the other requires a higher degree of enlightenment. These are the *Empirical* and the *Rational* systems. The first is founded on simple induction. By accident or by experience it is found that a certain medicine is of use in the treatment of a certain disorder; it is henceforth administered in that disorder; and on a number of such separate data an empirical system is constructed. It naturally requires for its elaboration a comparatively small degree of knowledge.

Now this observation of facts is indispensable as a beginning, but *something more is required*. We must not be satisfied with taking them separately, but we must proceed to compare together a large number of facts, and draw inferences from this comparison. And our plan of treatment will become *rational*, when on the one hand, from an accurate knowledge of the symptoms of diseases, we are better enabled to meet each by its appropriate remedy, and on the other hand, from some acquaintance with the general

action of a medicine, we are fitted to wield it with more skill and effect, and to apply it even in cases where it has not yet been proved beneficial. Thus, for the proper perfection of medicine as a *rational* science, two things are in the main needed; the first is a right understanding of the causes and symptoms of disease; the second, a correct knowledge of the action of medicines. Should our acquaintance with these two subjects be complete, we should *then* be able to do all that man could by any possibility effect in the alleviation of human suffering. This sublime problem is already being unravelled at *one* end. Diagnosis and Nosology are making rapid strides; and perhaps we shall soon know what we have to cure. But at the other end our medical system is in a less satisfactory condition; and though some impatient men have essayed, as it were, to cut the Gordian knot, and have declared boldly on subjects of which they are ignorant, yet it must be confessed, *that in the understanding of the action of medicines, and of their agency in the cure of diseases, we do not so much excel our ancestors.* While other sciences are moving, and other inquiries progressing fast, this subject, so momentous in its applications, has, in spite of the earnest labours of a few talented investigators, made after all but small progress.

"A long time ago, when men knew and understood less than they do now, it was fancied that the action and choice of medicines was a thing of the utmost simplicity; that it was comparatively an easy matter to fix at once upon that remedy required most in any particular case. But the light of science, which in this day burns more brightly, at the same time that it displays all objects with greater distinctness, discloses to us also many dim vast tracts in the distance, of which nothing had been seen or imagined before. In this, as in other things, *the more we know, the more we discover our real ignorance.* It is wrong, then, to treat dogmatically of matters that we cannot comprehend; and when perfectly in the dark as to the operation of a medicine, we should rest content with declaring the result of that operation. This by itself will be of great use to us.

"I am induced to lay stress on the difficulties surrounding an inquiry into the *modus operandi* of medicines, because it will be some excuse for the manifest insufficiency of the sketch which I am about to draw. For this, too, I may find a further apology in the fallacies and mistakes, both of reasoning and statement, of which previous writers have

been guilty. These are best shown by their discrepancies. *On no question, perhaps, have scientific men differed more than on the theory of the action of medicines.* Either facts essentially opposed and incompatible have been adduced by the disagreeing parties; or, which is nearly as common, the same fact has received two distinct and opposite interpretations. Many hypotheses, when tested, are seen to be grounded on bare assertions, and to be destitute of logical proof; many others are attempted to be established on ill-sustained analogies. Analogy, in such a case as this, may be used to increase a probability already evidenced; but by itself it is no proof, for we find often that medicines are capable of producing the same result in very dissimilar ways."

Throughout this excellent treatise the learned and enlightened author is evidently deeply impressed with the dangers and difficulties that surround drug medication, and it makes more evident, if possible, how great a boon that system of treatment must be, that supersedes to so great an extent, the necessity of risking the injurious or uncertain effects of poisonous substances on the constitution, the blood, and the digestive organs.

It must be clear enough to any one who is a close observer of disease, that injury of the digestive organs, and abuse of their functions, by the irritation of improper diet, drinks, and drugs, may be set down as a starting point and primal source of a man's physical and often of his moral maladies. Even still, by many medical men, the influence of a disordered digestive system, in producing a long list of nondescript and otherwise unaccountable ailments, is very inadequately appreciated. Deranged digestive organs originating an irritated brain and ruined temper, produce much more of the miseries of society—much more of the errors, and failings, and crimes of humanity than is suspected. The symptomatic ailments flowing from this source are often treated as distinct and independent diseases. These organs, as in so many cases the fountain of the evil, deserve therefore the first to be rescued from the agencies of disorder, and to be maintained intact and unimpaired. In their integrity lies the greatest aid to restoration for the diseased body. Under their various *abuses*, however, morbid causes resident in the stomach and bowels, are often tenfold aggravated and confirmed; because these *already suffering* organs are further

abused by being made the receptacle of noxious and irritating substances. To relieve the morbid sensations thus induced, the main causes of the malady are often so perseveringly used again and again for the antidote, that *radical* recovery from either the *primary* or *remote* ailments is all but impossible,—a return of healthy physical and moral sensations almost hopeless. This frequent source of the long continued derangements of the digestive organs is the more mischievous because so often the least suspected. Medical men, however, are now beginning to open their eyes; and *drug diseases*, or diseased states produced and kept up by drugs, are not only recognised, but beacons are held out to guard against the untoward effects of those medicinal substances, and means are pointed out by which they may be counteracted, cured radically, or what is better, in the majority of cases, prevented altogether.

Nor is the vital importance of this diminished, when in any case the *brain*, from overwork or anxiety, has originated the derangement of the digestive organs; on the contrary, they should be guarded with greater care when sympathising with a brain which daily threatens to resent their abuse by an apoplectic stroke, or an attack of paralysis; an event and result of frequent occurrence.

Cases under water cure treatment.

I will now introduce a number and variety of cases, sufficient to enable the professional or non-professional reader to form a comprehensive judgment of the results that may be obtained by a judicious application of the Water-Cure treatment. The majority of instances adduced are authenticated, and the patients tell their own history. I have avoided long or tedious details as out of keeping with the present design, but enough will be given to make the perusal of the Water-Cure processes which follow of great interest. Nor can I doubt that every intelligent and experienced physician or surgeon will come to the conclusion that the treatment here illustrated will be found of inestimable value, and must *eventually* be adopted in private, as well as in hospital practice.

CASE OF BLOODLESSNESS AND LIVER CONGESTION, WITH CHRONIC INFLAMMATION OF THE PYLORIC END OF THE STOMACH AND DUODENUM, &c.

In the following interesting case, some medicines were used as adjuncts to the hydropathic processes, but I may add that, although they afforded assistance, the cure could have been effected without them. This case, before presenting itself at the Water-Cure, was pronounced incurable by two eminent physicians in London, men possessing all the knowledge of the day, excepting ours. Moreover, two experienced water doctors also said of the case, that "the patient could not recover."

The danger and gravity of the situation is made evident, and the leading facts of the history of the case are afforded by the following brief statement, in a letter from the lady's husband:—

The Green, Ealing, Middlesex.
Feb. 1, 1854.

My Dear Sir,

It affords me the greatest happiness and satisfaction to be enabled to add one more testimony to the efficacy of the Water-Cure. My wife is now convalescent; she says that she feels quite well, and is stouter than she ever remembers to have been.

My wife's case is a very marked one, and although well known to you from personal explanation, I think it necessary to record it thus formally.

About ten months prior to my writing to you from London, she had an attack of jaundice at Dover, and was kindly and skilfully treated by my friend Dr. E. Jones, who brought her through the attack, but in a very prostrate state. Upon my return to London I placed her under the medical care of Mr. Whitfield, and called in consultation the eminent Dr. Latham, *who thought her case hopeless.*

About two months subsequently, at the earnest request of another medical friend, I consulted Dr. Addison, who stands, I am told, most eminent in the profession for the correctness of his diagnosis. Dr. Addison made a very careful examination, and pronounced the case to be *anæmia*, which he familiarly explained to me was absence of blood, a want of the power to make blood, *in fact, that the blood making functions were dead.* He said the disease was not a common one, though he had had in a lengthened experience many cases which had all, with one exception, proved fatal, *and therefore he could give me no hope.*

I then made up my mind, despite the discouragement of my friends, and the natural repugnance of my wife in her poor emaciated

state, to bring her to Malvern. I have great reason to be thankful that I was impelled to this step by the very decided opinion of the most eminent of the faculty, of the hopelessness of her case. To you, my dear sir, I can only repeat my grateful thanks for your great attention to my wife in her trying sickness, and with our united good wishes, I am, &c.,

To Dr. Wilson. BENJAMIN COLEMAN.

My *diagnosis* of this case, given to the husband after the first visit was as follows :—1. Chronic inflammation of the duodenum and pyloric end of the stomach. 2. Congestion and enlargement of the liver. 3. Barely blood enough to sustain life, and that of the poorest quality. 4. The nervous system all but giving up the contest.

The *prognosis* was recovery, and most probably in due time a perfect cure.

The treatment was commenced with hot fomentations, and warm baths cooled to 80°, sometimes to 70°. *Cold* applications, applied directly or indirectly, could not at first have been borne in the extremely emaciated and debilitated state of this patient. Mild mustard plaisters, for twelve minutes, were occasionally applied to the abdomen, and particularly to the region of the liver. Small doses of castor oil were also given at appropriate intervals, and a combination of conium and hyoscyamus at bed time. But the principal remedy was the lamp bath, used to produce gentle and continued perspiration, and this was followed by hot baths cooled down, with as much rubbing as the patient could bear.

The motive for this treatment, and the effect I anticipated was to make the chronic state acute, for it was evident that if a salutary change was not speedily effected she could not long survive. The powerful and steady revulsion to the surface, produced by the lamp baths, was evinced by the deeper yellow of the already jaundiced skin, the hot surface and quickened but now steady pulse. The pain which had been felt for so long a time in the upper and lower extremities was also intensified. These acute symptoms, when they had done what I required, were easily subdued by the Water-Cure processes. In a few weeks the patient was able to sit up with a cleared complexion, the jaundice gone, and the expression of the countenance so changed that her husband observed that no one, who had only seen the patient some weeks previously, could have recognised her.

The aversion to eating anything, which had been felt for more than a year, was now replaced by a convalescent appetite. She could now talk of nothing but eating. It engrossed all her thoughts. Notwithstanding these satisfactory and hopeful results the dropsy of the lower limbs gradually increased, until their size became enormous, and extended to the hips. This, however, was of little consequence, for the diseased condition that had so nearly proved fatal had been cured.

I did not think it expedient to interfere with the dropsical effusion for a few weeks, to allow time for making new blood, but when it became advisable to get rid of it quickly, I prescribed some simple diuretics in addition to the Water-Cure processes. The combined action was speedy, and in a short time there was nothing left but the bare bones of the lower extremities. The appetite still continued; there was a cry of hunger every three hours.

There was nothing further interesting in the case, it steadily progressed until the patient was restored to perfect health, and to the robust condition in which she still continues.

Castor oil was of great use in this case, and in similar morbid conditions I have seen it carry away incredible quantities of bile, sometimes green as pounded grass. See p. 43.

Congestion of the Liver with Chronic Disease of the Stomach and Lower Bowel, and Anæmia or Bloodlessness, &c.

The following letter from the Rev. Edward Wood relates the cure of another case of anæmia or bloodlessness, with congestion of the liver and other complications, differing however from the former one in many essential points, and requiring a different mode of treatment. In the present instance a tonic and refreshing system of treatment was necessary from the first, admitting of the use of *cold* water in the various appropriate modes of its application. This patient, although pallid, yellow, and very weak, could eat sufficiently, and take walking exercise. No medicine of any kind was used in this case.

"Skelton Parsonage, Ripon,
"Jan. 23rd, 1854.

"My dear Sir,

"I shall be glad if you will add my testimony to the efficacy and safety of the Water-Cure, for I have good reason to speak well of it.

"It is nearly three years since I placed myself under your care, to give it a fair trial.

"You will remember what a debilitated and nervous state I was in, partly from frequent and excessive loss of blood, and partly from a very much disordered state of the digestive organs, of long standing; both complaints having been of a very obstinate character, and but *temporarily* relieved by medicines. *In truth my friends had little expectation of my ultimate recovery.*

"Before the two months I was with you were expired, I found myself in far better health than I had known for many years, and, since that time, I am thankful to say *I have not had a day's real illness,* and have never taken medicine in any form.

"I may add, that we have seldom used any other than hydropathic remedies for our children; they were particularly successful in the hooping-cough.

"I hope to show myself to you before long, and spend a few days in your establishment.

"Believe me to be,
"Very sincerely yours,
"To J. Wilson, Esq., M.D. "EDWARD WOOD."

CASE OF LIVER DISEASE AND CHRONIC DYSENTERY, ETC.

The patient who wrote the following letter, was also weak, pallid, yellow, and bloodless, but with complications differing from the two cases already given. He improved steadily from the first, gaining flesh and healthy colour, with the subsidence of *all* his grave symptoms. The treatment was simple enough, consisting of hot fomentations, compresses, gentle but frequently repeated sweatings, followed by warm and tepid-baths *cooled down*, partial packings, sitz-baths, moderate water-drinking and careful dieting.

"Malvern, Oct. 16th, 1853.

"My dear Sir,

"I left India in August, 1851, on sick certificate, with liver disease and chronic dysentery. During the *two years* I have been at home I have been under the best medical care, and I believe have tried every kind of treatment, but to no purpose. When I entered your establishment, the beginning of August of this year, all my symptoms were as bad as ever; and it was evident matters could not

go on much longer with me. In fact, I had given myself up as *incurable*, and had prepared myself for the worst. Suffice it now to say, that after nine weeks' Water-Cure treatment, I feel quite well, and no doubt, with care, will continue so.

"If you think this brief testimony will influence any forlorn sufferer, such as I was a short time ago, to try the Water-Cure, I shall be very glad to see it in your new work, some proofs of which I saw on your table.

"To-morrow I must leave you, but be assured I shall never forget your kind attention, and the happy days I have spent with the numerous and friendly patients in your establishment.

"I remain, my dear Sir,
"Very truly yours,
"WALTER LLOYD,
"Lieut. 11th Reg. M. N. I., Coedmore House, near Cardigan."
To Dr. Wilson.

The following case is interesting and instructive, as showing the results of simple and rational treatment, and how time may be saved by the addition of a little drug medication appropriately administered.

CASE OF INFLAMMATION OF THE LIVER, BILE DUCTS, AND DUODENUM, WITH JAUNDICE AND ACUTE BRONCHITIS.

I was summoned by an old patient to attend his near relative, a gentleman æt. about fifty. I found him in the following condition:—Much emaciated, skin deeply jaundiced, dry and burning, tongue dry, brown in the centre and red at the tip and edges, pulse above 100. The slightest pressure over the liver, pit of the stomach, or duodenum, caused acute pain, he had incessant cough with expectoration of thick yellow sputa. He complained of a sense of extreme exhaustion, which he attributed to having vomited about every two hours, night and day, during the last ten days. There was no bile in the matter rejected.

My *diagnosis* was as stated above.

The history of the case is briefly as follows. He had been suffering from indigestion and great depression of spirits for above a year, with frequent attacks of catarrh. During this time he took large quantities of medicine, tonics and purgatives, in a variety of forms, being the principal prescriptions.

Three weeks before my visit he had taken a severe cold,

which laid him up in bed. Incessant cough soon commenced, and he went through an active course of drug medication. He was ordered a "supporting diet," with chicken, and the strongest beef tea that could be made. The 2nd week he complained of pain in the right side, with frequent shiverings down the back, followed by severe bouts of acid vomiting, but no bile. He gradually began to get yellow until the beginning of the third week, when he was quite jaundiced. After this the vomiting became incessant. For three nights before I saw him he had been delirious. He had taken during the last ten days, four five grain doses of calomel, each followed by a purgative draught, and three doses of Dover's powder in the intervals of the calomel. The bowels were freely relieved, *but not a trace of bile.* Saline mixtures were also given during the day. A large blister had been applied to the liver five days before.

It was clear, in this case, that if the fever and inflammation where not speedily subdued, and the vomiting arrested, the patient would soon sink from the exhaustion, combined with the poisoning from the immense quantity of bile in the system. The gall bladder, and liver, were also engorged with bile, and the duct into the bowel impervious.

It was clear, also, that the medicines hitherto given had failed in producing the desired results, acting as irritants, and aggravating all the symptoms. The stimulating diet had also its share in intensifying the inflammatory condition.

The *treatment* was commenced by a packing for an hour and a half in the sheet, followed by a warm bath for four minutes, this was gradually, at three intervals, cooled to 60°, during four minutes more that he remained in it. Constant ablution with towels was going on during the whole time. He slept in the sheet, and expressed great relief after the bath. In half an hour after the bath the stomach, liver, and bowels were fomented for two hours, and then a compress applied all round the abdomen for the night, with directions to refresh it every three hours. He slept during the night without delirium, and the vomiting had quite ceased. During the fomentation he drank half a pint of cold water in sips, containing half a tea spoonful of bicarb. of potass. This drink was also given him at intervals during the night.

The next morning the packing and bath were repeated, and as soon as comfortably in bed, two table spoonsful of

castor oil were given him. The happy result was just what I anticipated, the flood gates were opened. In three hours the oil acted freely, carrying down a larger quantity of bile than I had ever seen. In the first evacuation there was more than three half pints of a fluid green as pounded grass, a tea spoonful of it made a tumbler of water a deep yellow. The packing and a smaller dose of oil were repeated for six successive mornings, with the same result of green bile, but the last two days not in such large quantity. The fever and inflammation being now quite subdued, the packing was omitted for a few days, but a desert spoonful of oil for three mornings more was given; these only produced natural bilious evacuations. It was then discontinued, and he took no more medicine of any kind.

On the seventh day of this treatment all trace of jaundice had disappeared, and he could take sufficient nourishment, with the addition of a keen relish for it.

During the whole of this treatment the breast bone as well was fomented for one hour and a half night and morning, and in a week he only coughed early in the morning. During convalescence I ordered a gentle perspiration with the lamp every third day, and sitz bath for five minutes at noon, when the lamp was not used. His strength increased rapidly, in a month he gained much flesh and declared himself in better health than he had enjoyed for fifteen years.*

FACIAL PARALYSIS, WITH BRONCHITIS, CONGESTED LIVER, ETC.

The following is a very interesting case in one sense, being one of those that medical men, not acquainted with the Water-Cure, would at once say was utterly *unfitted* for it.

The patient wrote to me at the beginning of the *winter* of 1843, to inquire whether it would be worth his while to come to Malvern and try the Water-Cure for a *fortnight*, being all the time he had to spare, as he was ordered off to a warm climate, and intended going first to Rome. I advised him to come directly. I saw at once, if he listened to reason, that something better was in store for a man in his dangerous state of health. There was nothing to be gained by his going to Rome; he had already been there to no

* Castor oil, given a few minutes before a packing, acts freely in an hour without discomfort, but in this case it would not have answered, without first reducing inflammation.

purpose. There was every probability of his being laid up there, or on the way, with bronchitis, and in his deteriorated condition, perhaps never to return to his numerous friends.

That was my view of the case, the following is the result, and what *he* has to say on the subject.

LETTER FROM THE REV. R. A. F. BARRETT, B.A., FELLOW OF KING'S COLLEGE, CAMBRIDGE.

Feb. 10th, 1854.

"My dear Dr. Wilson,

"My account of myself is simply this. Having injured my constitution by long application to a literary work, at length, in 1852, I became affected with slow facial paralysis, and after I had tried most of the usual remedies without any effect, except of still further impairing my general health, I came to the Water-Cure. At the end of about a month I had received the most decided benefit, not merely for the paralytic affection, but also in my general health.

"In addition to the paralysis I had for many years suffered from chronic bronchitis, the least cold, irregularity of diet, or exertion of voice, invariably brought on acute attacks of inflammation, which only yielded to severe treatment, such as leeching, blistering, calomel, and antimony, and at the end of the time left me utterly prostrate and unable to speak, except in a whisper, for weeks, often for *months*.

"By these repeated illnesses I have been reduced nearly to death's door. Since I have tried the Water-Cure, although I have not been what you call a good patient, by taking every care of myself, I have been much less subject to these attacks than before, and a degree of inflammation, which under the usual remedies would require three weeks' of active treatment to reduce, and then leave me quite exhausted, is cured by your Water-Cure remedies in *a week*, without any internal medicine or weakening process. On this point I speak confidently, having probably had as many attacks of acute bronchitis as any one alive. Indeed, had I not tried hydropathy, I have reason to believe that I should before long have sunk under them.

"In addition I may add, that there is no place where I spend my time more pleasantly, and, as regards health, more profitably, than at your Water-Cure establishment.

"Believe me, &c.,

"R. A. F. BARRETT."

My Reverend friend is now in excellent health, and more robust than when he wrote the above letter.

In the *treatment* of the case, at the beginning, I had recourse to fomentations for chest and abdomen, partial packings alternating with gentle sweatings, each followed by warm or tepid baths cooled down to the natural temperature before he came out of them. Active irritation was soon

subdued in the bronchial tubes, as well as in the digestive organs.

By the end of the proposed fortnight he was convinced that he had found what he wanted, and he went through a great part of the winter under my care here, steadily improving.

The eyelid, and the muscles of the right side of the cheek and mouth, were severely paralysed, and he was obliged to support the latter with his hand when speaking. As the treatment went on these symptoms also gave way.

Gastric and liver disorder accompanied by tic douloureux.

Since the following letter was written I have often been consulted by Lord Anglesey. He always expressed himself highly satisfied with all the Water-Cure had done for him. He told me at our first interview that "it was almost incredible the enormous doses he had taken of the most powerful medicines, that it was only his strong constitution that could have survived the enormous amount of treatment he had gone through."

When at a later period I was staying with Lord Anglesey, and when he no longer needed the aid of medicine in any form, he told me that at my first visit here, when I assured him that the Water-Cure would at all events do this for him, he could scarcely believe me, it seemed so improbable.

I was the first who told him and made him clearly understand, that his cruel tic had no connection whatever with the leg he lost at Waterloo. A long continuance of *repose* from all excitement was a very necessary element in the treatment of this tic; it was part of my prescription the noble Lord negatived. His general health was much benefited by the Water-Cure, and the tic relieved as a necessary consequence. In his many letters to me they all end with its praises, with "*viva l'acqua*," or something equivalent.

This is his kind letter, sent me to use in any way I thought fit, as a reply to the sinister rumours that were then afloat. The first six months I was at Malvern, the Water-Cure was laughed at, but by *this time* my success produced a violent antagonism in some medical men, and startled them from their propriety.

LETTER FROM THE MARQUIS OF ANGLESEY.

"Beau Desert, Oct. 8th, 1843.

"My dear Doctor,

"I have your instructions conveyed in your letter of the 6th, and they shall be implicitly followed, as shall be also any other alterations you may be disposed to make in my treatment, being convinced (and this in the midst of much suffering), that if anything can relieve me from my most dreadful of all disorders, your skill, and zeal, and great experience and *prudence*, will bring me through. I mark this latter word more particularly, because I hear of the most absurd and malicious reports being abroad of your having very nearly killed me!

"*Quelle folie*, or rather, *quelle méchanceté!* Why, in general health I *never* was better than since you took me in hand, and I can declare that *since* the 21st of September, 1842, *I have never for a single day had occasion to assist, in any way whatever*, stubborn *bowels, which reluctantly yielded for years and years only to the most powerful and pernicious drugs.*

"It is true that to homœopathy I owe much, but then homœopathy had nothing to offer (ME *at least*) in order to effect that which the free use of the pure simple water within and without, have, under your prudent and judicious management, so admirably effected. Still I am often in great pain—and no wonder;—a desperate malady that for six or eight and twenty years had been in full possession of me, and which has probably been immensely aggravated by the swallowing of a mass of the most violent and poisonous drugs—a quantity, which I do believe if noted down would not be credited. It is no wonder, I say, that even water cannot in thirteen months effect a cure. But it has kept me in excellent, and even robust general health, and if, instead of being seventy-five I was only fifty-five, I should not be without hope of your totally subduing the enemy; but as I shall probably hardly give you *time* to obtain a complete victory, I must continue to bear my malady with all the patience and resignation that I can muster. If I do outlive it (which, however, I own I do not expect), I shall owe it entirely to your system. So persevere, my good doctor, as you have hitherto done and believe me you will find a confiding patient; and may you and the admirable system you have introduced into this country with so much talent, perseverance, and success, go on and prosper through good report and bad report.

"You will be glad to hear that Lady Adelaide is in high health, and a steady advocate of the Water-Cure, and I hear most favourable reports of Lord Lichfield. Lady Anglesey is tolerably well. We all send our best wishes to Mrs. Wilson, and

"I remain, my dear Doctor,

"Yours truly,

"ANGLESEY."

RHEUMATIC FEVER AND INFLAMMATION OF THE LUNGS, WITH DERANGED DIGESTIVE ORGANS, AND CONGESTION OF THE LIVER, ETC.

CASE.

Many years ago (ten or eleven) a gentleman (Mr. Dunn, late mayor of Coventry), arrived at my establishment and was at once assisted or carried up to bed. I found on examination that he had *rheumatic fever*, with *inflammation of the lungs*. He was very ill and in much suffering; the crepitus and dulness on percussion, indicative of inflammation, were distinct; the inferior portion of both lungs was engaged; the jelly-like sputa of a clear reddish-brown was abundant, and adhesive as bird-lime. After this examination, I remarked to the patient, that I was surprised at his having been able to reach Malvern in his condition; he replied, "I believe had I hesitated half a day longer I never could have started, but I was determined to try, if I died by the way." He went on to say, "I have suffered under rheumatic fever before, and was laid up in bed with it for *nine weeks*, and I assure you, it tried me pretty hard."

I found on further inquiry, that he had been for a long time rheumatic and in a bad state of health, and his digestive organs quite out of order; but notwithstanding this, and the severity of the present attack, with the addition of the serious complication I have mentioned, I had him up and about his room in *nine days*, and he had a speedy convalescence.

In cases of *rheumatic fever* and *inflammation of the lungs* like the one I have mentioned, the same antiphlogistic treatment does for both. The steaming flannels are applied to the maladive organs in the abdominal cavity, and under the back part of the ribs at the same time, and this fomentation is repeated once, twice, or three times a day, as required, for an hour, an hour and a half, or two hours, the flannels being *renewed every eight or ten minutes*. The latter is of the greatest consequence, as I have shown when explaining the processes. Once or twice a day this is preceded by full or partial packing in the sheet, for an hour or more, followed by a shallow-bath at 85°, which is gradually cooled to 65° or 60°. The patient remains in the bath from five to ten minutes, not exerting himself, but well rubbed by the bath attendant in the intervals of adding cold water. When the fomentation is not going on, a compress well protected is applied to the lower part of the chest, and embracing the stomach, liver, and bowels. The joints most affected, are also fomented and compressed. This is very much like poulticing *frequently* a boil, or any inflamed injury, to disperse the mischief and ease the pain.

It will also be perceived how refreshing and gentle is the *derivation*, by the warm and tepid-baths quickly and gradually *cooled down*, and how we *let off all the morbid heat* and quiet the circulation of the *blood*; without taking it out of the body by pints or quarts, as we

used to do, not long ago,—nearly as a matter of course. This is the simple way, by which we are enabled in these complications to do in *nine days,* or *less,* what often takes as many weeks. Besides the difference of the patient *after* the two modes of treatment is a matter of grave consideration. He is quickly convalescent, and all the better for the Water-Cure remedies; on the other hand, after the calomel, colchicum, leeching, bleeding, and blisters, every enlightened medical man knows there must be a long convalescence, and often *continued chronic disease,* only waiting a time for another acute explosion.

THE CASE OF A PHYSICIAN WITH CHRONIC RHEUMATISM AND GOUT, AND TENDENCY TO MALIGNANT DISEASE OF THE STOMACH.

The physician whose case follows, was under my care *eleven* years ago. He has since then sent me several patients. I have seen him, when I have visited London, looking remarkably well, enjoying excellent health, and fully engaged as a busy practitioner.

THE CASE.

A talented physician, enjoying considerable practice in one of the suburbs of London, was the subject of this case. He is forty-five years old, during fifteen of which he has been afflicted with rheumatism and gout; besides which he has an hereditary tendency to black cancer of the stomach, his mother having died of that malady. He had been constantly under treatment of one kind or the other, until his case was nearly hopeless, and his health so broken up as to oblige him to think seriously of abandoning his practice. An old friend of his, a physician* at the time under my care, wrote to him, advising him strenuously to try the Water-Cure, which he determined to do; but previously made a point of calling on two of the most eminent practitioners in London, who tried to dissuade him, recommending at the same time a course of mercury and iodine. The patient having previously tried this with some untoward results, and convinced, as he said, "that that was all that was wanting to *finish him off,*" at once started for Malvern, where he arrived in the following condition. The body much emaciated; the trunk almost bent double; face pale, sallow, and anxious; cheeks sunken; tongue swollen to twice its natural size, furred and red at the edges; appetite morbid and capricious, leaning to indigestible articles of food; bowels torpid, with bad secretions; knees swollen and painful,—one of them lame for several years past; lumbago; incapability of walking more than two or

* Dr. Adair Crawford, the learned author of the article "Inflammation," in the Cyclopædia of Practical Medicine.

three hundred yards without great pain and exhaustion ; considerable fulness and excitement about the head ; little or no sleep, and what there was of an unrefreshing kind.

I shall merely mention that by careful management he was soon brought into a state that allowed of the application of all the processes of the Water-Cure, even to the douche ; and that, although there were many other drawbacks in the shape of mental excitements on family affairs, he left Malvern at the end of eleven weeks, standing erect, walking ten and twelve miles a day on the hills without fatigue, the lameness having disappeared together with the chronic swelling of the knees ; his appetite so great as to require restraint, his sleep restored, and the bowels in perfect order. I venture to say that the change in his complexion and expression of countenance will be no small matter of astonishment to his metropolitan friends, both professional and laical.

DERANGEMENT OF THE DIGESTIVE ORGANS, WITH ERUPTION ON THE FACE, CRISIS, &c.

The following case was sent here by General L'Estrange, who had been under my care the preceding summer, and was cured of some severe ailments.

A military officer, twenty-four years old, came to Malvern in December last, for the above very common and disfiguring disease. His face was covered with red pimples, many of them with white heads, one crop of them succeeding another. He had been for several years troubled with severe headaches and a confirmed stomach complaint, showing itself in flushings after dinner, depression of spirits, and obstinately constipated bowels. His appetite was entirely gone, and he had consequently fallen into the habit of taking a strong dose of spirits and bitters immediately before dinner, without which he was unable to eat any. He had had his gums "*touched*" more than once with mercury, and had no relief of bowels except from purgatives, from which period he dated the commencement of his complaints, both local and general.

As there was much internal irritation to subdue, the treatment was commenced by sheet packing, followed by a general bath ; a hip bath being taken at mid-day, and six or eight tumblers of water taken daily, the major portion before breakfast while using exercise on the hills. The feverish symptoms reduced, and the bowels relieved naturally, which took place in the second week, he commenced sweating, the douche and the hip bath, with an occasional application of the wet sheet rubbing. In consequence of this treatment, a crisis of boils appeared in the third week, showing itself on the abdomen and extremities. In the meanwhile, as early as the second week, the appetite had become good—indeed, almost too good, and continued undiminished during the whole treatment. What frequently occurs in skin disease took place in this case, namely, an increase of the original

eruptions at the outset of the treatment. But as the critical boils appeared on other parts of the body, those on the face disappeared, and ceased to be renewed. Indeed a striking change took place in the whole of the skin, which, from being harsh and inactive, became pliant and healthy in appearance. The cure was effected in five weeks.

Remarks.—It is only necessary to observe in this case that the eruption depended on the diseased condition of the stomach, liver, and bowels, and that this appeared to have been much aggravated by the medicines he had taken, the first course of mercury being, most probably, the starting point. Add to this the hurtful habit he had acquired of taking bitter stimulants before dinner to force a fictitious appetite, and stimulants after dinner to mask the pains of indigestion. This patient declared that for years he had not been in such spirits as he was during the time the crisis of boils was present, all of which time he never walked less than from six to ten miles daily.

STOMACH AND LIVER DISORDER WITH ASTHMA.

A lady, about fifty years old, of strong constitution, had been for many years in the habit of indulging a pretty large appetite to its full extent, and entering into all unhealthy ways of fashionable life The consequences were, in time, shown in constant pain of the right side over the liver, and in the back, which was soon followed by asthmatic breathing, laborious action of the heart, and therefore, the greatest difficulty in ascending stairs. At the same time she became inconveniently fat on the surface, and gave likewise every indication of a similar accumulation within, and more particularly of that which is so apt to take place about the heart, the kidneys, and coverings of the bowels. The other common symptoms of a deranged state of the digestive apparatus, especially costiveness, were all present. With these ailments she came to Malvern. On my first visit, I could hear her breathing before entering the room.

The *treatment* was at first soothing and derivative, and subsequently more tonic and bracing; comprising fomentation, partial packing, compresses, sitz., and shallow baths at various temperatures after gentle sweatings.

It is tedious to racapitulate frequently the treatment of indigestion and its accompaniments; suffice it to say, that in ten days this lady was able to walk up the hills with but little difficulty of breathing, an undertaking she would not previously have dared to attempt; the pain in the side, for which she had been frequently cupped, was gone; the functions of the stomach and bowels were regularly performed; and her spirits rose to the highest state of exuberance. She continued the treatment for six weeks, at the end of which time she spoke of herself as "better than she ever remembers herself to have been."

NERVOUS INDIGESTION, &c., WITH SUICIDAL PROPENSITY.

A gentleman, æt. forty-six, after eighteen years spent in business, retired in consequence of the increasing distress both in the *stomach* and *brain*, which unfitted him for action, and further, as he said, "rendered the sight of the ledger intolerable." It avails not to repeat all the means he had tried previous to his trial of the water-cure; suffice it that they comprised all the circle of medication. He came here complaining that he only got one hour or an hour and a half of sleep in twenty-four hours, that he had the most horrible mental sensations, the predominating one being "*that he was doomed to be his own destroyer:*" indeed for the last two years he had never been left without some one to watch him. His bowels always costive, but no pain was present when they were pressed; but *eating* always brought on a more intense degree of the *mental pain*. His volition and his moral courage were quite gone. The contents of the chest were perfectly sound.

I commenced the treatment of this case with hot fomentations to the stomach and bowels at bed-time, the wet-sheet rubbing in the morning and evening, a sitz-bath in the middle of the day, and the sheet packing the second morning; the result of which was, that on the fourth night he had five hours' sleep. From the bowels too he had on the morning following this a good natural evacuation. The mind, however, still held by its painful sensations. He now began to lay every morning from one hour to one hour and a half in the packing, followed by a bath; the sitz-bath at noon and the wet sheet bath being continued. During this time he went every morning walking on the hill, and drank from three to six tumblers of water as he felt inclined. In the course of the day he drank from eight to twelve tumblers, taking exercise. At the end of eleven weeks he left Malvern perfectly recovered, having, during the latter half of that period, used the douche daily, and broken upon the wet sheet by occasional sweatings in the blankets. The changes in the expression of his face indicative of that in his feelings, was striking to all the patients in my establishment, and from being the most lugubrious he became the most laughter-loving of them all. *He slept invariably from the time he went to bed—ten o'clock—until the servant awoke him in the morning; and his sleep was dreamless.*

The only evident crisis in this case was an increased action of the bowels for a fortnight, carried to the degree of diarrhœa for two or three days.

REMARKS.—Here is a case in which during two years the patient had been gradually getting worse, notwithstanding that he had obeyed, as he said, to the letter, every system of treatment he had followed, backed by perfect rest of mind and body. It is plain that in such states of irritation of the nerves of digestion and of the brain, all internal medicinal means should rather exasperate than alleviate, and such was

the fact in the present instance. Yet by the soothing operation of the local fomentations and body poulticing, an almost immediate effect was produced upon that irritation, as the sleep and rapidly increasing quietude of mind testified. The same remedies, by thus reducing irritation, and conjoined with the derivative effect of the sitz-baths, succeeded at an early stage in setting up a regular movement of the bowels. Having thus secured the quiescence of the nervous system, and restored the regularity and quality of the secretions and excretions, it only remained to renovate the tone of the system, which was effected most completely by the douche, and the appropriate union of the previously named remedies. It will be remarked that the diarrhœa here served as an *internal crisis*. But although this did not continue for more than four days, there were for as many weeks two copious natural evacuations every day.

DERANGEMENT OF THE DIGESTIVE ORGANS, WITH THREATENING INFLAMMATION OF THE BRAIN.

This case was a very interesting one, and had been under the care of Mr. Coulson, a distinguished surgeon in London. The patient, a gentleman of forty years of age, had undergone excessive mental excitement, accompanied with constant and distressing sinking about the stomach and bowels, fever alternating with a tendency to fainting and cold sweats, all which he had endeavoured to fight against by frequent taking of large doses of stimulants. With all this he had been unable to procure even a small amount of sleep. In my first interview with him his speech was almost incoherent, his gestures violent, and his whole appearance that of a person on the verge of insanity or inflammation of the brain. His tongue was fiery red, his bowels constipated, and his skin dry and harsh, except when the cold sweat suddenly appeared on it, together with the symptoms of fainting. All this plainly indicated the use of the packing sheet, in which he was to lay for an hour twice a day, with sitz baths in the intervals. In twenty-four hours this patient became calm, and slept almost all the time he was in the wet sheets, of which he spoke as the *most soothing and delightful remedy he had ever experienced*. On the first night after commencement of the treatment he slept five or six hours consecutively. His bowels also opened and his tongue became paler; no stimulants whatever were allowed, although up to the moment of his treatment he had taken them largely, and he expressed surprise at not feeling the want of them. At the end of a week he pronounced his feelings to be better in all respects than they had been for more than a year. Nevertheless I thought it advisable he should continue the general treatment for a fortnight longer, which he accordingly did; and at the end of three weeks returned to London,

speaking of himself as "*a miracle,*" and extolling the Water Cure in enthusiastic terms.

Remarks.—Nothing could be more striking than the *immediately* sedative effects of the linen body poultice upon the highly excited nervous system of this patient. It is impossible to conceive of any medicinal opiate acting so quickly and so efficiently; neither had the sleep any of the disagreeable characters of that obtained by opiate, for he awoke soothed, refreshed, and with a moist tongue. This effect too continued throughout the case; the patient never retrograded for a single day. Although when he came his limbs would scarcely carry him half a mile, within a week he was able to mount to the highest of these hills. The harassing condition of mind disappeared, and he frequently expressed his surprise at the totally altered view he took of the circumstances which had previously so painfully excited him.

DERANGEMENT OF THE DIGESTIVE ORGANS.

The following notes are satisfactory, short, and to the point; they are both from what may be called good patients, who assist their medical adviser in every way,—and they have their reward. Before I had the pleasure of their acquaintance, they had both taken more than their share of strong medicines. These gentlemen are very differently placed: the first has his time at his disposal, the other actively engaged in business, but, by following my injunctions, is remarkable for his *excellent health* and *good spirits*:—

Leys Castle, Inverness, Dec. 1853.

My dear Sir,

After considerable experience and observation, I have every reason for giving the Water-Cure treatment, judiciously practised, my entire approbation and best good wishes.

Few patients, I believe, have read more works on the subject of hydropathy than myself. I have carefully observed the results of the practice on my many fellow-patients in your house, and have also visited other establishments.

Before I determined to put myself under your care, I had suffered much illness for several years, with little prospect of amendment, having fairly tried every approved method, well recommended to me, in vain.

I have been entirely free from suffering, and in *the enjoyment of better health than I have known for years*, during the last winter.

which I passed in your establishment, and, I must add, that it was also past most agreeably in a social point of view.

It would be well if this *curative system* were better known by many who are perhaps now suffering as I was, and that your forthcoming work may contribute to this result, is the earnest wish of,

My dear Sir, &c.,

JOHN FRED. BAILLIE.

Princess Park Terrace, Liverpool, Jan. 23, 1854.

Dear Sir,

I am thankful in being able to say that many years have passed since I was an invalid, always suffering more or less, and in the words of Burke, making the "extreme medicines of the constitution my daily bread." It was in 1844 that I became your patient, and after passing through a course of treatment in your establishment, found myself so much renovated that I have not needed your aid from that time to this. Since then I have been, as a merchant, actively engaged in business, *and in the enjoyment of uninterrupted health.*

Many of my friends, who by my advice have been persuaded to go to the Water-Cure, are now favourable specimens of your good care of them, and join me in warm advocacy of hydropathic treatment.

With sincere regard, &c.,

JAMES M'HENRY.

STOMACH AND LIVER DISEASE, WITH ASTHMA.

The subject of this case, was such a wreck when he came under my care, that it was necessary to commence by very gentle treatment. He recovered, however, more quickly than I anticipated. Fomentation for nearly an hour was applied to the chest and abdomen once a day, with half packing in a piece of calico, followed by tepid baths cooled to 60°. Towel rubbing in the evening, occasionally gentle sweatings, and the stomach compresses for an hour every two hours. He soon progressed to chilled and cold shallow baths, with sitz baths, wet sheet rubbings, and eventually the douche. His letter tells the history of the case and the results.

Malvern, 9th October, 1843.

My dear Dr. Wilson,

It affords me the greatest pleasure before leaving Malvern to add my evidence in favour of the admirable system you practice, and my thanks for the kindness and attention with which you treated my case.

I have been upwards of eleven years in India; in the year 1836 I returned home on leave of absence, and had a most severe attack of

influenza, and have not been well since. I returned again to England in May last. I had *asthma, and spasms of the stomach in their severest forms*, with indigestion and constipation of bowels, and torpid liver of many years standing. I was treated with bleeding, leeches, blisters, and medicines, but all my symptoms returned again with the same severity. I then tried the mineral waters with no benefit, suffering two severe attacks while taking them; in this most miserable state, I determined to place myself under your care. I am in every way more than satisfied with the result. When I came to you in August I was clothed in flannel, and wore a great coat, and was still chilly and cold; now, in October, I am without flannel, wear a single light coat, and am warm and comfortable.

I had what is called a crisis; the phenomena attending it would not be believed by many without witnessing them, but I felt perfectly well at the time, ate heartily with an appetite three times a day, and took plenty of exercise with alacrity.

So great has been the benefit I have received, and so convincing are the many proofs I have witnessed of the extraordinary benefits to be derived from the Water-Cure treatment *fairly* carried out, that it is my anxious wish to see others under similar suffering avail themselves of so certain and safe a cure. Wishing you many years of health to continue your present employment so eminently for the service of others, I have great satisfaction in subscribing myself,

My dear Sir, &c.,

J. Douglas de Wend,
Captain 44th Regiment.

DISEASED CONDITIONS OF THE ORGANS IN THE CHEST.

I have already given two cases, in one of which there was chronic, in the other acute bronchitis, [illegible]

CASE OF SUPPOSED TUBERCULAR CONSUMPTION OF THE LUNGS.

This case was particularly interesting to me, being the first I had under Water-Cure treatment.

It is one of considerable importance as demonstrating the remarkable curative results of the hydropathic remedies, when judiciously applied, in complicated diseased conditions that seemed to afford little or no hope of recovery.

When at Graefenberg I was introduced to the Princess Sapieha, at her request, and hearing that I intended passing another winter in Italy, she asked if I would take her daughter under my care, provided she accompanied me where I was going.

The history of the case is as follows:—

For three years the child had incessant cough, expectorating large quantities of thick yellow sputa, frequently mixed with blood, she had hectic fever with extreme emaciation, in fact, was reduced to skin and bone. This had been preceded by several attacks of convulsions, ending in long continued insensibility, and on two occasions she was thought to be dead for several hours. After one of these attacks, eighteen months before I saw her, blisters were applied from the nape of the neck to the loins, followed by courses of medicine and a confinement to bed for six months. Her physicians declared the case to be one of tubercular consumption, with scrofulous disease of the brain, and that she could not survive more than a few months. On this she was taken to Priessnitz, who held out a hope of recovery, calling it "scrofula fallen on the chest." During the first six months of Water-Cure treatment the child gained flesh and regained her appetite, but the cough and expectoration continued, but not so frequently mixed with blood.

That was the state she was in when I made an examination of the lungs, and found the upper part of the right very dull on percussion. On placing the ear there was a strong bronchial rule throughout both lungs, but four inches below the right collar bone, I found pectorilique and garguillement, the evidences of a cavity having formed.

Seeing the case so decidedly progressing towards recovery, I thought I might be deceived, and I said that most probably it was a case of the most severe form of bronchitis, with congestion of the upper part of the lung, and dilated bronchial tubes. I therefore took Dr. Coque, (one of the leading physicians of Ghent who was there Water-Curing himself) to see the child. After a careful examination he pronounced it to be a case of tubercular consumption, with a cavity under the right collar bone, he was positive, and his opinion outweighed mine.

I have reason to believe now that my diagnosis was the right one. It is well known, I seldom fail in my diagnosis. However, my opinion was that she would recover. The princess and the child passed six months with me in Italy. The patient improved steadily, gaining flesh and sleeping well. The cough had all but ceased, and there was little or no expectoration except the first thing in the morning. For three months there had been no trace of blood in the sputa, and she went about like other children. In the spring I returned to England, and the Princess went to Paris; I left full instructions, and an assurance that the child would get well.

Two months after I had been settled at Malvern, I received a letter from the Princess, and relative to the patient, she observes :—

"Je profite de cette occasion pour vous dire que Sophie va de mieux en mieux; elle tousse moins tous les jours, et ses nuits sont excellent. J'aime à vous dire, Monsieur, que vous êtes pour beaucoup dans cette amelioration, et je vous en remercie de tout mon cœur. Je joins en mille compliments pour Madame Wilson, et pour vous l'assurance de mes sentiments distingués.

"SAPIEHA."

I have since heard that the patient had quite recovered.

The treatment was commenced with the shallow bath tepid, and cooled down to 65°, morning and evening. In this she was rubbed diligently with the hands of two maids, during a period of from six to twelve minutes. A compress was applied all over the front part of the chest, well protected and warm, night and day, and it was at intervals extended to the abdomen. When the cough was violent at night, and it had sometimes been incessant for three hours, I ordered the compress to be refreshed, as often as the paroxysm persisted. This I always found quieted the cough, and put her to sleep. When the evening exacerbation commenced, the bath and compress never failed to relieve all symptoms of fever, and to quiet the pulse. The treatment was varied from time to time to meet different symptoms. The patient also took from six to eight half-pints of water in the course of the day in divided doses, during exercise and after each bath.

CASE OF BRONCHITIS WITH DERANGEMENT OF THE DIGESTIVE ORGANS.

Lord D——ne sent for me in Oct. 1855, to see his boy, æt. 7. He had been coughing incessantly since June, and it had resisted all the approved modes of treatment. The boy was very thin, delicate, and declining. The tongue covered with red pimples, and otherwise indicating active stomach and bowel disorder. He was warmly clothed as possible, and kept in a warm room.

By a simple Water-Cure treatment, in a week he was out like other boys, and in a fortnight nearly well. I ordered the chest to be fomented night and morning for an hour, followed by a warm bath cooled to 65°, to be well rubbed in the warm and then in the colder water, remaining in each three minutes. The first day the fomentation increased the cough, and Lord D—— had doubts of its efficacy, but the third day it diminished so considerably, that Lady D—— was full of hope of speedy recovery, and by this time her ladyship began to understand and appreciate the treatment. Partial packing was now commenced followed by the bath, and the wet sheet rubbing at noon and in the evening with a short fomentation at bed-time.

After this speedy cure, I was requested to examine four of the other children, all out of health, with deranged digestive organs. They all improved rapidly by Water-Cure treatment, and in a few weeks Lady D—— left Malvern a less anxious mother than she came here, having learnt much that it behoves every mother to understand —knowledge, which fifty years hence every medical practioner will deem it his bounden duty to communicate to every mother, and exemplify in every family.

BRONCHITIS AND SUPPOSED CONSUMPTION, WITH DISEASE OF DIGESTIVE ORGANS AND EXTREME DEBILITY.

Ten years have now elapsed since the following letter was written. During that time the lady has had a family, and I have had the pleasure of seeing her on two occasions, when she paid a short visit to Malvern.

On my first interview the patient presented all the appearances of consumption rapidly approaching its last stage, but on examining the state of the lungs the signs of tubercular phthisis were wanting. There was no sign of an ulcerated cavity. The *resonance* was sufficiently clear with bronchophony, &c., showing the existence of a grave and long standing inflammation of the bronchial tubes. I therefore at once gave a favourable *prognosis*, and assured her of speedy amendment, and in due time a *cure*. In the following letter, the patient relates her own cure. The treatment was much like that of Captain De Wend, already given.

"King Street, Carmarthen, Feb. 6th, 1844.

"DEAR DR. WILSON,

"If a brief account of my recovery by the Water-Cure will assist in removing ill-founded fears and prejudices, it is with great pleasure I send it you, to make any use of you may deem of utility.

"During a period of twelve years, I was in a very delicate state, scarcely ever well, and incapable of bearing the least exertion. I was frequently laid up with severe illness for months. At last my chest became so severely affected, that I was thought to be in a rapid consumption. During this long period I was generally under medical treatment, often thought to be in a *hopeless* state, and I was at last told that the probabilities were against my living long or recovering. My husband was informed by some of my medical attendants that tubercles were formed in the lungs.

"I put myself under your care in a forlorn state and as a forlorn hope, and when, after an examination of my chest, you told me that with proper management, care, and the necessary means, I should be free from disease, strong, and well, in less than six months, I thought at the time that you were flattering my hopes, and that it was next to impossible. I am thankful to state, that your opinion has been truly verified, for I am now strong, and in the enjoyment of all the feelings of perfect health.

"Soon after I commenced the treatment, I began to experience its strengthening power and to feel more assurance that I should recover. I was soon able to bear and find all the remedies agreeable, and to the present moment I have every day had more reason to thank a

kind Providence who gave me the benefit of the means you use, and of your skill and unremitting kindness. Mr. Charles joins me in kindest wishes for your welfare.

"Believe me, dear Dr. Wilson, &c.,
"ANNE CHARLES."

"P. S.—I forgot to mention that from the day I consulted you, I have not taken, nor have I in any way required, a dose of medicine or a stimulant of any kind."

SUPPOSED CONSUMPTION.

This is another case of the same kind as the last, with this difference, that there were family reasons for dreading that tubercular consumption had set in, and that it was far advanced.

This gentleman, whose studies had been interrupted by illness for some years, is now a Clergyman of the Church of England, doing active duties—and now married and has a family. When I last saw him, June 1856, he was a strong robust man. It should be remarked that this patient came to Malvern direct from a long residence at Madeira. The letter appeared in Mr. Lane's "Life at the Water-Cure."*

LETTER FROM THE REV. WM. SEALY TO RICHARD LANE, ESQ., LITHOGRAPHER TO HER MAJESTY.

(*Extract.*)

"Malvern, Oct. 1850.

"DEAR SIR,

". . . . The delicacy of my own health had obliged me to pass several years in the Island of Madeira, but so little did that much-vaunted climate tend to restore my health, that I came here seven weeks ago in a state of *mind* and *body* which it would be vain for me to attempt to describe. I looked forward to the future with gloom and despondency. Gradually and imperceptibly a change took place —my spirits returned—my general health improved—and the pains from which I had so long suffered began to leave me. I doubted the reality of all this, and thought that a few days would bring them back with tenfold violence; but such has not been the case. I am the astonishment of friends and others, and rejoice in the prospect of an *English winter*. I believe that with God's blessing the Water-Cure

* "Life at the Water-Cure, or a Month at Malvern." By R. J. Lane, A.R.A. Lamb, Library, Malvern.

has saved my life. If I had not had recourse to hydropathy, what would have been my fate—a few months of suffering with the feeling that recovery was hopeless. They would have then said, "poor fellow, he died of consumption." With more justice they might have said from great mismanagement and excessive drug treatment. When I see all around me progressing to health in an equal ratio with myself, I cannot but congratulate you in extending a knowledge of the Water-Cure.

"Dear Sir, &c.,
"William Sealy."

This was a case of thoroughly strumous constitution, and the change that has been produced in the tissues by perseverance in Water-Cure living, and active treatment *at intervals*, is as evident as it is decisive. He has now all the appearance of a robust country squire. Four or five of his brothers and sisters died of tubercular phthisis.

During the time this patient was at Madeira, he said he did not enjoy a day's health or comfort; active irritation was kept up by croton oil and other irritants, applied to the chest, with corresponding medication internally.

By a careful examination with the stethoscope, I found the lungs sufficiently clear, and if a deposition of the tubercule existed it must have been in small numbers, and not easily detected. Chronic inflammation of the bronchial tubes was evident, as well as intense irritation of the stomach, and all the symptoms that ordinarily accompany deranged digestive organs.

The treatment was commenced with the usual panacea of fomentation to stomach and chest, followed by the tepid shallow bath cooled down to 65°. The wet sheet, rubbing at noon, and the abdominal compress at several intervals of two hours in the day. As soon as the skin had regained a little tone and freshness, partial packing was commenced in the morning with colder baths, sitz baths at noon, and sitz or rubbing sheet, or both combined in the evening. In a few weeks he was able to bear the douche for a minute at noon, and occasional sweating before the morning bath. By these means his strength rapidly increased, he slept well, and his appetite became keen and regular. He was enabled to return to college, and in due time obtained ordination, and from that day to this—more than 6 years—has been in excellent health. During these years, when he has had an opportunity, he comes to me for two or three weeks' active Water-Cure treatment.

CASE OF PHTHISIS, OR TUBERCULAR CONSUMPTION.

In November, 1854, a gentleman, æt. 38, Mr. P——, a tobacco merchant, wrote to me from London, and the description he gave of his case left me to suppose that it was one of pulmonary consumption in the *last* stage. I replied that I did not consider his case one at all fitted for the Water-Cure, and advised him to remain quiet at home and follow the prescriptions of the able practitioners who were attending him.

I was a little astonished to see him enter my room the next evening in a state of great excitement. He said, "My doctors have given me up, but I have a strong impression that you can cure me, I am anxious for you to try, at all events I may as well die at Malvern as in London, I hope you will try what you can do for me." Although he appeared really as if he had not many days to live, I could not think of refusing, I therefore said, all that the Water-Cure could do should be tried for him. I at once proceeded to examine the lungs, and there I found a cavity at the upper part of the left lung, as large as a wallnut, the rest of the lung was dull on percussion, but in the right lung there was not much disease, except at the upper part, where a perceptible deposit had commenced.

The sputa, night perspiration, emaciation, and other symptoms, all corresponded with the pathological condition of the lungs.

I thought it probable that he might live two or three months with extreme care, but, although I had seen, in the many cases of tubercular consumption I have had here under Water-Cure treatment, an amount of reparation that produced sanguine hopes of ultimate recovery in the friends of the patient, I was not prepared for the restoration and arrest of symptoms that took place in this case. Mr. P—— went through the winter here, and in the spring found he had gained nearly a stone in weight, he seldom coughed, comparatively, eat and slept well, and, except in bad weather, was out every day. He came to see me three times a week, for he was in lodgings.

He returned home for a time, in the summer, wishing to attend to business, but did not remain long, he again commenced active treatment. After some months he went to London, and I learnt from him that he was getting on well, and attending to his affairs. After this I lost sight of the patient. It was at the end of the next winter that I again received a letter, stating that he had overworked himself and was laid up with diarrhœa. He wished me to prescribe for him, but I declined, further than a simple fomentation, but insisted that he should send for a medical practitioner at once. A few weeks after, I heard that he had died. The probability is that by this time the lungs were nearly destroyed, and the diarrhœa one of the last symptoms that hastened the termination.

The treatment he had undergone was sufficiently simple, consisting in frequent fomentation to the chest, and small compresses at night,

well protected,—partial packing, followed by warm and tepid baths cooled down to different temperatures, according to the condition he was in. Occasionally gentle lamp baths, with sitz and rubbing sheets.

In about a week the night perspirations had ceased, nor did they return whilst here, and in a month he began to gain flesh.

I wished him to take cod liver oil, but he said he had taken pints, and that he was sure it had made him worse, that he positively declined taking it, even in small doses. He said it had taken away his appetite, made acidity, and that he had always cold feet and headache when he took it.

THREATENING CONSUMPTION, WITH DERANGEMENT OF THE DIGESTIVE ORGANS.

The writer of the following letter, the Rev. Mr. Marshall, had suffered for a long time many of the symptoms preceding rapid decline, and it was expected that he would have been obliged to retire from the duties of the Church.

Cases of this kind are frequently met with on the Continent, where the subjects of them go in search of health. At Rome and in other parts of Italy, during three winters, I saw many such, and amongst them a number of clergymen going on from bad to worse, the *appetite decreasing*, the *strength lapsing*, the *tone of the skin becoming less and less*. These cases often commencing in mental work and irritation, lead on to derangement of the stomach and bowels, are accompanied with *stomach cough* and extreme readiness *to take cold*, and not unfrequently terminate in substantial disease of the lungs:—a conclusion which is seldom prevented by the system of remedying they too often go through, which, on the contrary, leads to *hotter rooms*, *warmer clothing*, more stimulating drinks, and additional *chilliness and debility*. It is really quite melancholy to see many of them in Italy—far from their friends and their duties—shivering at the bare thought of the bracing and healthy winter of their native isle, and feeling actually more cold than their countrymen on the banks of the Thames.

THE CASE.

My dear Doctor Wilson,

It is now just a year since I consulted you at Malvern. I had been out of health for many months, and tried various remedies in vain; there was then every appearance that I should be obliged to give up my public duties, and seek refuge in a warmer climate. Since I left Malvern, I have been in perfect health, and have not had an hour's illness, *a thing I had not known for several years previously.*

I feel it due to the *system* and to *yourself,* to state that your treatment has fully realized all you promised; for the last twelve months *I have been more equal to my public duties than at any other former period of my life.* During the winter I *went out* in *all weathers,* and at all hours, and *never once took cold.* I have not taken medicine of any sort or kind since I saw you. I never can be too thankful for the benefit I have derived from the Water-Cure treatment. With best wishes,

I remain, &c.,

W. K. MARSHALL.

GREAT SUSCEPTIBILITY TO TAKING COLD, WITH STOMACH COMPLAINT, INDIGESTION, AND OTHER COMPLICATIONS.

This was an interesting and a well-marked case. The lady had given the Malvern air, rest, and dieting a fair chance before she thought of the Water-Cure. In the whole range of medical treatment, there are no remedies that any medical practitioner can say will produce such results as described in the following letter.

Simple as the case appears, all experienced practitioners know to what serious results this state of matters too often leads.

The lady was sent here by Dr. Begbie, a physician of talent at Edinburgh.

Dear Sir,

In compliance with your request, that I should give you a sketch of my case, I beg to say that I have been for many years annoyed with a liability to take *severe cold,* with a cough that continued for weeks, and sometimes *months,* more particularly the last two years, *when* I was never more than a week without it, and closely confined to the house from *October* till *June,* never being able to go out without catching fresh cold, however warmly clothed, and even *latterly* in going through the house if the weather was at all damp. The usual mode of treatment was *medicine,* mustard poultices on the chest, leeches, and rubbed with irritating liniments; sometimes fly blisters, and every cough mixture, and lozenges,—all that could be thought of was tried, warm drinks, &c., and generally several days in bed at the commencement of every attack of cold. Occasionally the cold affected the wind pipe more than the chest, which made the cough at those times incessant. A complete change to *bracing* air having been recommended, induced my friends to bring me to Malvern, but not to try the Water-Cure; but it had *not* the *desired effect,* as I was attacked with a severe cold, similar to what I usually felt, and had I not consulted you, must in all probability have been confined to the

house for some time, as going out always increased it. However, you advised the packing in the sheet twice a *day*, and rubbing three times *each day* with the chilled wet sheet, wearing a warm compress constantly on the chest, hot fomentations applied to the stomach for two nights, drinking cold water, &c., and walking out three or four times a day, which treatment I followed, and at the end of *three days*, the feeling of cold in the chest was *quite removed*, and by the sixth day, the cough *completely gone*, which indeed appeared quite like a miracle, and thoroughly *convinces* my friends and myself of the extraordinary efficacy of the *Water-Cure*. I now go out without a thought about the weather or fear of catching cold.

I remain, yours sincerely,
ELIZABETH SPROT.

RHEUMATISM, CONTRACTED JOINTS, ETC.

This case was to me an interesting one, being the first of a deplorable rheumatic character, which I had to treat as a "Water-doctor." The lady is now married, and when I saw her about two years ago, she was as fine a specimen of robust health as could be seen; her only complaint being that she was too stout. This is the case as it was published twelve years ago.

A lady about twenty-six years old came to Malvern in July for the Water-Cure treatment. She had been some time under the care of Mr. Hodgson, of Birmingham. The right knee and elbow were contracted without the power of movement, swollen and painful; the wrists nearly in the same state, and many of the fingers completely distorted. She had been brought by her long and severe sufferings to a state of extreme debility, and appeared emaciated and bloodless. All the functions were deranged and in the worst condition. She had not been out or walking for nearly twelve months, and her medical advisers had given a decided opinion, that "even if her general health ever recovered she would be a cripple for life." A few years ago I should have come to the same conclusion. From the impossibility of taking exercise of any kind, and the weak state of the patient, the treatment was commenced with tepid and chilled baths, towel rubbings, and warm baths cooled to 60° after the sweating process. Fomentations and compresses were applied to the affected joints. In a few weeks the contracted knee gave way, and at the expiration of two months she was able to walk up tolerably steep ascents, with little lameness. In the third month she had become stout and well covered with flesh, the colour of the skin and face completely changed, and all the functions of the body in healthy order. The elbow which I considered fixed beyond the chance of regaining its movement, is now beginning to give way. She also walks out in all weathers.

I have omitted many of the minute details of the treatment prescribed to meet the deranged state of the digestive organs, suppressed menstruation, &c., in fact, in all the cases cited, I have only given the leading features.

RHEUMATIC GOUT.

The subject of the present case is now an active officer in the East India service. His letter gives a faithful description of his case.

"Malvern, Feb. 1st, 1844.

"My dear Sir,

"It affords me much pleasure to state, that the effect the water-cure has had on my *gout* and *general health*, has been most satisfactory. For the last seven years I have suffered as much as a man can well do, being often confined above a month to my bed, and afterwards continuing in a weakly state. This went on with other attacks of severe illness, until my ankles, feet, and left wrist were permanently enlarged to double their natural size, and at the same time hard and painful. When I came to you I was unable to walk the shortest distance without great pain and fatigue, and my general health was worn out.

"During the long period of my suffering I had taken medicines of all kinds, in great quantities, which were given me by able and esteemed medical men. In a short time after I was under your treatment, I began to feel its beneficial effects; my strength returned, my appetite, spirits, and sleep became excellent, and the hard swellings of the joints diminished rapidly and visibly. I am now able to be on my feet the whole day, and walk a great distance with little or no inconvenience. The feet and joints are more than two-thirds less than when I commenced the water-cure, and are indeed but little larger than their natural size. I now feel that I have health and strength, and by following your instructions, and going on gently with the treatment, I feel confident my recovery will be permanent. In leaving you, I have to express my most sincere thanks for your kindness to me, and my conviction that it is to your treatment by the water-cure, I am enabled to *pursue* my *profession*, and have been saved from being always *crippled*. I beg to subscribe myself,

"My dear Sir, yours very faithfully,

"Alan Hyde Gardner."

The treatment was commenced by packing in blankets, to induce gentle but long-continued perspiration, sometimes for an hour, followed by a shallow bath at 85° for three minutes, and then cooled to its natural temperature,

for three minutes more; steady but gentle rubbing with towels being actively carried on during the whole period the patient remained in the bath. Before packing in the blankets compresses were applied to all the affected joints. At noon the joints were fomented for an hour, followed by the same shallow bath, as in the morning after the sweating; when reaction was well established, the compresses were replaced. The douche was also used at the proper time.

In these cases, when the symptoms are acute, with fever and a quick pulse, a partial packing in the sheet for three-quarters of an hour is necessary; but as a general rule, the lamp-bath or the blanket packing is one of the principal remedies.

RHEUMATISM AT THE AGE OF SEVENTY.

CASE.

A gentleman residing at Leamington, put himself under my care in the following state. He had suffered a great many years with rheumatism, and had been treated with no permanent benefit. During the last twenty years he had been forbidden to touch cold water. I found him with the hands, knees, and feet distorted and enlarged; the patella of each knee fixed and immoveable; all the locomotion he was capable of, was a few yards on crutches. For the seven preceding winters he had not ventured out of his house, and he had been carried up and down stairs. A few weeks after he commenced the water-cure treatment, he was able to walk a considerable distance with one crutch, afterwards a stick was found a sufficient support, and he went out in all weathers without any disagreeable result. He left Malvern in the autumn, and returned here to spend part of the summer. He told me that during the winter he had taken a bath nearly every morning, and walked out every day. Dr. Jephson, meeting this gentleman walking about the streets of Leamington, said to him, "Well, I do not care how you got so well, or who made you so; I congratulate you."

CHRONIC RHEUMATISM, NEURALGIA, AND NERVOUS DEBILITY.

LETTER FROM THE REV. J. P. COOKE.

"St. John's College, Waterford,
"Jan. 26th, 1844.

"My dear Sir,

"I have now had an opportunity of testing the power of the water-cure treatment, which I went through under your care. For

the last three months we have had an almost uninterrupted continuance of that damp weather which for a long period used invariably to be a season of much suffering to me, and it is therefore with much pleasure that I acquaint you with the permanence of its efficacy.

"When I first put myself under your care, I had been for more than twenty years suffering from what I was told was chronic rheumatism, and consequent and daily increasing general debility. The night before I went to Malvern, my state of suffering was very great, and it was only by the most determined effort and exertion that I could cross the room. After the first ten days' treatment my strength began to return and my pains to disappear; and the happy effects have become daily more sensible. Under the Almighty Providence, to the water-cure, and your skilful administration of it, I owe this unexpected blessing, for I had in vain tried, I believe, every kind of remedy which medical advice could afford. It is no wonder, if from the benefit I experienced in myself, and that which I saw in so many others of your patients, that I should look upon the water-cure as a blessed revelation made to man in these days of scientific research and discovery. I know enough to feel authorised in recommending this admirable system of treatment to all sufferers from disease, and feel assured it cannot be harmful to the most tender frames or most delicate constitutions, but must be productive of relief in almost every disease when scientifically administered by qualified practitioners.

"Of your kindness and attention to myself I shall ever have a grateful recollection, and to your skill, candour, and liberality shall always be happy to bear ready witness.

"I remain, my dear Sir, &c.,

"J. P. Cooke."

RHEUMATISM.

This patient was induced to try the water-cure by Colonel Wilmot, a resident of Malvern. He has been here since he was cured, accompanied by his family, to place his daughter under my care.

THE CASE.

Colonel V——— came into this neighbourhood for his September shooting, but, in a few days, was so severely attacked with rheumatism in the lower part of the back, the groins, and legs, as to oblige him to give up all his sporting engagements, and *lay himself up*. The same thing had occurred to him in *several previous years*, and had confined him more or less during the winter. When I saw him he complained of great and incessant pain; and when he attempted to walk he was nearly bent double.

During the first fortnight that I treated him, the pain, though severe when present, became intermittent, and there were intervals when he could walk straight. Still there was every appearance of its being one of those obstinate cases, which usually baffle all treatment. He was a good patient, however, and stuck to the plan of treatment I laid down for him, with perseverance. Before five weeks from the commencement were over, all pain was gone, both in the trunk and limbs; and he was able to walk as well as ever. A few days ago I met him at a *battue chasse*, at Lord Beauchamp's, at Maddersfield, where he took his share with us in killing a great many pheasants; and although the day turned out very wet, he stood it out, laughing at the idea of a return of rheumatism. His general health and appearance also underwent a very marked change for the better; indeed, his health may be said to be now perfect.

The treatment was much the same as that mentioned in Mr. Gardiner's case already described.

RHEUMATISM AND NEURALGIA, WITH STOMACH COMPLAINT, ETC.

LETTER FROM J. CAMPBELL, ESQ.

"South Hall, by Rothsay,
"Jan. 9th, 1844.

"My dear Doctor,

"According to promise I write to report progress, and let you know how I have been going on.

"You will be glad to find that since I was under your care, I have not had a pain or an ache. I have left them all behind me; indeed, I may say I have not felt so well or so strong for many a day as at the present moment. I almost wish I had a twitch or two, that I might have an excuse to return to Malvern and your hydropathic treatment, which I tell all my friends, I found as much a matter of enjoyment, as it was beneficial. The water-cure is gaining ground in Scotland, and I am convinced it will do so, *the more it is practised and understood.*

"Believe me, my dear Doctor, &c.,
"J. CAMPBELL."

GOUT.

I have treated a great many cases of gout of all kinds; some of them as severe cases as could be found. Many of them bless the day when they discovered the water-cure; others, I know, have returned to drinking habits, or, what is nearly as bad, eating twice as much as nature requires. As a matter of course, with the return of gout, less exercise was taken, and the surplus provision *disposed of* with more

punishment and *difficulty*. Some of these have again had recourse to the water-cure, and have been again restored to a condition free from suffering, and compatible with the duties and *proper* enjoyments of life. There can be nothing more convincing and satisfactory to a medical practitioner, than to mark the reparative effects of a judicious course of water-cure treatment in a severe case of gout, where the joints have become crippled.

Priessnitz told me that, out of a *great many*, he had only *cured* one; if he had said he had every reason to suppose so, perhaps he would have been nearer the mark. From my past experience, I think it probable if this patient had returned to the regular habits, that induce a return of gout, he might have found that the enemy, though driven out of the citadel, was still in ambush.

About *twenty* years ago I had an attack of gout, which came on in the mail from Liverpool to London, after a course of hospitality, comprising an unlimited supply of madeira, port wine ("without a headache in a hogshead"), and brandy and water *ad libitum*. I entered my house in town without a boot on, but with a *great toe* not to be easily forgotten. I have taken much care since not to have gout that interfered with my movements.

The following was the first case I treated by the water-cure. I found him in a condition requiring his two footmen to carry him up and down stairs. As a proof that he continued satisfied, he sent me more than a year afterwards, a valued friend all the way from Italy, who was then supposed to be a dying man. It was Admiral Beauman, whose recovery was rapid, and very remarkable.

CASE OF GOUT.

"Malvern, Sept. 16th, 1842.

"My dear Sir,

"I cannot leave Malvern, without again expressing to you my thanks for the encouragement you gave me to try the effect of the water-cure, as you practise it, and for your kind attention to me during the time I have undergone the treatment.

"I have *now* gone through the perspiring process, followed by the baths fifty times, with the other parts of the treatment; I found them anything but disagreeable; indeed, I may say, quite the reverse; and they have been most beneficial to me. During nine months before I came here, *I was never able to move without my crutches*, and a great part of that nine months, *I passed in my bed*

or on the sofa. My nights were restless, my pulse high, and my tongue charged. I am now turned sixty-three years of age, and have been subject to the gout more than forty years. I paid little attention to it the first twenty years, and as soon as the fit was over, I never missed taking my wine daily. My knees, hands, and other parts were so crippled, that I had made up my mind to pass the rest of my days *in my arm-chair or bed*, or to hobble about with my crutches.

"The effect of the treatment has so ameliorated my situation, I can now go up and down stairs with ease and comfort, *without a stick*, and the other day walked half a mile on the high road. I frequently ride on horseback four hours a-day, and my general health, I thank God, is as well as ever it was in my life. I sleep well, my appetite is good, I can use my arms freely, and tie my neckcloth, a thing I had not been able to do for years; in fact, *I feel myself comfortable and independent.* Had I come here a year ago, and undergone the same process, I have no doubt but I should have saved my left knee from being contracted: as it is, I am content to walk a little lame, and shall be too happy to remain in the same state I am in at present for the rest of my days. Pray excuse this long scrawl, as I know you have not a minute to spare, and

"Believe me, my dear Sir, &c.,

"T. C. Marsh."

I had a letter a short time ago from an *experienced* gouty patient, who had really suffered a martyrdom from it,—he makes the following observation,—"I should have no objection to live a hundred years with any kind of gout, only give me my lamp-bath, and an occasional dose of castor oil, a Dr. Petro-Positive to order away forbidden dishes, and my old bath man to make me turn out after my bath on fine mornings."

GOUT.

"Acton House, Acton,
"7th Feb., 1844.

"My dear Sir,

"Experience has so fully convinced me of the good effects of the water-cure, that I feel no hesitation in complying with the request contained in your letter, but have great pleasure in adding my testimony in support of its efficacy. *Eighteen months* have now elapsed since I commenced the trial under your direction; previous to that time I had for years suffered dreadfully from gout, of which I had frequent attacks; indeed, I was very seldom and only for *short intervals free from them.* I was also much annoyed, I may say incessantly, with acidity of the stomach, heartburn, headache, giddiness, and other distressing symptoms. By strictly following

your rules, and without the aid of a grain of medicine, I have been long since relieved from them, and all similar inconveniences, not *partially* or by halves, but *wholly* and *entirely*.

"About a year after I left Malvern, I had a fit of the gout while making a little tour of the Lakes, but I may, I believe, attribute it to over-confidence; I fancied and flattered myself that the disease was eradicated from my constitution, and I therefore neglected the warnings that preceded the attack. Since then I have enjoyed perfect health, and can walk fifteen or twenty miles without any apprehension of suffering for it afterwards. I think, and indeed know, that mischief has occurred to individuals by *misapplication* of the water-treatment. Some expect wonders to accrue from drinking two or three tumblers of water before breakfast, and should gout appear, they have recourse to cold applications, without undergoing any kind of preparation, or using any *precaution*. Hydropathy then is sure to be *accused* and *abused*, and such cases I have heard quoted to raise prejudices against it. I am perfectly convinced that under *judicious* management the water-cure is a safe cure for gout, and I shall be always ready and happy to promote its adoption by every means in my power. I think, my dear Sir, that all who have experienced its benefits, owe you a great deal for having first introduced the practice of it into this country. I freely acknowledge my obligations to you, and remain always,

"Yours most faithfully,

"GEORGE LYNCH."

RECOVERY FROM PARALYSIS OF THE LOWER EXTREMITIES OF MORE THAN NINE YEARS' CONTINUANCE.

The account of this case I shall give in the words of Sir Edward Bulwer Lytton, as he relates it in his "Confessions of a Water Patient." He had heard of her recovery, from another lady patient, and afterwards questioning me on the subject, I gave him her address, and told him that if he introduced himself as a friend of mine, he might call upon her, and make his own inquiries. This statement was the result of his visit:—

THE CASE.

"The following is one of the many cases I witnessed when at Dr. Wilson's establishment, showing how much may be done by a scientific application of the water-treatment. It is that of a lady, who had had the lower limbs palsied for nine years, and who could, at the time I saw and conversed with her, walk well—and walk far. This was the more striking, and I have selected it more particularly, because the cure was effected without the aid of those

adjuncts of *air* and *exercise*, in which some sceptics are inclined to place the whole benefit which hydropathic treatment confers. For the patient had recovered the use of her limbs, and was enabled to walk without assistance, before she had quitted the two rooms which, for nearly six months, formed the magic limit of the cure. And, I confess, that I scarce know which I envy most, the delight of this grateful patient, or the pleasure and honest pride of Dr. Wilson in so signal a service to humanity, and so undeniable a trophy of his skill.

"The lady had passed the meridian of life, and it was not until the power of standing had returned, that she had any faith in recovering the use of the limbs, notwithstanding Dr. Wilson's confident assurances, from the first, that she would walk again; her only hope was benefit to the general health; and this, with the Doctor's assiduity, induced her to persevere until his prediction was fully accomplished."

This case required considerable perseverance, and it had peculiarities calling for much antiphlogistic treatment by daily sheet-packing. The lady had gone through in former years many very severe illnesses, which had left behind them a continued feverish condition, with a pulse seldom under 100. I observed also that the power of the arms and hands was becoming very weak, clearly indicating the insidious approaches of a similar state of paralysis of the upper extremities. Otherwise she conversed cheerfully, and was able to take sufficient nourishment, when placed and propped up in her seat.

She fortunately obeyed me implicitly, but she had *no faith* whatever in recovering the use of the limbs, so that I frequently taunted her incredulity, by offering to bet a thousand pounds to a thousand shillings that I should some fine day see her *walking* about Malvern. She would not give me an opportunity of winning my bet, but made amends by a proceeding much more agreeable. She sent me, some time after her return home, a very handsome silver salver, with the following pleasing inscription:*

"*Presented to James Wilson, Esq., M.D., of Malvern,*
By Sarah B. Penny, of Southport,
In grateful acknowledgment of his attention, skilful treatment,
and restoring to her, through God's assistance, the use of
her limbs, of which she had been deprived upwards of nine years,
1845."

* I read in a magazine an account of this case, with the observation "we should like to see this history authenticated," &c. I have

SLIGHT PARALYSIS, WITH EMACIATION, ETC., TREATED AT SEVENTY-FIVE YEARS OF AGE.

This case shows what may be done by a careful and modified system of treatment. The patient came from Richmond, and insisted that something should be done for her: during the time she was under the treatment here, she lived at the Library.

CASE.

The lady who is the subject of this case came here eight months after a slight *attack of apoplexy*, which left her with the following symptoms. Partial loss of voluntary motion in the lower extremities, occasioning an uncertain and shuffling step, gradually increasing up to the time she came here. Considerable thinning of the legs, and almost total disappearance of the calf. Permanently cold feet. Speech altered and difficult. Tongue red and dry. Bowels obstinately bound, yet purged violently with three or four grains of compound rhubarb pill. Sleep disturbed. Occasional giddiness. Pulse large, hard, and bounding, and varying from eighty-five to ninety beats in the minute.

The treatment was commenced by warm fomentations to the stomach and bowels, from three quarters of an hour to an hour night and morning. After the morning fomentation, she had a general ablution with a wet sheet, taken out of water at about 80°. She slept well the whole of the night, and the bowels were slightly relieved naturally. In the mean time she had had two foot-baths of cold water daily. At the end of a week she was in a state to be packed in the sheet, wrung out with warm water; but this was only done once, as, on the second day, it was applied cold, and she laid in it an hour each morning: a cold *wet-sheet rubbing* followed. From the commencement she drank about three tumblers of water a-day. The result of this was that the bowels became regular and natural every morning after breakfast, the feet permanently warm, the tongue moist, the pulse soft, and sixty-five. But what struck most forcibly a lady who lived with her for thirty years, was, that in a few days after the first *fortnight*, the calves of the legs had increased remarkably in size, and that flesh had accumulated to some extent over the whole body.

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therefore given the writer an opportunity of making his inquiries. I may also add that the intense spinal irritation, with that of the ganglionic nerves of the abdomen, causing and keeping up the paralysis, was subdued by the simplest measures,—viz., fomentation, and the daily body poultice for an hour, followed by the shallow-bath. There were also some other hydropathic remedies used, but I have mentioned the principal.

The lady went on with the treatment, packing alternate days, followed by a shallow-bath at 65°, the latter being taken every morning, for three minutes with active rubbing. The abdominal compress was also worn at night, and a greater part of the day. The patient left Malvern, as she said, "a wonder" to herself and friends.

SKIN DISEASES, ETC.

Since I have been in practice here, I have had under treatment nearly every form of skin disease, some of the cases of the most intractable nature, and of many years' continuance, notwithstanding that every approved mode of treatment had been tried. In many of these cases, the curative results of a judicious course of water-cure treatment have exceeded my most sanguine expectations, both as regards the removal of the skin disease, as well as the restoration to healthy condition of constitutions so shattered, that they seemed hardly to admit of amendment.

The following case is an illustration. This gentleman, so far advanced in life, could, when he left Malvern, walk thirty miles a day, without expressing any sense of fatigue.

CASE OF A PHYSICIAN, WITH THREATENING PARALYSIS, STOMACH AND LIVER COMPLAINT, AND SKIN DISEASE.

Malvern, May 1st, 1854.

"My dear Dr. Wilson,

"Now that your work on the water-cure is on the eve of publication, I request a place in your list of cases, for this brief and hasty account of my own. Being the case of a physician of more than thirty years' experience, in every branch of the profession, it may be deemed worthy of some consideration by my medical friends.

"You may remember when I consulted you in Jan. 1851, I was in extreme ill health and suffering. I had constant numbness and frequent neuralgia of the lower extremities, and other premonitory symptoms indicative of approaching paralysis. I also suffered much from heart palpitation, accompanied with pain of that organ,—these, with frequent nightmare and distressing dreams, compelled me often to resort to any stimulant or anodyne I could soonest find on the occasion. I also suffered much from spasm of the large muscles. In addition to these evils, there was a congested liver and congestion also of the abdominal veins, constituting the distressing class of ailments called hæmorrhoidal. All these circum-

tances led me to think very mournfully of a coming combination f ailments, sufficient indeed to make life comparatively useless,— he thought aroused me to a determined effort for my escape from nem.

"From boyhood I had a disease of the skin, of frequent occurence in this country, and decidedly of hereditary nature. With ne it assumed different appearances and degrees of severity, according to circumstances of season of the year, or of habits of life at the ime, and of the state of the stomach. It was as lepra or psoriasis a different parts affected at the same time. However, it matters ot to our present purpose what name correctly belonged to it. In ny youthful years I was extremely annoyed at its existence—and I pared no trouble nor expense—and I shrunk from no means, however severe, for its removal. I consulted the most eminent of my rofessional brethren, and read the most celebrated medical authors n my case, until the time that I became myself a physician. The neans of cure prescribed or devised for me consisted, chiefly of drugs—and many of them were the most violent and most noxious ver administered to the stomach of man—amongst such, arsenic, nercury, and iodine, with mineral acids, had a prominent place, nd of some of them I took largely and for years, and with other drugs, and especially with preparations of opium, intended indeed for the protection of the stomach and bowels, but which only enabled ne the longer, and to a greater degree, to undermine the power of n originally strong constitution. In addition to such internal remedies, I had abundance of external applications, and medicated baths of different kinds and countries. The result of all my experience of treatment of this kind was unmixed evil, to a serious degree; and I now look back with surprise that I could have proceeded so far and so long. For some time after I had ceased from all treatment of this disease of the skin, I had ceased also to care for it as an annoyance; alas, I did not escape the sad experience that such long drug medication had left unmistakeable and indelible traces of its destructive power on my digestive organs and nervous system.

"After many years of active professional duties, I resolved on a partial retirement from the more severe parts of it, because of incapacity from increasing derangement of my nerves. At length I resolved on a consultation with you on my case, and you held out to me the gratifying prospect of a cure. I commenced with a mind made up to do my part, and under the full conviction that, if this system of the water-cure, founded, I saw, on the correct basis of physiological principle, failed in my case, all other human means would fail also. Thanks be to God, I had not long to remain in doubt on the question: a few weeks brought the grateful assurance to my mind that I should eventually be rid of my complication of maladies. By strict perseverance in carrying out the system of

cure you laid down for me, in four months a very great and welcome change was effected in my state of feeling and of health. A few months more of active treatment completed my restoration to a degree of physical strength and vital energy which I only possessed twenty years ago. I have now, in addition to my cure, the gratifying retrospect of more than two years of the most usefully spent time of my life, in studying the water-cure practice in your establishment.

"I remain,
"Yours sincerely,
"JONAH HORNER, M.D."

MERCURIAL SKIN DISEASE.

The patient, Mr. P——e, is a gentleman-farmer, and visits Malvern frequently; he came here in July for the water-cure treatment. The chest and abdomen, in fact the whole body, with the upper and lower extremities, were covered in patches with scaly eruption, and the hands were so bad as to oblige him to have them always covered. On one leg there was a large ulcer of long standing. Before the skin disease made its appearance, he had gone through several courses of mercury. At the end of six weeks he left Malvern. The skin was perfectly clean and smooth with the exception of slight discoloration on the arms where the patches of scales had been most abundant.

His general health was also restored. About a month afterwards he called to show me the ulcerated leg, which had also completely healed by the use of the compress. He went through all the processes of the treatment, varied from time to time as his symptoms indicated.

BROWN LEPROSY.

A young gentleman, æt. fourteen years, became a patient here in December last. Over the greater part of both legs there existed a scaly eruption, the individual scales being dark in colour, easily detached, about the size of a human nail, and when detached leaving the surface underneath raw and tender, the latter discharging a bloody serous fluid, until the scales became again formed. This had been going on for a long time, gradually increasing in extent, without the least amelioration. He remained in the establishment nearly thirteen weeks, and left it to return to his father at Cheltenham, with his skin clean and healthy, and all the external appearance and internal signs of a robust state of health. He sweated every other day, and had the sheet-packing every day, and on alternate days twice. On coming out of the blankets or sheet-packing, there was a very strong and peculiar odour emanating from

them, and continued for several weeks of the treatment. The regular employment of sitz-baths and of the douche also formed a part of the treatment. Compresses were kept constantly upon the diseased parts, and he took from twelve to fifteen glasses of water daily.

NERVOUS DEBILITY, WITH DERANGEMENT OF THE DIGESTIVE ORGANS, AND CONSTIPATION, FROM APERIENT MEDICINES, AND IRREGULAR LIVING.

CASE.

A gentleman about forty years of age came under my care in July, 1849. He was a large, powerful man, and until a close inspection was made, looked anything but an invalid; I soon found, however, that he really was so. His conversation and thoughts from morn till night were about his digestive organs,—I could not walk or talk with him for five minutes, but with a heavy sigh he would involuntarily exclaim, "Oh, my poor stomach—and bowels!" the last words as if they issued laden with despair from the depths of the abdominal region. A word of sympathy would bring tears into his eyes at any moment, and he was as weak and nervous as any hysterical woman I have ever seen; yet in this shattered condition, if roused to an effort, he could have carried me in his arms like a child. He told me his history, as nearly as I can recall, in these words:—

"I suppose you don't think I look ill, but I am. I have been reading one of your works, which determined me on coming here; I am now so miserable that I would rather die if I can get no relief. Before the last three years I seldom ailed anything, when I began to lose my appetite, and to feel very heavy and sleepy, and sometimes in low spirits, but not in any way requiring medicine. I was living freely, and a friend advised me to take a *Seidlitz powder every morning*. This I did, and was much better, so much so, that I thought I had found exactly what suited me. I took one before breakfast for several months, when pains in the stomach came on in about an hour, without relief, then I took another. At last I took two at once without much effect. At this time I was troubled with acidity and heartburn, and took *soda* a dozen times a day. I have taken pounds. One day I called at my druggist's, and he said he would prescribe for me a *warmer medicine*, and that the Seidlitz powders were too cold for the stomach. He gave me a box of pills, three to be taken at night, and a mixture of *his own* to be taken in the morning. This I found to answer much better, but in seven or eight months was quite ill, and could *get no action whatever* without medicine, and sometimes the *strongest failed* altogether. I had a little before this consulted the first advice in London, and since

have been in the hands of nearly every man of note you can mention."

He then produced a huge packet of prescriptions, which he was anxious I should look over. Here I found the changes had been rung on every tonic and purgative, from calomel to croton oil, from gentian to quinine. Here was also creosote, with what intent I could not divine, and prussic acid, as well as a variety of narcotics. I should mention that his sleep was nearly gone, and when he did sleep, he said his dreams were so horrible that he dreaded going to bed. Here was a brain and bowels all but ruined by medicines and mismanagement.

I told him that it was a tedious, troublesome case to himself as well as his doctor, but that I would answer for his recovery. He replied, "If you can cure *me*, it will make a sensation; I am known to all the doctors, and I will go and show myself." I said, "Never mind, the majority will then say, you were a *malade imaginaire*."

Large and strong as he looked, he had no reactive powers; he was chilly in the warmest weather, and had inveterately cold feet. Here I found the value of hot fomentations to the stomach and bowels, and the gentle stimulation of the lamp perspirations, as a preparation for the different baths and ablutions. The organic powers were so exhausted, that the abdominal compress, which on most people is warmed in a few minutes, remained cold, and it was some time before he could use it. By the aid of wet-sheet rubbings, short sitz-baths, and foot-baths, during the day, and the morning warm-bath cooled to 60°, on rising in the morning, he soon began to progress. Every second day, sometimes every third, he took the lamp-bath, with his feet in hot water, followed by a tepid-bath cooled down. By degrees I began partial packing, but it was some time before he could tolerate them. He did not like it; he said it produced the most sombre thoughts, and a feeling of mental irritation so violent, that it ended in his imagining that he was fighting with some one.

At the end of five weeks, although his general health was much improved—temper and sleep restored—with good reaction after the baths—still the bowels were obstinately torpid, and requiring gentle aid. I advised him to go away for a week, and take a trip down the Wye. On his return he was in great spirits, there had been evidence of a return of the natural function of the bowels. He continued the treatment for six weeks longer, during which he took the douche-bath nearly every day, with the greatest advantage. He was now all but well, and returned to London. He wrote to me that "he should never forget the lesson he had learnt, that he was *all right*, and that he might be seen every morning before breakfast taking his glass in Kensington Gardens."

THREATENING APOPLEXY, STOMACH AND LIVER DISEASE, ETC.

Mr. Shailer called upon me a few days ago with another patient, the Rev. A. Crow, his neighbour. I found the former greatly improved in strength and his general health, and remarkably reduced about the abdomen. At the time he was going through the cure here, and throwing off *fat*, another patient, the Rev. George Burder, who was thin and worn, gained *flesh* rapidly. It so happened that they were going through precisely the same processes in the treatment.

CASE.

"Dunnington, near Alcester, Warwickshire,
"Sept. 29th, 1843.

"My dear Sir,

"It affords me great satisfaction to add my testimony to that of many others which I know you are constantly receiving as to the efficacy of the water-cure treatment. I entered your establishment on the 29th of May last, in a state of suffering very difficult for me to describe. I will enumerate the following as the principal features of my case: low spirits, costiveness, piles, headache, oppressed with fat, and threatened with *apoplexy*. I had the greatest difficulty to collect my thoughts, my *memory was nearly gone*, and I could scarcely direct my servants. I was in so deplorable a state of health, that I felt, and have since been told, that I was at that time in great danger. It induced me to adopt some prompt measures, having in vain had recourse to medicine. I was led to think favourably of the *water-cure treatment*, by the perusal of one of your books upon the subject, and therefore at once surrendered myself to your care, and during the three weeks I remained in your house, and from that time to the present date, I unremittingly followed your directions; being packed in the wet sheet every morning for one hour, as well as using the shallow-bath, sitz-bath, and compresses, at the same time drinking cold water, and observing the diet recommended by you. And now I have the gratification of stating, that having got rid of about forty pounds of superfluous fat about the stomach, &c., I am nearly relieved from the distressing symptoms I have mentioned above, and entertain fair hopes of having better health than I have known for many years.

"If this expression of my feelings is considered of the slightest use in giving confidence to those under bodily afflictions in the efficacy of the water-cure treatment, I must add that it will give me much pleasure your making use of it, in any way you may think proper.

"I remain, &c.,

"THOMAS SHAILER."

CASE OF KIDNEY DISEASE, ETC.

"My dear Dr. Wilson,

"I cannot leave Malvern without expressing my gratitude to you for the signal benefit I have received, together with my dear child, from your Water-cure treatment. I own I was very averse to the system; but I was induced to read some books on the subject; my judgment was convinced, and I determined to give it a trial. I began, according to the directions, to drink nothing but water, and deriving benefit from it, I made up my mind to consult you, and put my little boy under your charge. By God's blessing upon the means used, I was soon entirely cured of a complaint in the kidneys, which had been deemed incurable by many of the first medical practitioners in town and country. I also suffered severely from several other complaints brought on by the constant use of aperients and other strong remedies; these soon yielded to your admirable system, so that for many months I have taken no medicine, and am perfectly cured.

"My little boy came to Malvern in almost a dying state; indeed, a relation has since said he did not expect his life could by possibility last three months. His foot, which had been bad for some time, had become gradually worse and worse, notwithstanding the treatment of the best medical practitioners in town and country. In a short time there was a great alteration for the better, and in a few months he began to run about, which he does now without any ill effects; his foot is as nearly well as possible, and his general health is marvellously improved; indeed, the same relation has said that these two cases of themselves are sufficient to establish the Water Cure. I have to thank you for your kind attention and skill, and believe me,

"Yours very sincerely,

"T. B. Browne."

Mr. Browne lives on his estate, at Salperton, near Cheltenham, and the above letter appeared ten years ago, in one of my former works. He was here this summer for a month, looking well. His little boy, who was fragile and delicate in the extreme, is now a fine youth. When he was first brought to me, I had to unwind about three yards of sticking-plaster from the ankle joint, which had been on for some time, instructions having been given not to remove it. I found that sloughing or destruction of parts had taken place under the bandage, leaving the tendons and bones of the joint as bare as if they had

been dissected. With a constitution so strumous and delicate, the case was one of a dangerous character, and with any mismanagement might have terminated fatally.

It was highly satisfactory to observe the reparation that took place under our local and general treatment. Water dressing to the joint, and mild Water Cure processes, such as I have described as fitted for so tender a subject, were all that was requisite for a perfect cure.—*See Maladies of Children*, p. cxiii.

SCIATICA, ETC.

LETTER FROM JAMES SHERIDAN KNOWLES, ESQ., AUTHOR OF "THE HUNCHBACK," ETC.

"Glasgow, Nov. 5th, 1850.

"My dear Sir,

"I am glad that a new edition of your testimony, in favour of the water-cure, is coming out. You know my opinion of the establishment at Malvern, and the high respect that I entertain for Dr. Wilson, its proprietor and accomplished superintendent, whose patient I had the good fortune to be when I had the pleasure of making your valued acquaintance.

"When I arrived, I could scarcely walk to the turnpike and back again—little more than a few roods from the house; but before I left, I could cut my stick for a trudge of several miles; and for several weeks, almost constantly scaled, before breakfast, that insolent hill in front, which had previously looked down upon me, and successfully defied me to put a foot upon its crest. I entertain no doubt whatever that, with the blessing of God, a longer residence would have resulted in the thorough removal of my lameness of many a year.

"So much for my own experience. To speak of what passed under my own observation with regard to others:—I witnessed the removal of apoplectic symptoms; subduing of a neuralgic affection of the heart, as well as of pulmonary threatenings; summary expulsion of the gout; a formidable cutaneous disease superseded by a healthy state of the skin; exhaustion from the effects of a residence in India, by indications of rapidly increasing vigour, &c. In short, uniform justification of my previous faith in the admirable system practised at Malvern. If you value this hurriedly drawn up, but honest testimony, make what use of it you please. At all events,

"Believe me, &c.,

"JAMES SHERIDAN KNOWLES.

"To R. J. Lane, Esq."

THE HYDROPATHIC CURE OF DRUNKENNESS.

It is a matter of importance that it should be generally known how easily, in the majority of cases, the habit of drunkenness, and the craving for intoxicating stimulants can be sufficiently mitigated or radically cured.

Notwithstanding that this unfortunate condition is comparatively rare amongst gentlemen, still I have had the satisfaction of sending home many inveterate cases cured; the patients being otherwise persons of estimable character, and in some instances possessing very great talents and considerable acquirements.

The facility with which brandy, laudanum, and noxious stimulants of all kinds are given up, under Water Cure treatment, is remarkable, and has not escaped the notice of acute non-professional observers.

Sir Edward Bulwer Lytton, in his pamphlet on the Water Cure, makes the following remark—"The next thing that struck me was the extraordinary ease with which, under this system, good habits are acquired, and bad habits relinquished. The difficulty with which, under orthodox medical treatment, stimulants are abandoned, is here not witnessed.

"Patients accustomed for half a century to live hard and high, wine drinkers and spirit-bibbers, whom the regular physician has sought in vain to reduce to a daily pint of sherry, here voluntarily resign all strong potations, after a few days cease to feel the want of them, and reconcile themselves to water, as if they had drunk nothing else all their lives. Others, who have had recourse for years and years to medicine,—their potion in the morning, their cordial at noon, their pill before dinner, their narcotic at bed-time, cease to require these aids to life, as if by a charm."

In cases of inveterate drunkenness, the agreement I make with the patient is simply that he must come to me for any stimulant he may desire, and it is given as long as asked for. In cases of this kind, with two exceptions, I have found, after the fifth day, even the most inveterate decline taking the prescribed quantity, and, in some instances, express some repugnance to the smell and taste of beer, wine and spirits.

Case of Drunkenness.

A gentleman came to me, by the recommendation of Sir Edward Bulwer Lytton, with all the premonitory symptoms of delirium tremens. He had excessive trembling of the limbs, vertigo, apprehension of dying, sleeplessness, and phantasmagoria.

For many years he had taken large quantities of wine and spirits, and every means had been tried in vain to wean him from the habit, or even to reduce the amount taken. His servant told me, that for about a year, his master had taken three bottles of brandy, besides wine, as a daily allowance; that every morning he gave him a bottle of brandy in soda water, before breakfast; previously to which dose he could not attempt to button his shirt.

By the aid of very simple treatment, in a week I found him weaned from all urgent desire for stimulants. During the first five days of Water Cure treatment, his daily portion was three wine glasses of brandy, in sufficient water; and after that time, he refused the doses of his own accord. In less than six weeks he left me, looking and feeling well, and expressing the conviction that he was quite safe from any future excess. Some time after this, I heard that he had continued a moderate man, satisfied with a few glasses of sherry at dinner.

DISEASED CONDITIONS OF WOMEN.

In this class of complaints the Water Cure treatment, judiciously applied, will be found of the greatest value. The patient, when under this system, is surrounded by the most favourable circumstances for the recovery of the general health, as well as for obtaining the best and most speedy results from any special local treatment that may be found essential. The curative results that may be thus obtained in uterine disorders being if not wholly, at least comparatively unknown to the great body of the profession, as well as to those whom it so much concerns, it may be necessary, before introducing some illustrative cases, to make a few brief observations.

For more than twelve years, ample opportunity has been afforded me of witnessing, in my own practice, the cure of a variety of uterine disorders by Water Cure treatment alone; in other cases, I have found it necessary to unite

with our local and general treatment, the remedies employed by the eminent practitioners who devote themselves more especially to the removal of these diseased conditions. By this combination the usual period required for treatment is shortened, and the process of cure attended with much less discomfort to the patient. A cure has thus been effected in many cases that had long obstinately resisted the usual applications in experienced hands. It should be mentioned, moreover, and too great stress cannot be laid on the fact, that by a suitable modification of the treatment employed in this system for the uterine disorder, we are enabled, at the same time, to cure other chronic maladies attended with distressing symptoms. It is seldom that we find uterine maladies of any serious character co-existing with a sound condition of the other organs of the body; more particularly with a healthy condition of the digestive organs, the blood, and nervous systems.—*See Case*, p. xciv.

The cases I have had under my care, in which the Water Cure treatment has been attended with the most satisfactory results, have been those in which frequent miscarriage had taken place, followed by great debility, and accompanied by serious chronic disorders—cases of leucorrhœa of long standing, amenorrhea, painful and difficult menstruation, inflammation and ulceration of the cervix uteri, and others in which there existed induration and hypertrophy of the neck of the uterus, prolapsus, sterility, &c.

In reference to the favourable circumstance I have alluded to, as so materially aiding in the recovery of these patients, the following may be briefly mentioned as amongst the first that would be recognised by a physiological practitioner. 1. The Water Cure remedies admit of modifications that make them suitable for delicate states of constitution in which all other active medication has been obliged to be abandoned; they are eminently successful in the reduction of local and general irritation, and at the same time that they are antiphlogistic, they are found to be *restorative* and *alterative*. 2. By this treatment the patient, in the majority of cases, is enabled to take, with comparative impunity, a certain amount of exercise—the remedies themselves also being to no small extent a substitute for exercise—with the additional benefit arising from a sufficient exposure to fresh air. 3. A great improvement in all the processes of digestion soon takes place, without alco-

holic or medicinal stimulants, and evidence is soon afforded of new blood being formed in larger quantity, and of a better quality. The important relief is also soon obtained from the further necessity of frequently taking aperient medicines. 4. The cases most difficult to cure, and which require the greatest knowledge and experience in the treatment, are those in which a highly morbid condition of the nervous system exists. In these cases *repose*, and the absence as much as possible from worry or domestic cares, are of the first consequence. This repose is the usual concomitant of the Water Cure, more particularly in a judiciously conducted establishment. It is remarkable how soon refreshing sleep and improved animal spirits, with the diversion of the mind from any tendency to morbid reflection and depression, are obtained under these circumstances.

The "*constitutional treatment of local disease*" was the great idea that possessed the celebrated Abernethy, at a time when the treatment of local disorders was in a much ruder condition than it is now. His knowledge of its absolute necessity, and sufficiency alone in many cases, was often shown by his inquiries being exclusively directed to the state of the digestive organs and the general health. He looked at the tongue, but sometimes, to the great surprise and discomfiture of the patient, peremptorily refused to examine the sore leg, ulcerated throat, or other local ailment for which the anxious invalid had gone particularly to consult him.

If this gifted medical man were now living, and witnessed the results of Water Cure practice in competent hands, I believe he would, with that candour for which he was so remarkable, unhesitatingly acknowledge, that we now possessed a rational and scientific system for carrying out *constitutional treatment* to a greater extent and perfection than, in his day, he had any reasonable grounds for hoping would ever have been realized.

In these pages I have endeavoured to show by facts and arguments, that water—for constitutional as well as local treatment—is a *remedy*,—the greatest of remedies,—both as regards the great variety of diseased conditions in which curative results can be obtained by its exclusive prescription, as well as from its being so valuable an adjunct when employed in conjunction with so many other remedies.

In the records of every age we find sufficiently authentic

and detailed accounts of remarkable cures, water alone having been used as the remedy. Mankind, however, have always been unwilling to believe that great effects can proceed from simple causes; and thus from want of popular and professional appreciation, water remained unrecognised as a remedy, and fell into disuse. But now that its curative virtues have been experienced by so many, and large establishments erected which are devoted to its varied modes of application, there are sufficient grounds for believing that the Water Cure will be perpetuated as an important addition to rational medical practice.

It is evident, however, that the same causes which have retarded the advancement of *rational* medicine, will also impede the progress of the Water Cure, and amongst these obstacles will be found the long-established trammels of an unreasonable and exaggerated Polypharmacy. But as the tendency of *science* is to simplify, and the *law of progression* exists to overpower obstructive prejudices, we may rest contentedly assured that these friendly agencies require but time to fulfil their ends.

My attention was early directed to the diseased conditions peculiar to women; for during the four medical years that I kept at Trinity College much time was given to the study of these complaints, my design being to enter into a partnership in which I should be called upon to practise as an accoucheur. These studies were subsequently pursued for several years at Paris, where opportunities were afforded not at that time to be found in this country. Thus prepared, I passed nearly ten years in a rather large practice, where the diseases of women came much under my care. I did not fail to perceive the great necessity there existed for additional remedial measures for the more effective cure of this distressing class of complaints; but it was not until I had been some time at the Water Cure that I was made aware of the full extent of these deficiencies, or of the curative results that might be obtained in many of these local disorders by the nearly unaided operation of constitutional treatment.

During my long sojourn at Græfenberg there was ample opportunity for observing the results of unaided WaterCure treatment in uterine disorders. It was unexpectedly that I found there so many patients of every rank with these complaints, and I had the advantage of making an accurate diagnosis, from the fact of most of the new comers seeking

an interview with "the English doctor who was making such a good cure," and who was naturally supposed to have acquired considerable practical knowledge, from his long personal experience of the treatment they were about trying with some anxiety for their own ailments. This induced me to prolong my stay for nearly a year, in order to observe the progress of these and other interesting cases.

In the course of my observations, I noted many cases of uterine disorder that did not progress satisfactorily, and others in which the treatment altogether failed in producing a cure. These failures and protracted cures were clearly owing in some instances to the omission of that special local treatment which, in many cases, I have found necessary in conjunction with the local and general appliances used in the Water Cure; at the same time I was surprised to find how many recovered without those adjuncts which would have been considered essential for the cure of similar cases in ordinary practice.

The only interference that I ventured upon, in a few of these cases, was to advise the frequent local use of cold and tepid water, containing some astringent or emollient, applied with an ordinary apparatus. The one that my patients now generally use, and which they find the most convenient, is Read's fountain, or one of a similar construction, holding a pint of water; it has the advantage of being portable, and easily refilled. The required addition, with a shield, is screwed on to the fountain, and it can be used with comfort and convenience.

MISCARRIAGE, ULCERATION OF THE CERVIX UTERI, DISORDER OF THE DIGESTIVE ORGANS, ETC.

A lady, aged 29, consulted me under the following circumstances. Before her marriage, at the age of 26, she had been for several years in delicate health, and during that time had suffered under three acute attacks, which were considered to be bilious fevers. She was confined to bed with each of these illnesses for about six weeks. In the intervals had been constantly under treatment, and had taken stimulants, tonics and aperients, in large quantities. For many years the periods had been painful and irregular, followed by leucorrhœa at intervals; but no local malady had been suspected or mentioned to her as probably existing. The first year of marriage, no pregnancy took

place, but since then had suffered from four miscarriages, at four, three, six, and two months; the intervals between each being eight, six, and nine months. The last had occurred six weeks before she decided on coming here. I found the patient extremely weak, but more robust than might have been anticipated. The tongue was tumified, a third larger than its natural size, flabby, and coated; great tenderness existed at the pit of the stomach and right side, with pain on the slightest pressure. She complained of bad nights, with disturbed and unrefreshing sleep; cold feet, and constantly recurring apprehension of some coming evil; obstinate constipation had long existed, with hæmorrhoidal tendency.

I found that an attempt to walk across the room, which was as much as she could do, greatly increased a pain that was nearly constant in the lower part of the back and down the upper part of the right leg. There was profuse leucorrhœa, prolapsus, with extensive ulceration of the cervix uteri and hypertrophy of the anterior lip, &c.

The treatment was commenced September 22nd, the day after her arrival, as follows:—From seven to eight o'clock, A.M., hot fomentation to be applied for an hour to the whole abdomen, including the perinæum and lower part of the back, followed by a shallow bath, at 95° cooled to 70°, to be rubbed three minutes in the first, and two minutes in the water reduced in temperature. When well dried, to return to bed, and, for twenty minutes before breakfast, to be rubbed with the hand, covered with a worsted sock. At noon, a sitz bath for five minutes, the first two minutes at 85°, the remainder cooled to 65°. A compress on the lower part of the abdomen, including the sacrum and perinæum, to be applied for two hours three times a-day, and without omission during the night.

Sept. 23rd.—Repeat the treatment. Applied the nitrate of silver freely to the ulcerated surface, and ordered a pint of tepid water to be applied night and morning, with the fountain. Sitz bath at bed-time.

Sept. 24th.—An ounce of castor oil to be taken at five in the morning, and to continue the treatment.

Oct. 1st.—Repeated the application of nitrate of silver. Found the patient much better in every respect. Spirits, appetite, and complexion, much improved, the bowels slightly relieved every second day, without artificial aid, had slept comfortably, and always expressed considerable relief from uneasiness and pain, after nitrate of silver.

Oct. 2nd.—Omit the fomentation and continue the morning bath and sitz baths, all reduced in temperature. At noon gentle perspiration with the lamp, foment at the same time, with the feet in warm water, followed by a bath at 85° cooled to 60°; commence evening sitz bath, same as at noon ; continue the compress.

Oct. 3rd.—Found that the lamp bath had been followed by ease and comfort. Commenced partial packing, with the body poultice from the middle of the chest to the ankles, for three-quarters of an hour, followed by a tepid bath cooled to 60°. Lamp bath to be repeated every second day at noon, and sitz bath in the evening. Packing to be repeated two days successively, and omit one. Alum to be added to the lotion, a pint to be applied slowly with the fountain three times a day, cold.

Oct. 30th.—Much improved; able to walk without pain or uneasiness, appetite and sleep good, bowels regular; omit the lotion. Continue the packing, lamp bath and sitz bath as before. Omit the compresses.

The treatment was continued with some variation for little more than two months, at the end of which time all appearance of local disorder had been removed. The patient remained under less active treatment for nearly another month, and when leaving us said that she was in the enjoyment of better health than she ever remembered to have experienced. Nearly half a year after her return home, she wrote to me to say that she had continued well and was pregnant. I again heard that she had been confined with a second child; and that since she had left Malvern there had not been the least tendency to miscarry.

THREATENING MISCARRIAGE, ETC.

A lady aged 30, married three years, was brought here by her husband, who had been my patient under Water Cure treatment. She had suffered from three miscarriages, at four, two, and little more than five months, and was again nearly four months gone in pregnancy. Feeling extremely ill, and having been ordered to keep in the recumbent posture as before, for symptoms threatening miscarriage, she at last determined, from her own anxiety and the solicitation of her husband, to try the Water Cure without further loss of time.

I found her in a state of great debility, owing in a great measure to long-continued derangement of the digestive

organs. The tongue was coated, red and thick at the edges, no appetite, skin pale and yellow, inveterate constipation, and hæmorrhoidal protrusions. She complained of a sense of weight and dragging pain in the lower part of the back, and that for some time she could not rise from bed before two or three o'clock in the day, without aggravating all her dyspeptic symptoms to an intense degree. There was considerable leucorrhœa, and the cervix uteri red, ulcerated, and bleeding on the slightest pressure. Without entering into further details, it was evident from her history and actual condition, that without speedy amendment, a repetition of miscarriage would, in due course, be brought about.

Treatment.—To remain in bed for five or six days. First morning applied the nitrate of silver freely to the affected surface; ordered a pint of astringent lotion to be applied night and morning, and a compress, refreshed every hour-and-half, and well covered, to be kept constantly applied to the lower part of the back, perinæum, and abdomen. Every morning at half-past seven, and every evening at half-past five, to be rubbed in a shallow bath at 90° F. for three minutes, and then to add cold water at two intervals, to reduce it to 65°; the rubbing continued a minute after each reduction of temperature. Hot fomentation for three-quarters of an hour over the stomach and liver side, before each bath; and during the fomentation a tumbler of water, containing a small teaspoonful of bicarbonate of potass, to be drunk, a third part at a time. Six tumblers of plain water, a third of a tumbler at a time, to be taken during the twenty-four hours.

Second morning, a table-spoonful-and-half of castor oil to be taken at 5 A.M.: and the bath as before,—*not* preceded by fomentation,—two-hours-and-half after the dose.

Fifth day, repeated the application of the nitrate. Found the patient much improved; tongue pale and cleaning, bowels easily and sufficiently relieved with an enema, sleeping much better, and very cheerful. After the first week was sufficiently well to rise at noon, dress and walk about the room after a sitz bath of eight minutes, commenced at 85° and cooled to 60° during the last five minutes. Partial packing for an hour was now commenced and repeated nearly every morning before the bath; with the sitz bath at noon, a tepid shallow bath cooled to 60° for a few minutes, an hour before tea time, and a sitz-

bath five minutes at bed-time. Before the end of the third week the patient walked freely about the village, and soon afterwards as much as she pleased on the hills.

The nitrate was applied seven times in a little more than seven weeks, leaving the surface, at the termination, to all appearance perfectly healthy. The complexion indicated a highly improved condition, and at the end of two months the general health was sufficiently good. She ate three times a day with a keen appetite, slept well, and had daily relief from the bowels without artificial aid. Before the end of three months returned home, where she continued the morning bath and an occasional sitz bath, up to the time, when an easy and natural confinement took place of a fine healthy child.

Remarks.—I have had many cases similar to those just related, some of them returning home in time for the event, others remaining at Malvern,—where we have good accoucheurs,—and continuing the treatment, in some instances, up to the last day. In some of these cases, grave complications existed; the patient arriving here with bronchitis, verging on an acute state; others with supposed tubercular deposit in the lungs,—consumption in one case too far gone for *ultimate* recovery—another recently recovered from inflammation of the lungs, where large bleeding from the arm and active medication had been deemed necessary. All these cases responded most satisfactorily to a judicious course of Water Cure treatment; the general health being greatly restored, and the labour which followed, easy and natural.

This important fact has also been noted on the continent. A lady who took the greatest interest in the Water Cure,—the Princess Sapieha, whose daughter's case is given at p. 55,—told me that in her own instance, as well as in that of many ladies of her acquaintance, this system of treatment had made labour an easy and natural process, when compared to the painful experience they had repeatedly undergone; and she laid great emphasis, when adding the further mention of another fact—that, when the Water Cure had been pursued for a sufficient length of time, before, and even during the greater part of pregnancy, she had seen many instances in which there was a marked difference in the children,—in the absence of scrofula and other disorders, under which many of the preceding offspring continued to suffer.

CASE OF REPEATED MISCARRIAGE, LEUCORRHŒA AND GREAT DEBILITY.

A lady, aged 34, the wife of an eminent sculptor, was advised to try the Water Cure by her friends, Mr. and Mrs. Calvert, at that time patients in my house. I found her suffering under the effects of four or five successive miscarriages, the last of recent occurrence. The recumbent posture had been for a long time found necessary, any movement being accomplished with difficulty, and followed by pain and exhaustion. When in the erect position there was severe bearing down, with prolapsus, and for several years there had been considerable leucorrhœa. An *accurate* diagnosis, however, was not made of the actual pathological condition. I found that the general health had suffered less than could have been expected; there was sufficient flesh and blood, and the nervous system comparatively but little deranged. On these grounds I anticipated a speedy recovery, and deferred additional inquiry until it might be found necessary, by the treatment not succeeding as we expected. The treatment was at first gentle, and carefully graduated; it commenced with tepid towel and sheet rubbings, chilled sitz baths, fomentation for an hour on the lower part of the back and abdomen, before the shallow bath; compresses frequently renewed, and omitted for an hour every two hours; but to be continuously applied during the night. In a few days partial packing was commenced, before the morning bath. A pint of astringent lotion to be applied three times a-day. After the second week the patient could walk short distances, and commenced the douche bath instead of the noon-day sitz bath; this soon enabled her to ascend to St. Ann's Well, and to take more active and prolonged exercise.

Before the termination of seven weeks, all local and general symptoms had disappeared, and I considered her quite well. She went to Italy with her husband, and I advised her to continue, as soon as settled, the shallow bath, followed by the walk before breakfast, and a sitz bath of eight minutes an hour before dinner.

The restoration to health and strength, so soon obtained in this case after so long a period of debility and lying on couches, &c., was a matter of much congratulation by her

friends and many patients in my house who had witnessed her previous state of debility. I have since heard that the patient has had three healthy children, without the recurrence of any symptom threatening miscarriage. Soon after her arrival in Italy, I received the following satisfactory epistle :—

"Palazzo ——, Florence, Nov. 10th.

"My dear Sir,

"I fear that I have drawn largely on your faith in my promises by my long silence; but although I have deferred the pleasure of writing to you, believe me, the benefit I derived from your advice, and the 'pure wells undefiled' of the Malvern hills, is of too lasting a nature to be erased from my memory, even though it were '*unstable as water.*'

"By strictly persevering in the plan you laid down for me on my leaving Malvern, I have continued in the excellent state of health to which I was restored when I left you, and which I had not enjoyed for years. The elasticity and freshness of spirit, the joyous sense of existence, which I thought gone for ever, have returned to me: my cheek has recovered its bloom, my eye its brightness, and surely you know enough of human nature to feel assured that no woman can be ungrateful for the restoration of her good looks. The ladies ask me what cosmetics I employ, and when I assure them that pure cold water night and morning is the only application I ever make use of, they look incredulous, and give me to understand that they think I am fibbing and determined to keep my own counsel.

"As yet there is no hydropathic establishment in Italy that I am aware of, but, even in this dreamy land, people are by degrees opening their eyes to the great truths embodied in the Water Cure. One of the most eminent physicians in Florence has created a great sensation by his successful treatment of nervous fevers on the system of the Water Cure. The first essay was in the case of a poor man at the hospital, supposed to be at the point of death. To the astonishment of all parties the patient recovered. The faculty assailed the worthy 'professore' with vituperations and words of 'learned length and thundering sound;' but disregarding the clamour, he acts upon the hint he has received, and in all cases of nervous fever administers the only true medicine. If only one disease is thus treated, it is a great point gained; and it is not likely that a man who has had the courage to take so important a step towards crushing the host of prejudices that envelope the public mind, will be content without pursuing his investigations.

"Our mode of life is very simple, and, with the exception of an occasional cigar in which my husband indulges, there is nothing contrary to Water Cure doctrines and your injunctions. Mr. ——

is even more enthusiastic on the subject than I am, but I leave him to speak for himself, and with kind regards to Mrs. Wilson, I beg you to believe me,

"Dear Sir, very truly yours,

"——— ———."

"Though the word '*enthusiastic*' used by my wife is an epithet to which I have a certain aversion, I must plead guilty to it this time. I have continued since I left Malvern to practise what you advise for persons in health, and though I always thought myself in the enjoyment of tolerably good health, I perceived soon after I abandoned all irritants, drinking only water, that a 'veil of bile and gall had long hung between me and God's world.' I have gradually gained ever since in the powers both of mind and body. My occasional colds have come no more, my skin is different, and I feel altogether fresher and younger. If you should have it in your power to write us a word of the health of your family and patients, you would do us a signal favour.

"Very faithfully yours,

"——— ———."

LONG-CONTINUED CONGESTION AND ULCERATION OF THE CERVIX UTERI, WITH INTENSE IRRITATION OF THE GANGLIONIC NERVOUS CENTRES, AND DISORDER OF THE DIGESTIVE ORGANS.

This case presents many features of considerable interest, the patient having been treated for a period of above five years by many of our most eminent practitioners, but without producing any curative result. There were also some peculiarities that stood much in the way of even the most judicious modification of Water Cure treatment, and many that would have resisted altogether the ordinary administration of this system of hydrotherapeutics.

The lady's age was 32 years, had been married ten years, but without a family. She came under my care by the advice of her family medical attendant, Mr. B———, a successful practitioner at Stoke Newington, near London.

The history of the case, as given by herself, and her condition and symptoms as they presented themselves at our first consultation, were briefly as follow:—Her appearance indicated a weight of about fifteen stone, owing in a great measure to a large and general deposition of adipose matter, which had been gradually accumulating after the

first year of her marriage. I found that a walk across the room produced much pain and exhaustion, and she complained that even the motion of her carriage, the easiest that could be procured, was insupportable. The slightest pressure on any part of the abdomen, particularly at the pit of the stomach, caused the most distressing sensations, and a state of general convulsion, followed by violent coughing and a sense of strangulation. Even approaching the hand to this region produced sickness and the same spasmodic cough and convulsions. She could not lie on either side when in bed, was obliged to be supported with pillows, and to have the abdomen protected from the pressure of the slightest coverings. The tongue was permanently furred, the papillæ large and indurated, altogether indicating long-standing disorder of the digestive organs. The liver was congested, the bowels obstinately costive, and the lower bowel engorged, with internal hæmorrhoids. Extremities cold, and sleep uncertain, restless, and unrefreshing. Leucorrhœa existed, but not to a high degree; the cervix uteri was indurated and much enlarged, livid and ulcerated.

After I had made my diagnosis, she related the following *history*. Seven months after my marriage, I began to increase generally in size, and at the same time to feel very unwell. I took a variety of medicines, and made great efforts to keep my sufferings to myself, but finding I was gradually getting worse, went to London for the first advice and consulted Mr. *. He prescribed leeches near the seat of pain, and tepid hip baths, and other treatment at intervals, for a year, but at the end did not find myself any better.

I went again to London, and consulted Dr. *, who said the uterus was in a very morbid condition, but treated me for liver and constitutional disorder, with calomel, taraxacum, &c. I continued nearly two years under his care. It was at the end of this treatment that the intense nervous sensibility commenced, with an increase of the irritation of the uterus and lower part of the back. The mind also began to suffer as well as the body.

In the autumn of 1851, went again to London to consult Dr. *, another eminent practitioner strongly recommended; I was then suffering with the same ailments, but, in addition, the spine had become very sensitive, with frequent shivering fits. Under his care had caustic and leeches

applied, and then soothing lotions, and took iodine. Not finding any continued benefit, all local treatment was omitted, and he treated me for spine, with acid medicines and acid baths. I remained under his care, at intervals, for three years, but without any decided relief. In one respect I was worse, my spasmodic cough came on about this time.

Sept. 1854.—Had caustic applied from the top to the bottom of the spine, by another experienced medical practitioner, but was no better. I was now in a wretched state, feeling always ill, spirits depressed, and the local irritation continued unabated.

Under these circumstances, I consulted Dr. *, at Edinburgh. He said that he found the cervix closed, and performed an operation, which was followed by much hæmorrhage. This loss of blood afforded me relief for the time. Dr. * afterwards applied caustic for five weeks. Iodine was applied once, but it produced so much distress that it could not be repeated. Returned home better, but in a month was in every way as suffering as ever.

From November until April 1855, inflammation and ulceration of the cervix uteri existing, I was treated by another medical practitioner with anodyne applications. For some time I had not been able to walk, and the motion, even for a short distance, of a carriage—expressly procured for me as easy as possible—caused great distress and increased my troubles.

At this time went to London to consult the celebrated Dr. *, who had distinguished himself in his writings on complaints like mine. He said that "the cervix uteri was purple with congestion, hypertrophied, indurated, and hard as wood." Slight applications of nitrate of silver were at first applied; then two issues were made in the part affected, with potassa cum calce, keeping each application open for six weeks. Leeches were applied once, and iodine tried, but it could not be borne. This treatment went on for four months, but I felt no better at the termination. The same pain and distress continued, but other symptoms were added. I could not bear the light, or read, or work, and noises of any kind caused great distress. My nights were wretched, and the tenderness of the abdomen, sickness, and convulsive coughing, increasing.

During the next four months leeches were applied at home, and the application of the nitrate of silver every

fourth day, for six months. At this time, July 1856, our own family medical attendant became very anxious about me, and advised me to go to Malvern and consult you.

Treatment. — Some of the more evident difficulties already alluded to as existing in the management of this case, arose from the general disturbance produced by touching or causing the patient any movement, and also in her not being able to bear the application, directly or indirectly, of water at a low temperature. It was necessary to conduct even the rubbing necessary for drying, with care and gentleness, for the whole body had more or less of the intense morbid sensitiveness already mentioned.

The shallow bath was therefore commenced at 95° or 100° F. and cooled down after a few minutes, when she was in it, to 70°. By thus stimulating and bringing the blood to the skin by warmth and agreeable sensations, the subsequent addition of cold water was tolerated, producing reaction without irritation or shock to the nerves. By repetition, the vitality of the pallid and morbid skin was steadily increased, more blood remained in circulation on the surface, and the baths were gradually lowered in temperature. To make this desired result more active and certain, the abdomen was fomented for an hour, including the perinæum and lower part of the back, before the bath was taken. The centres of the patient's maladies were thus for the time soothed and relieved of some irritation, and the whole system was therefore in a better condition to respond to the bath.

After the bath and fomentation at six or seven o'clock A.M., the patient returned to bed, and often enjoyed a refreshing sleep. Compresses were applied over the stomach and liver, womb, lower part of the back, and perinæum. Much irritation was allayed by these linen poultices, but in this case they could not be borne continuously. The interval of their application was left to the patient's sense of relief and comfort. The second day of treatment, applied nitrate of silver freely, and ordered a pint of tepid lotion to be applied at least once a day. The application of this caustic never produced pain, and was soon followed by relief from uneasiness; it always acted as a sedative.

I now called to my assistance the invaluable aid, in such cases as *this*, of the lamp-bath. By the heat it produces on the surface, the temporary increase of circulation, and the genial revulsion of gentle sweating, the patient was

able to react on a colder bath. This process disengorged the liver, &c., and caused rapid absorption and rejection of diseased matters in the body. It was also a substitute for exercise. After some weeks, the patient was able to leave her bed-room and go down to the drawing-room, and even sit at the piano; but walking up and down stairs was attended with much difficulty. An attempt was made to take her out of doors in an easy bed-carriage, but as yet the undulation was found to cause too great distress.

As the treatment went on, there was visible improvement of the solids and fluids. The enormous deposition of fat began to disappear: the nitrate had been frequently applied, and the ulcerated surface was nearly healed, and looked healthy. Small doses of castor oil had been given four or five times: I preferred this medicine from its property of disengorging the biliary ducts, and causing a freer and more abundant discharge of bile than other medicines, —calomel and black-draught not excepted; in fact, I have often found it succeed admirably when these more irritating compounds had failed in producing the desired effect.

At the end of little more than three months' treatment, the patient had got rid of above thirty pounds of fat; *the cervix uteri was remarkably reduced in size, and free from all traces of ulceration.* The sitz baths, fomentations, and compresses at intervals; drinking a certain quantity of water; lamp and shallow baths, &c., were continued, and I now directed her maid to make passes, to produce a mesmeric influence, and finding that she sometimes slept better after this, I directed it to be done more perfectly; and, although none of the more evident mesmeric phenomena, such as sleep, insensibility, &c., were produced, still great good was effected by it, in allaying undue sensibility.

At the end of five months, the patient returned home, and before she left me was able to walk freely out of doors, —two years having elapsed since the last walk she had taken in her own garden. She weighed at this time 11 stone 5 lbs., was in excellent health and spirits, and grave local maladies of more than five years' continuance entirely removed. To confirm this condition I directed some baths to be continued at home.—(*For further report of this case, see* p. cxii.)

Remarks.—It will be perceived that the sheet-packing was not prescribed in this case, for there was every contra-indication to its use. I should also mention that the lamp-bath, which in this case aided so much in reducing the

great amount of fat, &c., in *many* other cases is followed by an increase of flesh. A lady lately left me, who had *been very thin;* she at one time gained at the rate of 5 lbs. within a fortnight, producing a free perspiration *daily* with the lamp, and being at the same time on a restricted diet for serious disorder of the liver, and digestive derangement.

ULCERATION OF THE CERVIX UTERI, LEUCORRHŒA, ETC.

This patient, a lady aged 37, had been married thirteen years, and had suffered with three miscarriages. Five years after marriage, had a child at the full time, but it only lived a few months. Had been well treated on several occasions for uterine disorder. She rode constantly on horseback, except during illnesses, and, until prevented a few months previously to my seeing her, by constant dragging pain in the lower part of the back, accompanied by general weakness and great depression of spirits. Had determined on coming here, from her medical attendant and another eminent practitioner, called in consultation, telling her that she must for the future give up riding on horseback; that, in fact, they were decided on the point, that she would never be fit for it; adding that she had severe ulceration, &c.

I found the constitution strumous, but the figure well developed. The tongue tumified, pale, and indented with the pressure of the teeth; the corners of the mouth sore, and small ulcers on the inside of the lower lip and cheeks, digestion laborious, and the bowels obstinately constipated. There was profuse leucorrhœa, the cervix red and ulcerated, the os everted. She could walk a mile, but it was followed by great uneasiness, exhaustion, and a nearly sleepless night. Had suffered from severe and often-repeated headaches, which laid her prostrate for twenty-four hours. The extremities cold during the day and burning during the night. Had been in the habit of taking strong aperient doses frequently, and nearly always under a course of some medicinal tonic.

The treatment was commenced with fomentation in the morning for an hour, over the whole abdomen, followed by a tepid bath cooled to 60°. At noon, a sitz bath of ten minutes, tepid and cooled to 55° Fahr., during the last four minutes, and this was followed by the wet-sheet rubbing. At night, the compress on the lower part of the abdomen,

back, and perinæum. Second day, applied the nitrate of silver freely to the ulcerated surface, and ordered a pint of tepid astringent lotion to be applied three times a day, and a cold water enema every morning.

Before the end of the week, commenced packing from under the arms to the ankles, for an hour before the morning bath. Found that she warmed quickly in the packing, and slept nearly the whole time when in it. Expressed great reluctance to be taken out of the packing, which she said afforded her the greatest relief at the time, and that she felt better all the day afterwards.

At the end of the week, repeated the application of the nitrate; leucorrhœa much diminished and redness nearly gone. There being still some yellowness of the skin and eyes, although the patient's complexion was much improved, I ordered the lamp bath every second evening, instead of the sitz bath. Always found herself more light and cheerful the evenings on which she had perspired freely.

End of third week able to walk, by resting occasionally, for two hours on the hills, without inducing any pain or uneasiness. Nights good, and the appetite keen and regular; the bowels beginning to act without assistance. During the first fortnight, had taken three doses of castor oil.

The fourth week applied the nitrate, and found the leucorrhœa had nearly disappeared, and that there was barely any trace of ulceration left. The douche was now ordered for a minute and a half at noon, and to continue the packing and sitz bath, alternating with the lamp bath, in the evening; to continue taking six or seven tumblers of water daily.

The sixth week, the patient began to ride on horseback, and continued to take long rides nearly every day, during the three remaining weeks of her treatment. Before she left Malvern she had gained eight pounds in weight. Returned home quite well, and continued the morning bath and a short walk before breakfast, as a general prescription.

More than two years have passed, and there has been no relapse. I have lately heard from her that she rides constantly on horseback, and when threatened with any indisposition, from dining out too often, &c., finds immediate relief from a small dose of castor oil, followed by a lamp bath, or a few packings. She concludes her last letter by stating that she never before enjoyed such uninterrupted health.

LEUCORRHŒA, ETC.

I have had under my care, since I have been settled here, a great many cases of leucorrhœa, many of them with grave complications, such as amenorrhœa, dysmenorrhœa, and menorrhagia; bloodlessness; and profound disorder of the liver, stomach, and nervous system. It has been but in few of these cases that I have found much difficulty in removing the local malady, restoring the function of menstruation to a normal state, and putting the digestive organs in a healthy condition. In the majority of *these* cases, no local diagnosis was made, except from the patient's accurate description; trusting to the remedial operation of local and general Water Cure treatment, and local applications, simple or medicated, that could be applied by the patient. These cases have ranged from the ages of nineteen to forty years. It is remarkable how soon—by a judicious prescription of these hydropathic processes, and the combined aid of regulated habits, and the absence of disturbing causes—the quality of the menses has been changed from a poor and morbid to a normal condition, and how soon a change of the fluids and solids for the better becomes visible in the appearance of the patient.

LEUCORRHŒA, WITH AMENORRHŒA, BLOODLESSNESS, AND INTENSE HEADACHES.

This lady, aged 23 years, had, from the age of 19, been suffering from intense headaches. For the first two years they had occurred once a week or fortnight, but during the last two years had been nearly constant. She was of that peculiar paleness that indicates an impoverished state of the blood, but the figure was round, and she did not appear to have lost much flesh. The monthly period had been uncertain for a year, but during nearly two years it had entirely ceased. There was much leucorrhœa, accompanied by constant pain in the lower part of the back, and in both legs. She expressed herself as being nearly blind from headaches, and that a short walk, or any excitement, brought on the headache in a more violent degree, and often obliged her to go to bed for twenty-four hours. A great variety of treatment had been tried, under the care

of eminent practitioners, and their prescriptions included change of air, sea bathing, port wine and animal food twice a day, tonics and purgatives, and a variety of the preparations of iron in very large quantities. She said that no amelioration had taken place from any of these remedies, except finding a little less headache for a few days after arriving at a new place. The *treatment* here was commenced with the wet sheet rubbing three times a day; the abdominal compress to be applied from ten to twelve, three to five, and eight to ten o'clock; and to take a rubbing foot bath three times a day, for five minutes, in two quarts of water; mild mustard plasters to be applied for ten or twelve minutes every second day at noon to the abdomen, for a week or ten days. In a few days the sitz bath for five minutes, with active friction, was ordered to be taken at noon, immediately before the sheet rubbing. A pint of astringent lotion to be applied three times a day. The abdomen, lower part of the back, and perinæum, to be fomented for an hour at bed time. At the end of the week the appetite was much improved, but the headache no better. Tried partial packing, omitting the extremities, but found it premature. She did not warm well in it, and felt tired and hysterical during the day. Ordered the lamp bath at noon, the feet in warm water, and flannels wrung out of hot water to be applied to the abdomen at the same time, to be followed by a shallow bath at 95° for three minutes, and to be cooled to 60° Fahr., for three additional minutes, before the termination of the bath. This was the first process that afforded decided relief. For a few hours it nearly suspended the headache, and the patient felt warm and comfortable for the rest of the day.

During the next month the shallow bath, tepid and cooled to 60°, was prescribed before breakfast; the lamp bath every day, sometimes every second day, at noon; the sitz bath and rubbing sheet in the evening; and three foot baths daily.

Towards the middle of the second month a marked change had taken place in her appearance; the pale cheek and lips had gained a permanent fresh colour, and she had increased six pounds in weight. She could also walk sufficiently, and said that her headache was bearable in the morning, and that she was barely conscious of it after noonday. The leucorrhœa had nearly disappeared, with complete cessation of local pain or uneasiness.

The third month the patient commenced the application of the douche every day at noon, for two minutes; the lamp bath being taken instead of the evening sitz and rubbing sheet. Near the end of the third month there was a natural appearance, and progress of the monthly period. The fourth month it returned again, and the patient returned home without a symptom of local malady; the headache had entirely ceased, and she was, to all appearance, in perfect health. She had gained above nine pounds in weight, and it was evident had made no inconsiderable quantity of good blood—the natural result of having been for some time enabled to digest good bread and mutton, with unprovoked and restored digestive organs.

LEUCORRHŒA, PROLAPSUS, HYPERTROPHY, AND INDURATION OF THE CERVIX UTERI, ETC.

The patient, aged 38, had been married above fifteen years. For a long period had been in a poor state of health, attended with great debility. Had experienced several acute attacks, with fever and slight jaundice, causing a confinement to bed for several weeks with each. Two miscarriages, she had reason to believe, had taken place at an early period—when about thirty years of age. Since then the monthly periods had been occasionally irregular, with leucorrhœa at intervals. The last three years found it nearly impossible to walk, from pain and bearing down, and from hæmorrhoidal protrusions. Had been treated with ointments and a great variety of tonics and purgatives, and a pessary had been used as a support. Two courses of warm salt water baths had been taken, but after each felt weaker. Ems and Kissingen had been tried without any clear benefit. Six months before she came here the pessary had been removed, and an external support substituted. Many kinds of lotions had been prescribed. Walking and sitting had been given up for nearly two years; even carriage exercise in a semi-recumbent posture was attended with fatigue and uneasiness. A third of the day was passed in bed, the remainder on the sofa.

I found that there existed great derangement of the digestive organs; there was pain on the slightest pressure over the edge of the liver and duodenum. She complained of frequent pain in the right shoulder, and aching between the shoulders. The tongue was large, white, and flabby,

with acid eructations and a sense of sinking. There was considerable prolapsus and profuse leucorrhœa, the cervix large and indurated; and large hæmorrhoidal excrescences of long standing also existed.

The treatment was as follows:—At seven commenced with fomentation for three-quarters of an hour over the liver and stomach, followed by a brisk wet towel rubbing; breakfast in bed. Compress on the abdomen from eleven to twelve, followed by four minutes' rubbing in a warm shallow bath, water then reduced to 70°, and rubbing continued a minute, and the bath finished by pouring two pails of water at 60° gently over the back and shoulders. Dried well, and rubbed for ten minutes, lying between blankets. At half-past five P.M., sitz bath six minutes, tepid, and cooled to 60° the three last minutes. A pint of chilled water with alum to be applied three times a day. A large tea-spoonful of castor oil every second night at bed-time.

During the first week no variation was made from this treatment; large quantities of bile had been passed; the patient had slept better, with spirits and appetite much improved. Suffering considerable irritation from the hæmorrhoids, and likely to be still some time in the recumbent posture, I proposed to remove them with ligature. This was easily done, and by applying fomentation and a compress to the part, they fell off without pain or inconvenience. The previous treatment was continued without interruption.

After a fortnight ordered the lamp bath at noon, followed by the shallow bath, as before. Omitted the fomentation and substituted the shallow bath, tepid and cooled to 60°, for the towel rubbing.

At the end of the third week the patient commenced walking short distances in the garden, and at noon to take the ascending douche for a minute. The lamp bath was ordered every second evening, and sitz bath five minutes at bedtime. At the end of five weeks she could walk for an hour at a time, with short intervals of rest; a little of the prolapsus was still remaining, but the leucorrhœa had changed in character, with very little of it in quantity. Much improved in appearance, and said she could eat all day.

The treatment was continued in a less regular manner for a little more than two months longer, and varied from

time to time as she progressed. The general douche bath was prescribed to be taken every day at noon during the last six weeks, and the local ascending douche bath changed to the evening; the lamp bath to be occasionally taken before the morning bath. For more than six weeks the patient had walked for half an hour before breakfast, and before and after the noon-day and evening bath. The general health at the end of this time was good, and she said that she felt no local inconvenience whatever.

AMENORRHŒA, BLOODLESSNESS, AND LEUCORRHŒA.

This patient, aged 24 years, was tall and remarkably well formed, and, although much reduced in size during the last two years, had retained sufficient adipose and muscular substance not to appear at all wasted. She had suffered for nearly three years with complete suppression of the monthly period. The surface was pale and of a peculiarly waxy appearance, and the ears and nose as if they had been modelled in wax. The tongue was white and bloodless, the pulse quick, small, and feeble; appetite capricious, with much distress and oppression after eating, and frequent acid eructations. Any sudden exertion produced violent palpitation of the heart; she had frequent fainting fits, and nearly every week attacks of intense neuralgia over and under the left eye, often extending to the teeth on that side; these attacks lasted until she had passed a night in bed. There was leucorrhœa, increasing and diminishing at intervals of three weeks, and pain in the small of the back after the least walking.

The history of the case was as follows:—Had been overworked at school up to the age of sixteen; at fifteen had become regular. The tic-douloureux came on during the last year of her studies, and had been preceded by attacks of indigestion, which were followed by violent and continued vomiting. From nineteen to twenty-one the periods had become frequently irregular; and at twenty-one had ceased altogether, without any ostensible cause. She had been under regular treatment during the first year of the suppression, leeches had been frequently applied, and she had been twice largely bled from the arm, at intervals of five weeks. After the last bleeding

was nearly blind for four months. Had taken a great variety of medicines in large quantities, and iron mixtures every day for four months at a time. Port wine and animal food twice a-day had been prescribed, and tried until she had more frequent attacks of severe sick headache, which she attributed to this diet. Galvanism and warm salt-water baths had been ordered on two occasions, but they were not followed by any amendment. Had been to London, Leamington, and Paris for advice; had felt better from the neuralgia for a few weeks at Leamington, but it returned at intervals the same as before, during the remainder of the time she continued there under medication.

Treatment.—In this case there was so great a deficiency of circulating fluid in quantity, but more particularly in quality, the condition so deteriorated, and vitality at comparatively so low an ebb, that it was necessary to commence the treatment by such gentle measures as would be borne with benefit. The patient dreaded cold water. The first prescription was rubbing with wet towels morning and evening, the patient taking one for the face, chest, and abdomen, and the bath attendant using the other briskly over the back and lower extremities. This was preceded, by the patient, whilst lying between blankets, being gently rubbed all over, for a quarter of an hour, with a soft hair glove, by the maid. The next process, at noon, was active rubbing of the lower part of the back in a shallow sitz bath, at 100°, for four minutes, then to add cold water to 65°, and continue the rubbing for an additional four minutes. A cold rubbing foot bath, taken in two quarts of water, for four minutes, half an hour before the noon-day and evening bath. A compress, well protected with flannel four times doubled, to be worn on the abdomen from ten to twelve o'clock, and from half-past three to half-past five. To drink five or six tumblers of water during the day, the third of a tumbler-full at a time. To apply a pint of astringent lotion at bed-time, and before the morning process.

After a week of this treatment, the shallow bath, warm, and cooled to 60°, was taken before breakfast, and a wet-sheet rubbing after the noon-day sitz bath; the same being repeated in the evening. A table-spoonful of white mustard-seed to be taken three times a-day, after each meal and continued for a week.

At the end of second week tried the lamp bath at noon, followed by a warm bath cooled to 60°, and found that she perspired easily, and felt, for several hours after the bath, warm and exhilarated. It was ordered to be repeated every second day, and the morning and evening baths, &c., to be continued.

The third week all the processes of digestion were greatly improved, the tongue and skin becoming more healthy in colour, the feet always warm, and a good appetite recurring three times a-day. I now ordered the *ascending douche*, to be taken for a minute after a walk, and an hour before the noon-day bath; it was followed by strong reaction, and continued every day at the same hour.

Towards the end of the seventh week, symptoms were felt of being unwell, great pain was felt in the lower part of the back, with attacks of shivering and vomiting. Hot fomentation was applied for an hour and a half, three times a-day, to the abdomen, lower part of the back, and perinæum.

The patient was still in bed and ailing, when I ordered the lamp bath to be taken at noon; this seemed to increase the pain, but during the night the menses appeared, and continued for nearly two days. In a few days nearly the former treatment was resumed and continued for another month; the patient was improving daily in strength and colour, and at the end of this time the period came on naturally, with very little pain or indisposition, and continued nearly four days. Circumstances obliged her to return home before the termination of the next month.

The shallow bath, followed by a walk before breakfast, and a sitz bath for ten minutes, an hour before dinner and tea-time, were prescribed to be continued at home. I received from time to time several satisfactory letters, to say that she was going on well, and feeling in every way a steady improvement.

TUMOUR OF THE BREAST.

A lady, aged about 50 years, married, but had never been pregnant, came here with a tumour in the right breast which caused her great distress of mind and body. It was about the size of the largest kind of walnut, and felt as hard to the touch. The surrounding parts were swollen, very

tender, and harder than natural, which made the tumour seem much larger than I have mentioned. The glands in the arm-pit were painful on the least movement or pressure but only just perceptibly enlarged. This tumour had existed for above two years, but during the last eighteen months had gradually increased in size, and was daily becoming more painful. It had been frequently leeched and poulticed; a great variety of liniments had been *rubbed* on the part, and there had been an application of iodine, diligently used for several months continuously but without the least amelioration; it had caused, on the contrary, more heat, pain, and swelling.

The patient had come from London, where she had been some time, having gone there to consult Sir B. Brodie and another celebrated surgeon. She hoped to have had an operation performed for its removal, but her wishes were negatived.

The patient appeared sufficiently robust, but said that for eight or ten years had been in very bad health, and during that time had taken an immense quantity of medicine; her prescriptions were purgatives, tonics, alteratives, stimulants, and opiates, in nearly every form in which they are ordinarily given. I found great derangement of the digestive organs; she had no appetite, and felt distressed and flushed after eating the smallest quantity; had constant heartburn and headaches, and the bowels never relieved without a strong dose of medicine; the tongue was enlarged, thickly coated, and red at the tip and edges; the skin yellow, rough, and parched.

The treatment was commenced with fomentation for an hour and a half at night and morning on the affected part and a compress, well protected, to be kept constantly applied over the whole of the right breast; a warm bath cooled to 60°, and a rubbing-sheet at noon and in the evening; no animal food. In a few days she expressed considerable relief, particularly in moving the arm, and from tenderness in the armpits, and said that the tumour engaged less of her attention.

At the end of the first week, the patient commenced the sheet-packing every morning for an hour, followed by a tepid bath, cooled to the natural temperature; at noon, five minutes' sitz bath, and a wet-sheet rubbing after it; on alternate days at noon the lamp bath, and every evening five minutes' sitz and rubbing-sheet.

At the end of the second week the patient was evidently improving in health, and in much better spirits; and, under the compress all over the breast, a red rash began to appear, exuding freely a yellow glutinous matter, which stained the compress. The tumour was of the same size, but much less tender to the touch. Much the same treatment was continued for the next three weeks, with the addition, during the latter part of the time, of the douche bath, for a minute and a half at noon; the lamp bath being transferred to five and a half, P.M. The eruption went on increasing all this time, until it was of a bright scarlet, and discharging large quantities of sticky yellow matter. The eruption caused intense itching, but not the slightest pain.

A little over three weeks' continuance, the discharge and eruption began to decline; the tumour no longer gave any pain on pressure, and had evidently become softer; the patient declaring it was much smaller, but this arose from the diminished congestion of the surrounding parts.

The treatment was continued, and at a little over the period of two months the tumour was as soft as an ordinary mammary gland, *painless*, and a third reduced in size. The patient was in excellent health, and I advised her to cease from all treatment, except the morning bath and the compress. She returned home, and has since written several times, stating that she continued to enjoy excellent health, and in a letter written nearly a year after she had left Malvern, observes that the remains of the tumour were soft and barely to be felt.

STERILITY, ETC.

This is is one of several well-marked cases of a similar kind, that I have had under my care, which, within the short period of a few months after having ceased from active water-cure treatment, have been attended by the same result. When on the Continent, I heard of many remarkable cases of the same kind, and was introduced to several patients who had met with the same desired success. These results will be of easy explanation to those eminent accoucheurs and physiologists who regard the uterine system as a sympathetic *part* of the human body, and who, in analysing the water-cure processes, perceive the restorative and alterative effects they must necessarily

produce, when judiciously applied, in any local or constitutional disorder. My limits will not at present allow of more than the two following instances, as illustrations.

DISORDER OF THE UTERINE AND DIGESTIVE ORGANS.

A lady, aged 42, the wife of an eminent judge, came to consult me under the following circumstances. I found that she had been ailing many years, but without a symptom of having a family. Although her appearance—being tall and still rather stout—did not indicate weakness, she nevertheless complained of great debility, of frequent attacks nearly approaching a state of actual fainting, and of being exhausted by the least exertion. There was nearly constant pain in the lower part of the back, and she said that the lower extremities up to the knees, almost always felt to her as cold as marble. Severe headaches were also frequent.

I observed that the face was much more red and congested than natural; it was covered with an eruption of pimples, and after eating or any excitement it flushed to a painful degree. The tongue was large and coated, the papillæ red and protruding through the white surface; the liver congested, and the stomach extremely irritable. The periods were painful, but not irregular, and long-standing leucorrhœa existed, although not in its extreme degree. She had taken a great variety of medicine for many years, and was related to one of the most eminent and successful practitioners of the day.

The *treatment* in this case was directed more particularly to remedying the profound disorder of the digestive organs; and this was comparatively soon done from the constitution being naturally strong; nevertheless, at the commencement the patient was only in a condition to bear the most gentle water-cure treatment. In a few weeks, however, the digestive functions and the circulation were so much improved, that she said the different baths and processes were looked forward to more as the agreeable events of the day than as its necessary duties. The treatment may be gathered from the preceding cases, and will not be entered into; suffice it to say, that all local and general symptoms being much amended, in little more than two months she returned home, with instructions to continue

some of the processes, until I considered her perfectly cured.

I received several letters announcing her favourable progress; but at the end of a few months she wrote to say that the treatment no longer agreed with her; a state of extreme illness occurred every morning, and the digestive organs were again very disordered. My reply directed her to persevere, presuming it to be only premonitory to a critical bilious attack. Her next letter stated that continuing no better, and not being near enough for my regular advice, she had given up the treatment.

Some little time after this my wife received the pleasing intelligence that the illness in question had proved a very natural one,—she was in the family way, and in due time had a fine boy.

About a year after this event the judge and his wife brought their "little water-cure boy," as they called him, to Malvern on purpose to show him to me; and he certainly was as fine a child as could be seen.

DISORDER OF THE UTERINE AND DIGESTIVE ORGANS.

The following case is sufficiently well marked, and I note it from memory. It was that of a lady, about thirty-four years of age, who had been married many years, but had never been in the family-way. She came under my care for dyspepsia, debility, and a remarkable condition of the cutaneous surface; but I found that there was in addition constantly more or less pain in the small of the back, and at its lower portion; there was also leucorrhœa, painful menstruation, and intense sensitiveness of the mucous membrane, particularly at its commencement, amounting to very acute pain on the slightest pressure. She had consulted Sir James Clark, and other eminent practitioners, before coming to Malvern.

The patient remained here under Water Cure treatment on, I believe, three occasions of six or eight weeks each, returning home in the intervals, and continuing more or less regularly the morning bath, or such of the processes I had advised, which might be found convenient. Considerable improvement of the general health, skin, and local symptoms, followed each essay of the Water Cure.

For some time I lost sight of the patient, and had not heard how she was progressing, when I received a joyous

letter from her husband—who was a particular friend of Mr. Hoffner, a gentleman well known here and highly esteemed—stating, that after his wife had been at home a few months from her last course of water curing, she became in the family-way, and that with grateful acknowledgments he had to announce that she had been safely delivered of a remarkably fine child.

The following is a satisfactory report, in a letter from the mother of the patient, regarding the progress of an interesting case, given at p. xciv :—

"Stamford Hill, Dec. 31st, 1856.

"My dear Dr. Wilson,

"I do not think I could give you a better greeting on the opening of the new year, nor one that will gratify you more, than the united grateful acknowledgments of both my husband and myself, for the happy result your admirable treatment has, with God's blessing, effected in the health of our beloved daughter. The change in her is most wonderful, and the improvement continues without a sign of retrogression ; on the contrary, as each day comes round, I perceive a renewal of natural energy, and a return to the old former self and interests. After attending the communion service in our church last Sunday, she called at her own house, and walked round the garden, which for fully two years she had not been able to accomplish ; and this without any after feeling of fatigue or inconvenience, sleeping well, and rising next morning fresh and in good spirits ; she walks every day with enjoyment and quickened appetite, &c.

"Most truly and sincerely yours,

"——— ———."

P.S. As you object to insert the initials of the many eminent doctors who attended our daughter, pray refer to us any one interested in, or wishing to substantiate the facts. My husband's initials are A. N., and he is one of Her Majesty's Justices of the Peace for Middlesex.

THE MALADIES OF CHILDREN.

My intention being to devote my earliest leisure to the completion of a practical treatise on the acute and chronic diseases of women and children, and their treatment by the Water-Cure processes, and other approved remedies—a work already commenced—it was not until the present volume was printed, and nearly ready for publication, that I was induced to insert a few uterine cases.

The following letter has been the cause of my introducing a few brief and cursory observations on the treatment of children; and in according with great willingness the request the letter contains, I may remark that in the present progressive stage of the Water Cure, such a letter is not without its value, in advancing a spirit of inquiry into the simple, rational, and successful treatment it advocates.

The letter in question is from a gentleman well known in his county, Mr. Archer, of Trelaske, Cornwall, a magistrate and a man of education and fortune.—*See* p. cxxi.

I must commence by stating that there are *two domestic remedies of the greatest value*, one but little used and understood, and the other all but unknown to those who have the treatment and bringing up of children. Yet there are no other remedies that can be relied upon with so much certainty in arresting or mitigating to a great degree, in the safest and speediest manner, the most frequent and dangerous symptoms in the acute attacks to which they are so liable.

These remedies are fomentation, and the linen body poultices, or different modes of "packing." The best mode of using these remedies, and the *rationale* of their operation, will be found explained further on in the *Processes of the Water Cure*.

Long and ample experience of every kind of treatment, vaunted or approved, has given me good ground for placing these simple remedies at the head of all others in the treatment of the acute attacks of children, where there is local or constitutional irritation, a hot or feverish skin, head symptoms, disorder—inflammatory or otherwise—of the stomach and bowels, convulsions, or inflammatory

action threatening, or going on in any part, in short, in those conditions that so frequently threaten the existence, and so often cut short the life of these tender creatures.

These remedies also possess great collateral advantages, that must not be overlooked; they are always in the house, and within easy reach; they are all but innocuous in the rudest and least instructed hands; their remedial operation is prompt in the relief they bring, and this is sufficiently evident to be easily comprehended by the most obtuse or untaught observer; and not amongst the least of their advantages is their compatibility, and the great aid they afford to the operation of any other approved remedy that may be found necessary to be prescribed; they also possess the quality of counteracting the effects of any medicine or prescription the action of which has been or may prove pernicious. Nor with such remedies as these I am discussing can there be any anxious doubt on the mind of the practitioner—when the emergency is great and the symptoms running a fatal course—lest the remedy on which he relies be adulterated, imperfectly compounded, or by some peculiarity of the patient's constitution, or other causes, may prove *utterly inert*.

Whether the medicine prescribed be castor oil or calomel, croton oil or scammony, rhubarb and magnesia or mercury and chalk, antimonial doses or Dover's powders, febrifuge mixtures or saline draughts, the minute sugar globule with its infinitesimal ingredient of aconite, belladonna, pulsatilla, nux vomica, mercurius, arsenicum, or chamomilla, &c., or Homœopathic medicine in an appreciable dose,—it must be sufficiently evident to the intelligent parent as well as the medical practitioner, that any remedial appliances, the operation of which can be shown *directly* to reduce fever and inflammation, must leave the system in a more favourable condition to be acted upon by any of the medicines I have mentioned, or that might be prescribed. Fever and inflammation interfere with the action of all medicines in a greater or less degree, in the same way that we find their operation suspended or diverted by passion or intense anxiety. The means therefore that most safely and readily remove all the symptoms of inflammation and fever, at once strike at the root of the evil, and the *fons malorum*, whatever that may be, which accompanied, preceded, or caused the acute attack, is shorn of

those morbid phenomena that more directly threatened the extinction of life.

And here I should not omit to mention another amongst the advantages possessed by fomentation and packing, in reducing fever and inflammation, viz., that however prompt and effective they may prove in this operation, they leave behind none of the debility, constitutional derangement, and organic deterioration that so often follow mercury or antimony, bleeding, blistering, and other remedies of the same character. It is so far otherwise, that it will be found as a general rule in the great majority of cases, that after any acute attack has been subdued by the Water-Cure processes, there is not only a short convalescence and little or no debility, but often, in addition, an improved state of the constitution and an amelioration of any chronic disease that may be present.

It remains for me to explain that after the different kinds of packing, and frequently after fomentation, a bath or some form of ablution is, as a general rule, a necessary sequence to complete the operation. Nevertheless, there are some cases in which, from extreme delicacy, or from the fomentation or packing having alone produced the effect desired, the patient is left to rest or sleep undisturbed.

And here I must direct particular attention to two points in practice of great importance, as yet unwritten and hardly known. 1. That *a child labouring under any acute symptoms should seldom be taken out of a warm bath without first cooling it down to an appropriate temperature.* 2. *Nor when a child is labouring under any irritation or acute symptoms should it be put at once in a cool, much less a cold bath.* The remarks which follow partly explain these propositions.

After fomentation or packing in such cases as I have indicated, the patient is warm, and this warmth should be prolonged and *increased* for a *few minutes* in a bath some degrees above the bodily heat; when this is done, the bath should be gradually cooled down, by adding cold water, to the point required. By this essential modification, I always find that great refreshment is experienced, without any shock to the nerves, and the subsequent reaction is not followed by any feverish tendency; the pulse becomes soft and less frequent, and the circulation throughout the system is equalized. By thus quieting the nervous centres and causing the due contraction of the

capillary, or hair-like vessels throughout the system, fever and inflammatory action, and any convulsive or spasmodic condition are allayed, the sedative effect is complete, and the process is generally followed by a prolonged and tranquil sleep. When perspiration breaks out, or a tendency to it is shown during this repose, nature unaided will do the rest; little more is left for the practitioner than to direct with care a simple treatment and a speedy convalescence.

I may here adduce as an illustration, that I have frequently seen children put into a warm or hot bath when attacked with convulsions. This is one of the ordinary prescriptions expected in such a case by the parent, and it is frequently resorted to even before advice can be obtained. I have often seen this application increase the severity of all the symptoms, the convulsions continuing in the bath, and becoming more intense when the child has been taken out of it. By this proceeding the rapidity of the circulation has been increased, without allaying any irritation or congestion of the brain or nervous centres; on the contrary, these have evidently been aggravated. I have seen the warm or hot bath repeated a second and a third time with the like result, until nature, exhausted with the contest, has given up the struggle, and a fatal termination has ended the troubles of the little one.

When, however, the packing precedes the warm bath, cooled down; or even when the latter is used alone, and sufficiently *prolonged*, with *rubbing*, at the reduced temperature, the painful scene I have described is altogether changed, and the happy effects which I have already mentioned as resulting from these processes are obtained.

It will be perceived, with but little reflection, by the physiological practitioner, in how great a variety of dangerous conditions of disease these processes may be prescribed, with the most important curative results.

Although the opinions I have advanced are based on true physiological and pathological principles, which may be so easily tested, still it may be useful to adduce a few additional facts in illustration, for my non-professional readers. The only cases of children I have already given in these pages, are those of the Princess Sapieha's little girl, p. 55 — Lord Downe's little boy, p. 57—and Mr. Beale Browne's little boy, p. 80,—although during the last fourteen years that I have been here, I have had a variety of interesting cases of chronic and acute disease in children.

CROUP.

The following case is adduced to demonstrate the effect of the simplest treatment, as well as from the nature of the malady being generally known and easily comprehended.

Late in the autumn of 1855, I was sent for in a hurry to see Captain Sewell's little girl, aged four years; the Captain was at the time under the care of another medical man here, and he and his wife—who was my patient—had been from home; on their return they found the little one suffering under a severe attack of croup. All the usual symptoms were present, and indicated that acute inflammation of the upper part of the windpipe was in rapid progress,—the face red, hot, and turgid, skin hot, pulse hard and quick, and the peculiar cough and crowing-like sound on inspiration frequent.

Fomentation was ordered to the throat, breast-bone, and abdomen, and after seeing it fairly commenced, I went on other business, and returned in two hours. At the end of this time the symptoms were already improving, and I remained two hours to watch the progress of the case. The desired effect was so far advanced, that other remedies I had in contemplation were suspended, and I expected would be entirely superseded. Before leaving, I ordered the fomentation to be repeated during the night and again early in the morning; after the latter, to give a warm bath, gradually cooled to 65°, and to rub the child well for three or four minutes in the warm water, and three minutes in the water when lowered in temperature. The next day I found that all the symptoms had subsided, and only a little tone and rest required, and the third day the family were able to start on their way to India. Mrs. Sewell was very thankful for, and fully appreciated, the lesson she had learnt.

Remarks.—It will be observed that I place great reliance on fomentation, *properly administered*, as *one* of the most valuable remedies we possess, in reducing a variety of dangerous inflammatory conditions, and also that I am anxious that it should be generally known and adopted. This fomenting process must be regarded as *a repetition of flannel poultices, following one another in quick succession*, and from being so light and porous, and emitting so much

warm vapour, they are the best that can be applied in all acute conditions. Bread poultices would answer the same purpose to a great extent, but that they have the great objection of weight, as well as in not being so easily *repeated every five or ten minutes*, which is above all *essential* to produce the desired effect.

When I introduced hot and warm fomentation into the practice of the Water Cure, it was considered a mistaken innovation by many of its partisans, who had only a limited knowledge or some superficial notions of the "cold-water cure." This remedial process is still but seldom prescribed, and as seldom properly applied.

CROUP.

A lady with her only surviving child, aged six years, came here on a visit to one of my patients, who had much reason to speak highly of the Water Cure, viz., Mrs. O——, the wife of a gentleman possessing large cotton mills.

A short period only had elapsed since the lady had lost a daughter with inflammation of the air-tubes. The present child was delicate and sickly, and before leaving home had taken cold, which was increased by the journey here. After having been here a few days, croup set in with violence, and the mother was distracted, on the one hand by urgent persuasion to send for me, being at the same time full of fear of, and prejudices against, the Water Cure, and, on the other hand, by the remembrance yet fresh, of the circumstances of her recent loss of the other child, under the ordinary medicinal treatment. In this way, before she could decide, some precious time was lost.

On seeing the child, I found the usual symptoms; the inflammation of the upper part of the windpipe had advanced to a degree of considerable danger. Finding that the fever was high and increasing, she was at once packed, and the throat fomented at the same time, followed by the usual bath given in such conditions. All acute symptoms readily gave way by a repetition of these processes, and the child continued the Water-Cure treatment for a few weeks after her recovery, to the great amendment of the general health.

SCARLET FEVER.

This case comes nearer home. It was that of my only little girl, then aged eight years; a very precious possession, as may be supposed. The invasion of scarlet fever, in this case, was severe, and grave symptoms followed in quick succession. The second day she was quite prostrated, the throat red, tumified, and already assuming the most dangerous form of ulceration.

At first fomentation was applied to the throat, and stomach and bowels, from which the child expressed considerable relief. This was repeated every three hours for little more than an hour at a time to the abdomen, but more frequently to the throat. The next day, not finding the eruption coming out favourably, partial packing was resorted to; in this body poultice she slept for an hour-and-a-half, and when it was removed the scarlet eruption was well out, remained fully established, and pervaded the whole surface in profusion. The packing was followed by a brisk rubbing with a towel taken out of tepid water, without disturbing the recumbent posture. In this condition a bath was uncalled-for; moreover, the child was too feeble for useless exertion. In a couple of hours the throat was again fomented. By this simple treatment the case progressed favourably, the convalescence was remarkably short and without an after symptom of her having had scarlet fever. No medicine of any kind was given.

Remarks.—In such cases as this, the fomentation to the throat is of the first consequence; it affords the greatest relief at the time, and assists, in no small degree, in saving the patient from one of the greatest dangers that accompany this fatal disease, and subsequently from the deafness that so frequently follows. The packing is always effective and perfectly safe when the skin is warm or hot; and in many cases, the warm bath cooled down, as a sequence, is of the most essential service. In extreme cases, the throat should be fomented during the time the patient is in the packing; and the same rule applies to cases of inflammation of the larynx, or acute bronchitis, in which fomentation is equally effective.

A cold compress should never be applied to the ulcerated throat in scarlet fever.

When I was at Nice there was an epidemic of scarlet

fever. The English practitioner there told me that, on an average, eleven were dying of it daily. He had at this time an only daughter, aged sixteen, highly gifted and accomplished; I explained to him my plan of treatment for this epidemic, in the event of his requiring it near home, but in vain. He lent me a deaf ear, and, unhappily, shortly afterwards his daughter was attacked and died.

At this time my wife was attacked, and had scarlet fever in its severest form;—I treated her as already described, and she recovered without any of the serious consequences that so often follow this disease. Not a dose of any kind of medicine did I administer in this case,—*not even belladonna, or a dose of castor oil*,—and her convalescence was so rapid as to elicit remarks of astonishment from her relatives, who had previously joined us in Italy.

Before my wife was up, I treated one of the nurses of the Princess Sapieha, in a similar attack of scarlet fever, in the same way, and with the like result.

MEASLES.

The same little girl whose case has been last given, had the measles at the age of ten years. Here, again, fomentation was of very great benefit; it was applied to the breast-bone to relieve the chest-symptoms, and to the abdomen, to bring the eruption freely to the surface. The Homœopathic remedies, *aconite*, *pulsatilla*, &c., were given in very small doses. The case progressed so favourably, that no other means were found requisite. In *this* disease, under such circumstances, all baths would have been out of place; but when there is a dry burning skin, and the eruption does not appear or come out favourably, and the skin does not become moist by aid of fomentation, then packing and a warm bath, not reduced in temperature lower than 70° or 75°, must be used as the remedy most certain and speedy in aiding nature, by unfettering the organic efforts to cure.

Remarks.—The symptoms and progress of this case were so favourable, that all really necessary to insure a favourable termination was comprised in rest, warmth, diluents, and flannel poulticing. Nevertheless at each stage of the complaint an appropriate medicine was given, as above mentioned. The effects of these homœopathic medicines on my child were noted by Dr. Stummes.

In children and patients living under Water-Cure regimen and treatment, minute doses given on this system are often of much utility, their action being more certain and evident, when the conditions are so peculiarly favourable.

Some months past I was sent for to a favourite resort for invalids seventy-five miles distant, for consultation with a homœopathic practitioner in large practice. He stated that he had many cases in which he was obliged to prescribe the Water-Cure processes, finding that without them, the cases in question did not progress beyond a limited extent, short of what was required, and obtained easily by the aid of the remedies mentioned.

In insisting on fomentation and packing, as the most effective and essential remedies in the treatment of the acute attacks of children, I should not omit to direct attention to the *lamp bath*, as another remedial process of great utility. Although I find the utility of the lamp bath, more particularly in their chronic ailments, still it is of great value at the commencement of some of those acute attacks that are ushered in by depression, shiverings, &c.; it also acts powerfully in bringing out a retarded or suppressed eruption, and in some cases may be used with advantage in producing free perspiration, where there is a tendency to perspire but still some obstacle to its freedom. It is a process much liked by children, and I cannot recall an instance in which it was not followed by their expressions of relief and comfort.

I have heard different opinions expressed on the subject of the lamp bath, but on strict inquiry of many patients who had come here with an adverse opinion, I found that it had been either imperfectly administered or injudiciously prescribed.

THE EFFECTS OF WATER-CURE TREATMENT IN CHILDREN, IN A LETTER FROM ED. ARCHER, ESQ., OF TRELASKE, CORNWALL.

"Malvern, Dec. 27th, 1856.

"My dear Dr. Wilson,

"You told me that a new edition of your work on the Water Cure was on the eve of publication; and I should deem it a great favour if you could find room for insertion in it of the following letter from myself.

"I have read with great interest, and equal instruction, yo large work; its perusal has greatly enlightened me on matters the highest importance affecting health, of which before I was co paratively extremely ignorant: but I find therein recorded the cas only of *adults*, and I am very anxious to contribute my opinio based upon *experience*, of the great benefits to be derived *children* from the Water-Cure treatment,—hoping thus to prom inquiry among heads of families, and to take a wider range than privately replying to the queries of my own many immediate frien and relations.

"My first visit to Malvern, in 1849, when I spent some wee most beneficially as a patient in your establishment, impressed m very favourably with the effects of the Water Cure. Since the having known much sorrow, which in all human probability migh have been averted had my residence been nearer Malvern, and bei again desirous of placing myself under your treatment, I determin to confide my eldest boy, a lad about ten years of age, also to yo care.

"He was in a state of great debility from the effects of a malignan fever, which had been raging with fatal virulence in my neighbou hood. He had a ravenous appetite, incessantly craving for anim food, which (with intermediate nutritious sustenances, viz., Po wine, jelly, &c.) had been permitted him at each meal, in the ho of 'recovering his strength.' Yet withal the boy was never sati fied, always craving, faint, and *wasting away*. After a fortnight packing and gentle treatment, with abstemious, unstimulating die I noticed in a short time sensible diminution of this unhealth craving, and a proportionate increase of vigour, spirits, and actu *weight*. Suffice it to say, that at the end of ten weeks he ha gained upwards of seven pounds in weight, and was the most activ and muscular little fellow in your gymnasium.

"From closely observing the effects upon this boy, I felt satisfie that my other children would derive both present and future benef from the water treatment, and determined on bringing up my who family to Malvern for the winter.

"The children were all younger than the boy already mentione and were subject to *frequent* stomach derangement,—one, indee had never quite recovered an alarming attack of gastric fever abou the preceding Christmas, during which we had for some days d spaired of her life.

"In taking this step, I knew that I had the prejudices of trul interested friends, as well as a mother's natural fears to conten with; but I felt assured that the latter would speedily disappea on witnessing the treatment and its effects.

"It was predicted that 'the children would go into fits,' or tha they would 'scream so, it would do them more harm than good, &c. &c. The aspect of my nursery, however, on the morning c

their first treatment effectually contradicted these predictions, and banished all fears as to screams and convulsions, for four or five little heads might be seen poking out from their '*pack*' as quiet as dormice, whispering only 'they were warm as toasts.' A 'tepid bath, *cooled down*,' followed, and from that moment all apprehension subsided: the other water-cure processes were readily acquiesced in, and their salutary effects in due time evidenced by the bright eye, clear complexion, and healthy tongue, together with the happy temper of the little patients. It ended, in fact, in their mother becoming a patient herself, and deriving great benefit from the mild tonic treatment you prescribed for her.

"I ought particularly to say, that so far is the treatment from being dreaded by children, that I have known a general order for 'packing,' on the following morning, create a squabble as to whose turn it was to be packed *first*, and that even my recently weaned infant, when feverish or unusually ill with teething, submits without a tear (in lieu of the carminatives and soothing syrup of old) to be put into the wet sheet packing by its mother, which speedily lulls it to sleep. Neither ought I to conclude without notice of the very severe attack (precisely similar to the one she had last year, mentioned above), from which my eldest little girl, a child of eight years old, has so recently and rapidly recovered under the Water-cure treatment.

"The progress and termination of the two attacks must, to form a just opinion, be put in contrast. She was taken ill last year on the 15th December, 1855, was in bed, and still in a precarious state on Christmas-day, and did not come down stairs, still ill and feeble, until the 7th of January. Her present attack commenced on the 18th of December, 1856, accompanied by precisely the same symptoms, viz., high fever, constant nausea and vomiting, and incessant diarrhœa, streaked with blood, and complaining of intense headache. The packing very soon subdued the fever, whilst the fomentations you prescribed at once stopped the sickness and relieved the bowel irritation as well as the severity of the headache, and to our great surprise and thankfulness she *came down to sit with us at dinner* on Christmas-day! in good spirits, and bearing scarcely any trace of nearly a week's fasting and severe illness.

I admit that, at the end of the first three or four days of great alarm and anxiety—the bowels still frequently affected, and still with some blood, we became uneasy, and ventured to inquire if you could not combine *medicinal* treatment of some kind or other with the Water Cure; but I now rejoice that you did *not* humour us by the administration of even the smallest dose (although, I must say, assuring us you never hesitated to do so when necessary, though never, as you said, to gratify prejudices or groundless fancies), as we have been enabled thereby to witness the effect of *simple Water-cure*

treatment in a case of children's acute disease; and I am sure, from my painful remembrance of the past, that, with our numerous young family, it will prove a matter of valuable experience to us to have witnessed results so startling and gratifying, from means so accessible, safe to use, and easy of comprehension.

"Believe me, my dear Dr. Wilson, yours very faithfully obliged,

"EDWD. ARCHER, Trelaske; Cornwall.

"P.S. Mrs. Archer begs to say, with kind regards, that she has read her husband's letter, and finds it corresponds in every particular with her own feeling and observation."

PART II.

THE WATER-CURE PROCESSES

OR,

THE SYSTEMATIC APPLIANCES AND PRACTICAL DETAILS OF THE WATER-CURE, WITH AN EXPLANATION OF THE MODE IN WHICH THEY ACT ON THE HUMAN BODY,

AND

RULES FOR THEIR SAFE AND SCIENTIFIC ADMINISTRATION.

"We are unwilling to believe that great effects can proceed from simple causes, and so water fell into disuse.

"If men knew how to use water so as to elicit all the remedial results which it is capable of producing, it would be worth all other remedies put together."—MS. Notes of Dr. Macartney's Lectures at Trinity College, A.D. 1826.

CONVERSATION I.

The water-cure theory, and the actual science of the day—How does it cure?—Medicinal adjuncts—What is polypharmacy?—Candid medical opinion.

PATIENT.—My dear Doctor, if I am to judge of the sentiments of others from my own, I believe that the first and anxious inquiry that interests and agitates every intelligent patient on subjecting himself, or proposing to subject himself, to the water-cure, is *How does it cure? What is the rationale of its operations?* How are explained those surprising changes from disease to evident amendment or actual health, which it effects, not only in the course of a few months, but often in a few weeks, *in chronic cases* long intractable to drug-medication; and *in acute cases*, as I am informed, in the course of a few days, or even of a few hours?

DOCTOR.—It is an object infinitely desirable both for the practitioner and the patient to have clear ideas of the nature,

and the action and application of, the water processes. This is a subject on which much mystification still exists. Yet, I apprehend, when once ascertained, nothing can be more plain, more level to common sense, or more in accordance with the first principles of chemistry, physiology, pathology, and therapeutics. From all that science has revealed to us —of late years more especially—of the ultimate and intimate nature of disease and diseased action, the "Water-Doctor" may boldly, yet modestly and truthfully affirm of his system of treatment, that it can be proved *to a demonstration* to be the most *rational* and *successful method of healing, taking it as a* WHOLE, of any curative agency ever yet propounded.

P.—So saying, you admit, or imply, that there are *rational* prescriptions in the drug system?

DR.—I do make that admission most unhesitatingly. Who should know if I do not, that there are valuable resources for the sick in the stores and experience of drug-medical practice, including also the valuable remedies that characterise homœopathy. But, after a fair investigation and trial of both old and new physic, I most conscientiously believe my own system, in the majority of cases, far the most effective, because, while it is free to adopt all the best lights and aids of its compeers, it deals with an agency which in many cases enables us to dispense with the subsidiary aid of medicine in any dose, and when that becomes necessary it both *facilitates its action and augments its efficacy.** But on this branch of our subject I shall give you my experience at a future period. In the meantime to the subject in hand.

P.—Your declarations are very strong, and show at least what your convictions are. Some, who care not to inquire, may construe them as high-flown—I am sure at all events they are honest and heartfelt.

* I often find quinine, copaiva balsam, preparations of iodine, iron, and other drugs, which had been given, in larger doses, for a long time in vain, followed by deranged digestion and considerable loss of the general health, act with speedy and well marked efficacy after a short period of water-cure treatment.

I have also found homœopathic medicines, given in minute doses, act well when the digestive organs were repaired, and the constitution under the influence of water-cure treatment, the same remedies—as attested by the patient and his previous adviser—having failed in producing the desired effect under less favourable circumstances.

DR.—Knowing what I know of the water-cure, studying it as I have studied it, and seeing what I have seen and experienced of its capabilities and actual performances, I say, on my conscience, I speak not beyond bounds. I utter only the words of truth and soberness.

P.—I understand you to say *that hydropathy, as a theory, lays its foundations deep in the actual science of the day, and that, as a practice, its means and appliances best bring about those changes in the body which the nature of morbid action points out to be effected, in order to the restoration of healthy action?*

DR.—That is the substance of my affirmation and belief. Moreover, the water-cure, whether considered as a theory, or as a practice, challenges the severest tests and scrutiny that can be applied to any curative system. Will any other stand so fearlessly forward to be examined?

The proud and gratifying position of the Water-Doctor is that of a *physiological* practitioner—the strong basis of his hydropathic science and art is *physiology*. Pathology and therapeutics are both derivable from that, and all three are inseparably connected. The first shows the *standard* of the corporeal constitution in its solids and fluids. The second marks the *deviations in structure and function* induced by disease; and the third traces *the methods of recovery*. But as we started from physiology to learn what disease is, so we are brought back to physiology to learn how to cure disease. For the path that nature follows in her sanative efforts, the agency she works with, the aids she requires, and the laws she conforms to, constitute the true and only basis of an effective medicine, or healing art. By this line of studies, alone directed and corrected by actual observation, and treatment of the disease, shall the profession be able to shake off the prejudices and the trammels of polypharmacy, and become alive to its *scientific errors*, as well as its *practical evils*.

P.—What is *polypharmacy?*

DR.—That complex, cumbrous, unwieldy, system of mixing all sorts of drugs. Excessive faith in "nostrums," and "specifics," which has existed more or less from the days of Galen and the Arabian physicians down to our own time, to the neglect of that acute observation of nature's instincts, leadings, and tendencies, and the disuse of those simple precautions and domestic remedies, that in the beginning of so many diseases are adequate to afford the organism

all the help it needs, a course of action, that with the physicians of the earlier times of the world, proved more abundantly successful than many modern chemical doctors can possibly believe.

P.—I should presume that a meddlesome interference with nature, as for example, strong and oft-repeated dosings, bleedings, salivations, *forced* drains from the bowels, kidneys, or liver, has in very many cases only the effect of thwarting nature's efforts, deviating her ways, subverting her powers, and rendering the system the more easy prey of the destroyer—disease. I believe, doctor, if you were to ask any candid physician of your acquaintance, he would say that my remarks were true, particularly if you applied the question in reference to the ordinary drug practice he had witnessed in any other hands but his own.

Dr.—Such is virtually the conclusion and dictum of some of the most eminent practitioners, past and present, of our profession. If the opinion be somewhat *ultra* in its tone, there is this good in it, that it plainly indicates the expediency of a return to those sane and simple principles of treatment embodied in the philosophic and physiologic—or, if you like, hygienic—WATER-CURE

P.—Well, the world will in due time do you this justice, that you are anxious to practise with the sanction of the patient's understanding, if that patient will only be at the pains to follow your counsels, to study what the body is in health, and what its condition and requirements are in disease. No cause can be more straightforward than this certainly. You attempt no mystery or mystification with regard to any part of the processes. All is plain and above board, and your hate of humbug is gratified.

Dr.—In fact, I hope and believe, we water-doctors desire nothing so much as to have patients of cool, deliberate judgment; and the more generally intelligent the patient is, and the better informed he is, especially on all medical topics, so much the better for us. Hence my best patients have often been *retired* medical men—acute, learned, and experienced—men mature in judgment and in years, men sufficiently clear-sighted to see the errors and inefficiency of the old system of *treatment of chronic disease*, and too independent and too honest not to *hail* an *ally* of the *healing art*, come in what guise, under what name, from what quarter it might.

P.—This alone argues much for your cause, that you can

dispense with exacting any *blind* confidence in yourself or your measures, that you can render a valid reason for the whole of your treatment, and for every part of any ordinance or operation you may advise. You can afford to set your light so that men may look at it. It is only stolid ignorance, timid doubt, crafty deception, or the thorough humbug, that courts darkness. Knowledge, honesty, frank purpose, and open practice, ask only to be brought to the light, that they may be seen, known, and in due time, approved of all men.

CONVERSATION II.—*First principles—The nervous and circulating system—Quality, quantity, and distribution of the blood—Preissnitz and the water-cure system.*

P.—I have heard it was the practical lights struck out by an immense variety of experiments on the action of water on the diseased organism, and not on any *à priori* reasonings, that have rendered the hydropathic processes the splendid implements of the healing art that they have become.

DR.—It may be true, to a certain extent. But Preissnitz told me that his theories, however defective, preceded his seeking for remedies and finding them. However that may be, like some others of the greatest boons to mankind, many of the valued instruments of our art were neither the suggestions of theory, nor the elaborations of the closet, but the pure discoveries of experiment.

Let me caution you, however, on the subject of the argument drawn from *cures*. Everybody knows, who chooses to investigate and inquire, that the water treatment produces the most favourable results—*cures*, I believe, never before paralleled; for a great many of them take place in patients alleged incurable. But cures, although an immense recommendation, and this on the principle of judging of the tree by its fruits, are not always a safe criterion to judge by. For some systems of arrant imposture have rested their pretensions on the same grounds, grounds open to much fallacy. But if the Water-Doctor's great success *in practice* can be explained on the soundest grounds *of theory*, then the curative results on which I congratulate myself, are not to be laid to the score of blind hap-hazard, or simple good fortune; but, on the contrary, *are results obtained in accord-*

ance with LAW—a success that may be calculated to attend all similar cases similarly treated.

P.—LAW; I like that word. I do not mean parchment law, vexing, cheating, low cruel men's iniquitous, pettifogging law—but the Creator's divine physiological LAW. I apprehend and appreciate the high ground on which you wish to rest the merits of the water-cure.

DR.—This is the sole ground on which the scientific water practitioner bases the pretensions of his system. *It is by the scientific soundness, or unsoundness of the water-cure, that he must stand or fall.*

P.—Well. Now for the *rationale* of the processes.

DR.—For this I wish to lay a broad and firm foundation in your understanding, and in the understanding of every water patient. To this end it may be necessary to refresh your memory with a brief summary of some of the points illustrative of the nature of disease, its facts and doctrines.

If I am to justify the laudations of the advocates of hydropathy—that it is a system in minute and curious accordance with the teachings of the exactest medical science; a system based on the very constitution of man's frame; a system taught and enforced by every fact of anatomy and physiology, pathology and chemistry; a system at once harmonising with the philosophy and reason of things, and justifying its abstract pretensions by practical proofs without number and without parallel—then I must proceed to prove all this. I ask you to take nothing for granted. Your credulity or love of the marvellous is not called upon; I do not ask you to believe improbabilities or impossibilities.

To show the special grounds of the details and operations of the water-cure, we must again have some brief and cursory talk about *first principles*. It is necessary particularly to refresh your memory, as to the fundamental conditions of the diseased body; then we shall be prepared to comprehend those deductions from the *nature of disease*, which show the general theory and scientific basis of a true healing art. These may occupy a conversation or two, but the time and attention will not be lost, although it be going over old ground. I hope and expect that it will neither be uninteresting or unedifying. For if I am to explain and make you understand the true idea of *remedy*, it is necessary to recapitulate some of our long discussed points of pathology, and refresh your memory with a summary of the most mate-

rial and palpable conditions of *disease*, and of the generalities of diseased action.

P.—I recollect that you stated that the fundamental fact and condition of all diseased action was this, *an undue activity, accumulation, or stagnation of the circulation in the capillaries of the affected structures.*

Dr.—Precisely so. Apart from this tangible pathological state or result of disease, we know nothing very accurate of what disease is, or wherein it consists. We talk much, indeed, of *nervous lesion;* but it is an *unseizable element* for the most part. We can rarely make it clear to our senses, as we do in the more palpable vascular changes, and their deposits.

P.—Nevertheless you asserted that this nervous damage, impairment, or injury of the great vital electrical battery and wires (for to this you likened the brain, spinal chord, and ganglionic system, with their nervous ramifications *everywhere*), was the *first link* in the chain of morbid sequences.

Dr.—Yes, truly, and that we know for certain, and on many grounds. The nervous system, especially the ganglionic, is the *primam mobile* of all healthy action—the part of man's wondrous mechanism first generated, and the last to die—the part on which the practitioner most surely calculates to aid him in his efforts to arrest or cure disease; the part which, least strained, or exhausted by hard work, or hard living (good or bad), is a valuable criterion by which the experienced practitioner judges of the amount of hope there is for a patient, and of the degree of success likely to attend curative efforts.

P.—With such views of the nervous system, nobody can accuse you of not appreciating its power or its importance, or of assigning to it only a secondary place as an agent of cure.

Dr.—Quite the contrary. Yet you cannot too distinctly remember, that we can only efficaciously address the nervous through the circulating system. In no other way, save by electricity, or the direct importation of the nervous energy of one individual to another, can *abiding* healthful results be established in the nervous system, or in any other part of man's frame, except as I have before mentioned. The circulating system, I repeat, is the great field to cultivate, granted by nature and pointed out by science for the opera-

tions of the Water-Doctor. His great function is to rectify the *quality*, the *quantity*, and the *distribution*, of its currents.

P.—You say then, that the circulating system is that on which the operations of the Water-Doctor tell most in producing curative organic changes?

Dr.—Yes, I do; the system he is specially called on, or which is specially "indicated," in the treatment of disease to be modified, and the system which he has most directly under his command. In fact, if you ask me to define briefly, yet accurately and philosophically, what was the great function of the medical practitioner, I would say in a word, it was to rectify the quality, the quantity, and the distribution of the blood. And thus add fresh energy to the nerves and vitality to the body.

P.—It would seem, then, by all the fresh lights which the microscope and modern chemistry have thrown upon this subject, and by all the sanctions lent by modern science to the water-cure, that providence had opened up this field to man as a new curative possession.

Dr.—Certainly all that we know *now* of the blood, urges the practitioner more than ever before, to explore its untold sources of healing, and to try its neglected power; to use it more and more as the recipient and channel of healthful influences to every other part of the economy. And just in proportion to the genius, judgment, and energy with which this field is cultivated, will the art of healing throw aside many of the false props it has so long leaned on.

P.—So far as my reflections go on medical practice, and from the light you now place the matter in, I should say there has been *much oblivion and neglect of the circulating system*. Else how could every means have been so sedulously and systematically taken to poison or to vitiate its currents—at one time to gorge them with excess of blood—at another time to drain it off like so much water—much of which I consider is brought about by the introduction into the system of irritating material of a poisonous nature—materials totally foreign to the composition of the structures; and by the too often reckless withdrawal of the essence of the body's strength and life, the BLOOD—*the alone source of its repair*. And all this, forsooth, as has often been alleged, to enable it the better to struggle against the assaults of disease.

Dr.—There is much truth in what you have said, what

other result could you have expected from so great a perversion of the true ends of healing carried to such lengths, of so outrageous a divergence from the common-sense path of corporeal renovation, a path clearly pointed out to the student of nature; and *now* a path equally clearly traced by the lights of science. A new and better system was therefore loudly called for, by every motive at least of humanity, if not by the march of modern progress. And here is a fact too that contains weighty matter for reflection: that when *such a system* was struck out in the *solitudes of Silesia*, how singular to find it in curious and minute accordance with the teachings of the exactest science of the day; to find it, when carefully sounded and analysed, a system based on the very constitution of man's frame; and *now* taught and enforced by every fact of ANATOMY and PHYSIOLOGY, PATHOLOGY and CHEMISTRY; a system at once harmonising with the philosophy and reason of things, and justifying its *abstract* pretensions, by *practical* proofs without number and without parallel. And this system we owe to the creative genius of Vincent Preissnitz, and the *providential circumstances* by which he was surrounded.

P.—Bless my life! I am glad to hear you say so much; I was beginning to think, that being so occupied with nervous centres—ganglionic and animal—capillaries, and chemico-vital changes, actions, reactions, and counteractions—your *fons malorum*, *vis medicatrix*, and *modus operandi*—you had quite forgotten what you owe to *him*. One was almost led to imagine that Preissnitz had stood meekly by, admiring the building up of the water-cure, as it rose step by step into a rational system—and then went his way rejoicing, when he saw it delivered to a grateful people, fresh formed by the creative genius, and fostered by the cheering influence, of medical orthodoxy. I am truly glad that you are assured of the fact, that neither Dutch nor German, English nor Scotch doctor, neither surgeon-doctor, nor apothecary-doctor, homœopathic or soi-disant doctor, had anything to do with it—except in the way of an active opposing cause.

DR.—All you say is very true; but calm your virtuous ire, I have not been ungrateful as you suppose. I am rejoiced to find myself no longer treating my cases of *chronic disease* exclusively with drugs, which I suppose I should be still doing, with the rest of the water-doctors, but for the enlightenment we owe to PREISSNITZ's *water-cure* system. But do not forget that men of our profession have also done a

heavy and profitable day's work in their generation, which I could make clear to you were this the place. Not alone in the aid they have afforded to the progress of science and civilization—as well as in attending to the sick, and administering consolation in the hour of need—but also by their devotion and courage. The latter we know is the commonest attribute of the human being, and reaches its highest pitch in a field of battle; but there is courage of a higher order, which enables men calmly—without the pomp or circumstance of murderous war—to pass their days in an *infected* and too often *deadly atmosphere*, affording relief and meditating remedies, where hundreds are dying of plague, cholera, yellow or typhus fever. Who will deny the immense debt that humanity owes to the medical profession?

P.—Or how niggardly it has been paid!

Dr.—In judging of those who are gone, we should remember, that every generation has the advantage of the scaffolding raised by its predecessor. We should thus avoid an injustice often committed, by blaming *those of the past*, for their errors and short-comings. The last lend their best lights and props, with their accumulated capital, to those that start afresh. But with all this, strange to stay, we find Dame Nature granting lights to a German farmer to create a curative system, which centuries of science had denied to the combined fraternity of *all* the sons of Esculapius.

Conversation III.—*End and aim of the Art of Healing—The simple physiologic cure based on imperishable truth.*

Dr.—Having refreshed your memory in our last conversation with some of the fundamental facts concerning the nature of diseased action, it still remains necessary, before I endeavour to explain the mode in which the *processes act*, to lay before you a few deductions from the nature of disease, which plainly show what is the *general theory* or *scientific basis* of a true art of healing, by whatever name it may be called. These I will mention in the shape of a few plain observations, which even the common sense of every unprofessional man must assent to. No consequences from any facts, it appears to me, can be clearer in themselves, or more reasonable in their applications, than are the following remarks.

The end and aim of the healing art, in all its forms and schools, dogmatic, empiric, eclectic, allopathic, homœopathic,

hydropathic, the beginning and the end of the medical man's calling (by whatever name he may be called, or whatever agency he may use), is to amend the quality of the blood and to direct its distribution. The surest means to promote the former object is that which most successfully accomplishes the latter.

P.—You showed certainly very plainly, in your last conversation, that in deranged, diverted, or locked-up currents of blood, however produced, lie the source and essence of all diseases.

Dr.—True. This embarrassed and irregular circulation in itself is bad enough, but the worst part of it is, the inevitable tendency and result of such a state of matters, which is, to vitiate the quality of the fluids, and to impair the energy and integrity of the solids. For it is too clear, to need a moment's insisting on, that, to what extent the usual vital or chemical decompositions in a part are perverted or prevented, to that extent the sound constitution of the blood is lost, and it becomes more or less charged with excrementitious matters. In any case, it is less fit to sustain the healthy functions of life. The structure itself falls into disorder, and its solids and fluids are malelaborated. The nervous, the circulatory, and the secretory systems, and all the energies they subserve, then flag and fail. In short, man's fabric has lost the conditions of health and becomes diseased.

The character and intensity of all diseases are determined by the varying degrees of this derangement of blood-currents and impairment of blood qualities. Upon the exact appreciation of the extent to which one and the other of these states exists in any individual case, is the scientific method of treatment based. In this is often demonstrated the genius of the practitioner, and by this suggested the means of his success

P.—If I remember well, I think this was one of your great pathological doctrines, that this faulty circulation and character of blood—its excess and obstruction in certain organs, and its deficiency in others—according to its local extent, and the constitutional infection or structural impairment supervening or superinduced, produces the morbid states called *irritation, inflammation, congestion, engorgement, degeneration, induration, ramollissement*, or softening, and other organic alterations.

Dr.—You are quite right. This leads me to another remark.

That the resolution of these sanguineous accumulations, the correction of these irregularities, the equable distribution of the vital current throughout all the interior organs, and over all the exterior surfaces of the body; and, consequently, the restoration of healthy properties to the blood, healthy structure to the tissues, and healthy action to the frame generally, can only normally and effectually be brought about by an agency exclusively directed to exalt the physiological and healthy play of the organic functions.

III

P.—The question then becomes, "What is the best agency of cure?—where is it to be derived from, from the resources of the mineral or the vegetable kingdoms?

DR.—From neither. You will recollect how I proved before, in our *introductory* conversations, that the bane involves the andidote, that remedy is placed side by side with disease, that it consists in imparting the *right direction* to the *deviated powers* of nature. This brings me to another remark.

That the CURE *of disease is to be sought in the powers of the living organism, and not in the vain nostrums of the apothecary's art. This is a sound principle, universally received by* all *philosophical medical men. But as there is no general rule without exceptions, I gladly take the opportunity here again to remind you,—who are* ultra *in your prejudices and in your dislike of all drugs,—that many cases occur wherein drug medication, judiciously used, renders signal help to struggling nature.*

IV

P.—I should like to know what you consider is the *extent* of this *help*; and in what directions best rendered? *I* have seen very little else than mischief—making bad worse—by exclusive drugging. In this opinion I am backed by many justly celebrated physicians, native and foreign, and I can give you chapter and verse, if you would like it.

DR.—The grounds for *my* opinion, I shall at a future time define and explain to you. In the meantime allow me to state, that if cure be solely and exclusively the result of the body's own efforts, a very clear consequence resulting therefrom is,—

That the most available agents of cure are those required for the healthy exercise of the natural functions, especially those of waste and repair, of excretion and secretion.

V

P.—I suppose, in our present state of knowledge, no other agents can minister health to disordered functions?

DR.—It is not likely, so far as the ordinary LAWS of nature

operate. But to proceed. It is another equally clear consequence flowing from the above admitted fact or premiss,—

That the true, safe, and scientific art of healing *must consist in this natural agency reduced to a system; the real* hygienic system, *the* simple physiologic cure; *its* modus operandi *exactly understood, and its technical rules established on sound principles; in a word, its practical applications and its scientific bases clear, tangible, and definite.*

P.—Well, I anticipate your conclusion from your conclusions; that the *ensemble* you call the *water-cure* is the natural agency thus methodised?

Dr.—I cannot see how that conclusion can be parried.

P.—I must say, according to all your reasonings, that the *water-cure* comes the nearest of any other system to the philosophic *beau ideal* of a curative art or science. It has much to allege in justification of this high pretension. It lays its foundations deep in the soundest principles of physical science—that is saying much for it.

Dr.—I cordially believe with you, and am prepared to prove that the abstract merits of the water-cure, not to speak of its practical capabilities and results, are far higher than those of any other system. Believe me, the water-cure is not the chimera of an hour, or the folly or fashion of a day. Based on imperishable TRUTH, and fitted to confer the most solid advantages on society, it will, as a system of curing disease, as well as a system for *preserving health* and *prolonging life*, command the acceptation of *all* who calmly investigate its merits, as it will secure the confidence of all who fairly test its powers.

CONVERSATION IV.—*Reasonableness of water-cure remedies—True theory of action—Water, air, exercise, diet and repose—Capillaries and chemico-vital changes—Inflammation and congestion—Fever.*

P.—THE *general* scientific basis of the water-cure, as you have explained it in the preceding conversations, I believe, I am beginning now to understand. The deductions from admitted principles, as applied to the *abstract* question of cure, appear to me sound and unexceptionable, and carry with them the full assent of my understanding. I trust, therefore, all this preliminary ground being cleared, that I am now prepared to enter more deeply with you into the *feasibility* and *reasonableness* of the water-cure remedies.

I am anxious to know the special grounds, principles, and details of each individual operation, its specific local mode of action, and the general constitutional changes it effects.

Dr.—The true *rationale* of the water-cure processes is a question of far more moment, than appears to the superficial observer. Clear views of their agency are now of considerable consequence, both to practitioner and patient; not only because without a rational and consistent theory of action, we are constantly liable to err in their application, but also because the determination of their real action will constitute a fair field of discussion whereon to decide what medical practice, *as a whole*, has the best claim, *in pure reason*, to the largest confidence and the most permanent popularity.

I hope to make it clear to you that there is nothing mysterious in the operation of the water-cure "means and appliances." The mystery, if there were any, would be, that they did *not* accomplish the great *curative* results which medical *reasoning* and *theory* alone would lead us to anticipate. You will, therefore, lend me your ears, while I attempt to unfold the high rationality and efficiency of the *simple water-cure processes*, and to establish *on indisputable physical facts* what I believe to be the true theory of the mode in which they produce their effects.

P.—I shall be glad to give you my undivided attention, that I may understand the physiological principles on which the multiform water processes operate. Indeed a faithful portraiture, a scientific exposition, of their distinctive attributes and actions is now a sine quâ non—it is, as it were, to take a likeness of the Water-Spirit—to daguerreotype the genius of Hydropathy.

Dr.—If (following your figure and humouring your *comparison*) I fail accurately to portray the shape and lineaments of this spirit or entity, to embody its essence, and to transfer its features, it is not so much from want of light, as the want of skill to put it in the true position for that light. The characteristics to be taken stand out so clear and defined, that, if the image be incorrect, or the picture blurred, the fault is not in the light, or the object it shines on, but in the maladroitness of the draughtsman. It is not from a paucity of *material*, but an *embarras de richesses*.

P.—Well, to arrive at the explanation of the potency of the water-cure.

Dr.—To obtain that desired result, it must not be viewed

in *its totality*, in the aggregate and combined result of its agency, but *in detail*, and in the operation of its individual parts, each piece of the mechanism, as it were, being taken asunder, and examined for itself intrinsically, as well as explained in its relations to the whole.

P.—That is the advisable plan; the only true way of treating the subject. For it stands to reason that an accurate appreciation of the combined effect of the whole agency can be obtained only from a thorough comprehension of the individual parts.

DR.—Quite so. Without going to the bottom, therefore, of this subject, and analysing the action of each element of the CURE, without ascertaining clearly the effect of each *process*, of *diet*, *air*, *exercise*, *regimen*, *and repose*, my elucidation of the principles and practice of the water-cure would neither be as complete or comprehensive as would satisfy you.

The word *repose*, I again repeat with emphasis. When first used by myself, it was thought out of place, but you should know that it possesses important elements of restoration; for it includes rest of mind—loosening of the grasp of care—freedom from restraint and from injurious habits, and the sleep of the passions. Many patients will tell you that nowhere are these desirable results in aid of cure, so surely and speedily obtained, as under a judicious course of water-cure treatment.

Here, then, *in limine* of this exposition, I must further refresh your memory with a brief recapitulation of physiological doctrines relating to the subjects of *capillary circulation*, *cutaneous action*, and *the production and dissipation of animal heat*. These lie at the foundation of the *water-cure as a science*, and by affording the most intelligible *rationale* of its action, constitute the safest guides of the judgment in its practice *as an art*.

P.—Without a proper theory of the action of his remedies, I should presume the practitioner will be often mystified by his own measures, will be liable either to underrate or overrate the organic capabilities to bear prescribed treatment and, will go perhaps blundering on, accomplishing cures by mere haphazard?

DR.—Undoubtedly, one would naturally expect that in the non-comprehension of the real theory of the water operations lies the greatest source of errors of treatment, of failures where cure was practicable or within easy reach. At

the same time I should remark that I have seen excellent treatment and remarkable cures, the result of fine natural tact, combined with much experience and close observation, *without theory* or any medical knowledge; *and, on the other hand, I have seen very fine scientific theorisers* do considerable mischief to water-patients, from want of this natural or acquired tact and experience; I have seen others err from never trying or feeling the effects, on their own persons, of the remedies they so freely and carelessly administer to others.

To refresh your memory, I must request you to note again that the capillary vessels, or the minute ultimate branches of the circulation, and the ganglionic system of nerves are the chosen instruments, seats, centres, and sources of all the *chemico-vital processes* of the organism. In them repair and waste, secretion and excretion, the building up of the new materials, and the taking down of the wasted fabrics of the body are carried on. Of these changes the blood is at once the *medium* and the *stimulus*, and the nervous system the *operating power*.

P.—An electro-magnetic agency, it is presumable, acting along the wires, the nerves?

Dr.—Heaven knows! it may be so. However, recollect there is no *extra vascular action* in the body; I mean no *vital* action out of, or independent of, *vessels*. In the interior of the capillaries the blood is brought into contact with the net-work of organic nerves which ramify in them, is pressed against their points, and the absorbing orifices. In this, nature's secretest laboratory, her *sanctuary* I might almost call it, the *composition* and *form* of the various structures of the body are determined.

P.—Are the capillaries passive carriers of fluids, or have they an independent peristaltic action of their own, in consequence of which they propel forward their contents?

Dr.—While I admit that the principal cause of the motion of the fluids in the minute vessels, is referrible to the chemico-vital changes that take place at their extremities, as, for example, in secreting organs, on exhalant surfaces, as those of the skin, lungs, peritoneum, &c.; nevertheless, it must be conceded that the capillaries are very much influenced by the nature of their contents, or by mechanical irritation acting on them from within or from without. They contract or dilate, become turgescent, or flaccid, according as the blood may be too stimulating, or not stimulating enough.

Dietetic irritants or medicinal poisons, for example, ardent spirit, opium, foxglove, prussic acid, &c., at first unduly excite their coats, and then, exhausting their irritability slacken or paralyse their action, according to the intensity of the exciting cause. On the other hand, when the contents of the capillaries are not exciting enough, in states of the blood deficient in red particles, and excessive in serum (anæmia), in scurvy, &c., or from the effects of poulticing, or long soaking, or macerating the capillary tunics, and the areolar tissue in which they are embedded,—the *tone* of the capillaries is impaired, their tension relaxed, their irritability diminished, and their contractile power weakened.

P.—Are not some of these you last describe the physiological actions wanted to reduce irritation or inflammation in a part, or to effect the cure of chronic disease?

Dr.—Precisely, and note the effect of maceration. It is to be remarked in such case, that the capillaries are nearly empty, and completely so of all red fluids. This is the condition of the skin after the action of a poultice, compress, and to a certain extent, after fomentations, long continued. Surgically, this would be called one effect of the water-dressing. The part is rendered pale, shrunk, flaccid; in short, *it is depleted*—one effect of blood-letting, leeching, and cupping, has been accomplished *without loss of blood*. Moreover, not only has the cutaneous surface been emptied, but such is the effect of this process by sympathy on the deep-lying organs below, that a similar disgorgement has been operated in their overloaded capillary circulation. In whatever way this is brought about (call it *organic sympathy* or any other term) it is an undoubted fact. In consequence of the same sort of action, by sympathy or consent of parts, *leeches applied to the epigastrium, or hypochondrium, unload congestions of the stomach and liver.*

P.—That gives me some light on the action and utility of the abdominal compress, which is prescribed to be worn in many cases of digestive derangement?

Dr.—It is; and you have in part its *rationale*.

P.—Well, such being the effect of imbibition, maceration, or poulticing the sentient surface or the sound skin, I can easily conceive its effect in diminishing the painful distension of an inflamed part.

Dr.—To be sure. In an inflamed part the action of the capillaries is morbidly increased, their organic excitability (or irritability) is too tending to exhaustion, to relaxation

This, in fact, constitutes the distinction between *inflammation* and *congestion*.

P.—Will you please refresh my memory again with those distinctions?

Dr.—With pleasure. The doctrine is "in a nut-shell." The one is an *active* the other a *passive* state. In *inflammation* the blood is propelled too rapidly and forcibly, the contractility of the vessels is too great, their movements excessive, their irritability and sensibility are morbid. Very probably, too, in an inflamed part such an alteration takes place in the blood (from the altered nervous power of the part) as renders it unnaturally stimulant.

Congestion is the opposite of all this. It is the relaxed exhausted state into which has fallen an over-worked or over-excited part. The blood accumulates and *stagnates* in it, because the propelling energy of the vessels is lost. Hence compression of the adjacent structures and more or less solidification of their substance is the result.

P.—But this is not all the evil, according to your own showing. For the contained blood, no longer undergoing the due chemico-vital changes, must become not only morbid in itself, but also a source of morbid excitation and empoisonment, at least to the neighbouring parts, if not to the rest of the system.

Dr.—You perfectly comprehend the matter. Hence, I need hardly tell you, we have in this way, *when peculiar constitutional predispositions exist*, malignant alterations of structure of various kinds developed in the seats of neglected or maltreated chronic inflammation, or more strictly speaking chronic congestions.

P.—Well, as you are upon these topics, will you step from inflammation to *fever*?

Dr.—You have only to depict to yourself the *active* condition first described as *existing on a large scale, extending over the whole body, pervading the entire blood-vessel system*, and you have a representation of *fever*. In the latter case (in fever) there is besides a general and central impairment of nervous power, a dynamic fault, or organic lesion, at the *core* of man's vitality, which is the first link in the chain of morbid action, and the mainspring of the diseased sequences. In plague, typhus, yellow fever, malignant scarlet fever, or cholera, this is the part on which the destructive blight first falls, or first *tells*. From this starting point the seeds of death are dispersed over all the rest of the frame. The

next link in the chain in fevers and inflammations (simple or malignant) is a morbid irritability (inordinate action) of the heart and blood-vessels. But this is of very short duration in cases where the offending cause is still more fierce, as in cholera. The action of the vessels in some cases is paralysed, almost suspended; from the first, circulation is arrested. Matters cannot long remain at this pass. Reaction must ensue, or life is soon ended.

P.—Well. To turn to *practical* account all this sound doctrine, now for its applications. If such be the state of things the practitioner has to contend with in disease, local or general, acute or chronic, what is the remedy by which this state is be opposed?

Dr.—If we had a means that could control *at once*, and restore the perverted or exhausted nervous power (which is at the centre and source of morbid action) all the tedious round-about processes of the water-cure, or any other cure, would be superseded. For some *few* cases such a power exists, whether it be in the electric force of *faith* in the patient, or a mysterious mental influence, or corporeal galvanism. But we must be content to attack disease in the nearest of its strongholds to which we can have access—that is, the deranged capillary circulation: and by the means proved the most feasible, sensible, and scientific for accomplishing the desired ends.

P.—This brings us again to your grand doctrine, that *the circulating system, as influenced by the nervous system, is the great field for curative operations*, a field opened directly, as it were, by the hand of nature, and pointed out to be cultivated by every light of science.

Dr.—We have yet a discussion or two on the subject of the skin and of animal heat, and then I shall have the ground fully prepared to show you *how* the water-cure accomplishes the ends just pointed out (the regulation of the capillary circulation), how *safely* as well as how *effectually* it does it.

Conversation V.—*The skin—Cutaneous action, direct and indirect—The power of repeating curative operations—The skin an organ of elimination, and not of nutrition.*

Dr.—The skin is one of the great excreting organs, in fact, is a principal *outlet* of the body. It may be denominated a web of nerves and blood-vessels. Endowed with

exquisite sensibilities in itself, it acts immediately on the centres of sensation, the brain and spinal chord. But it has also intimate sympathies with the interior organs, by means of its filaments of organic or ganglionic nerves, in consequence of which it transmits to the vital parts within all morbid impressions made on the surface; and whereby in turn the cutaneous functions themselves become deranged by every *interior* irritation. According to the extent and intensity of the interior derangement, or visceral disorder is the healthy action of the skin perverted, and does it become reciprocally a source of aggravation to the interior suffering.

P.—The skin and mucous membranes, I think, you described as nearly identical structures, and analogous or equivalent in function?

Dr.—They are. The skin may be considered a mucous membrane *with its epithelium dried*, that is, its delicate outer membrane in the state of a simple tiling or pavement of scales. In the usual condition of the skin, its hardened insensible covering, the epidermis, cuticle, or scarf-skin, is nearly water-proof. Each of its minute scales forms a valve to give exit to fluids, but to repel, or nearly so, the passage in of fluids from without. *By soaking, however, this coating is made permeable.* It then acts like any other porous matter, that is, by capillary attraction. When this outer barrier is once cleared, fluids are readily absorbed from the true skin (the same as from mucous membranes), by *endosmose*, or interstitial absorption.

P.—What is the effect on the vascular system of cutaneous action, as roused by the hydropathic processes?

Dr.—This is two-fold, *direct* and *indirect*. In the first place, the abstracting of heat from the surface of the body determines a rush of blood thither to supply its place, thereby unloading interior congestions and tending to establish the sanguineous equilibrium; the gain of fluids on the exterior of the body being obtained by the relief or unloading of the interior—a result too palpable to require a moment's demonstration. In this lies half the cure. For to relieve the labouring viscera of the stagnation, or of their excess of blood, to restore the lost equilibrium of the intropelled fluids, and *allay irritation*, in most diseases, acute and chronic, is the principal help nature requires, and should be the one great aim of medical art to accomplish. This done successfully, the organism soon rights itself. It only wants the pressure on its springs removed. Then the

nervous (vital) power is liberated, and in a state to put forth all its energies. All that is necessary is to supply gradually (as the demand for them arises) the *natural* stimuli and supporters of vitality. To meet this requirement, the hygienic *regimen* of the water-cure has been created, THE WHOLE SYSTEM OF DIET, DRINK, AIR, EXERCISE, REPOSE, MENTAL AND CORPOREAL HABITS.

P.—So much for the *direct* effects of cutaneous action on the vascular system. What is the *indirect* effect?

DR.—This is that which is propagated by the route of the nerves, and is of two kinds: first, *excitant*, or what is generally understood by the term stimulus or shock; second, sedative, soothing, or the effect we attribute to a poultice. In the first of these cases, the cerebro-spinal and the ganglionic nerves have a temporary excess of vitality given them by the stimulus of the cold-water. The heart and blood-vessels simultaneously participate in the recruited energy and beat with augmented power and steadiness. Hence congested viscera are found to be relieved, and finally disgorged by the *repetitions* of the process, under fitting circumstances. The cheering and genial stimulus of the *entire nervous system* goes for a great deal, in the curative agency of the chilled or cold bath; in all cases of pure debility, or simple under-par action of the corporeal powers, *precaution being always taken to ensure reaction*. On the other hand, the soothing of the nervous system, and the *reduction of vascular excitement*, by the refreshing and poulticing processes of the cure (the sheet-packing, the fomentations, the compresses) and the *warm-bath cooled down*, are some of the modes of relief in diseases of above-par action of the body.

The combined use of these two principal remedies of the water-cure, the means of graduated stimulation, and the means of *sedation* respectively, their artistic handling, according to the phases of corporeal excitement or depression, constitutes the routine of ordinary water-cure practice. Let me impress upon you again the immense importance of the fact that we can *repeat* our curative measures daily, without which *many chronic diseases* would be hopelessly incurable.

P.—The aim of your observations, and the conclusion of your argument is, to *show* that the *skin*, or as you call it, the great external sentient surface, is the best seat or field for *active* and *repeated curative operations*, when the body is

diseased; and this you make out as warranted on the strictest grounds of medical philosophy and science.

Dr.—Assuredly. Every fact in physiology and pathology lends its support to this grand therapeutic principle. And truly it is sad to repeat again, that the alimentary tube and its exquisite nervous lining should be used *exceptionally*, and with merciful consideration, by all who know the dire consequences of its abuse, either by irritating drugs or other means. The stomach and bowels should, as much as possible, be reserved for their natural purposes, the repairs of the body, by sound digestion, and pure blood making.

The skin, I contend, is pre-eminently fitted, and indicated to be the chief battle-ground of the practitioner in his struggle with disease, and this, for a variety of reasons. First, as being a great medium for transmitting impressions to the brain and spinal chord, on the one hand; and to the viscera of the chest and abdomen on the other. Secondly, as being a sort of electric surface, with infinite connecting wires, the conducting media along which power is to be sent to either of its extremities. Thirdly, as being an organ of *elimination* and not of *nutrition*; one of only secondary and not primary consequence to life. Fourthly, from the *immense superficies* covered by the skin; from its thrilling sensibilities, and *extensive sympathies*; by its influence over the circulation by *graduated cooling*, &c., and from being at the same time the part most patent to observation.

Conversation VI.—*Animal heat—Effects of abstracting and accumulating heat—Derivative action.*

Dr.—I have now come to the last of those expositions preliminary to the discussion of the water-cure processes themselves,—expositions necessary, although repetitions, because they go to unfold in a great measure the secret of their mode of acting. I therefore request your attention while I reproduce a few of the salient points of the physiology of animal heat.

1. The primary, indispensable condition of the life and health of animals is a due amount of animal heat.

2. A small diminution from, or increase above, the healthy

standard, if persistent, entails serious, often fatal, derangement of the organism.

3. As the body, even under the greatest cold, hardly varies from the temperature of 96°, it is plain that the quantity of heat generated must precisely correspond with that abstracted; in other words, the generation of heat in man bears an inverse proportion to the temperature of the air.

4. The sources of heat in the body are similar to those which support combustion out of the body, that is, heat is liberated in both cases by the union of oxygen with carbon and hydrogen.

5. The only means by which heat is brought to, or developed in, any part of the body, is by circulation of the blood. If the body were a solid lump of metal, the cooling of one part, say a limb, while other parts were withdrawn from the cooling influence, would cool that part unequally; but being a sort of living sponge, or hydraulic machine, its fluids going to and fro and ever in motion, the temperature is constantly equalised by the warm blood conveyed to the part. This is independent of the chemico-vital changes which are effected with increased energy in the cooled part.

6. The elements whose union yield heat, are supplied in the food, in the air inspired, in the water drunk, and from the wasted, decomposed, and absorbed fabrics of the body.

7. In proportion as heat is abstracted from any part, and consequently, more heat developed in that part, *more materials of heat must be supplied;* a more active circulation also must be established in the part; more blood must be determined to it; more energetic chemical decompositions must take place; *a greater change of structure must, there, be brought about,*—the breaking up and absorption of the old, decayed, or diseased matter, and the deposition of new. In short, an augmented activity of the *vis vitæ* must prevail in the parts systematically cooled, an exaltation altogether of that *physiological activity of function*, which the practitioner can alone count upon as the corrector of morbid action.

8. To effect these purposes the Water-Doctor applies water *methodically*, not only *directly* (or as near as possible) to the principal seat of disease; but indirectly to remote or un-

affected organs; that is, on the principle of *revulsion* or *counter-irritation*, with a view to produce there such determination of blood and such activity of chemico-vital changes, as shall tend to unlock and draw away the pent-up stores of the diseased structure, in order to supply the large demand of vital fluid set up in the locality chosen for active curative effort.

9. This, then, may be established as a well made out point of the water-cure theory and practice—*that the abstraction of heat from a part*, or *its exposure to cold, produces a determination of blood to that part*. Here then, we reach a *main fact* of the water-cure *modus operandi*, which has not yet been properly regarded, insisted on, and shown in its important bearings. LIEBIG, indeed, had shown the effect of applied cold in hastening the change of matter in the body: and this, writers have taken advantage of in their *rationale* of the processes. But here their view seemed to rest. To my talented friend, Mr. Julius Jeffreys,* belongs the merit of having first rightly seen and developed the important practical conclusions this fact (the effect of abstracted heat) suggests.

10. It is necessary accurately to distinguish, on the one hand, between the *primary* or *temporary*, and the *secondary* or *enduring* effects of *the abstraction of heat* from the body; and, on the other hand, to study well the effects of *the retention of heat by covering up* with non-conductors, as compresses, blankets, &c. In these distinctions are involved the solution of the whole problem of the water-cure, the *rationale* of its processes, the grand secret of that great curative system, whose daily and *ordinary* results in restoring to health, can be shown to bear more than a favourable comparison with any other medical system known.

11. The *primary, intrinsic*, and *essential* effect of the abstraction of heat is *sedative*, a lessening of vital action, or the reduction of excitement. It tends to exhaust the sensibility and irritability of the structures by the excessive demand and drain upon them for the time being. The result is, the fluids are repelled from the surface, and retreat to the inte-

* "Views upon the Statics of the Human Chest, Animal Heat, and Determination of Blood to the Head." London: Longman and Co. 1843.

rior. They have only to be blockaded there—in life's citadels—by prolonging and intensifying the cold, in order to extinguish life altogether. Used, therefore, with a curative view, in the hands of the Water-Doctor, this effect is permitted only to be very *temporary*, or if prolonged, so graduated *as to be followed by a more normal condition* and *slower* reaction.

12. The *secondary* and *enduring* effect of the abstraction of heat (when confined to moderate limits, as in the daily water-cure operations), is *stimulant*, an augmentation of organic action, of the *sensibility* and *irritability* of the vital structures. *The necessity of replacing the lost heat calls the blood vigorously to the exposed surface, and augments the capillary actions thereof*, requiring every vessel, and every particle of blood, to be in full activity, doing duty. These phenomena are more vaguely expressed by saying the vital powers react, and send the repelled blood back to the surface. This is the fact. The stimulus of the cold applied in such cases by the temporary *toning up* or *tension* of the nervous system produce, is an element that cannot be left out here. The refreshing feelings and electric thrill thus sent through the system summons up all the energies of the ganglionic system and of the heart, however languid but an instant before. This is an instinct of the economy summoning it to meet the call on its powers, and make an effort. Hence, between the augmented impulses of the heart and vessels, and the intensified chemical actions taking place on the surface invaded by the cold, there is wherewithal instantly got up for stout resistance. The whole science and skill of the Water-Doctor consist in taking due advantage of these conservative efforts of nature.

13. The *primary* effect of the covering up of a part, the prevention of the escape of its heat (or, what is equivalent, the *proper application of heat*), is to determine and retain the blood in the part covered up. But this effect is only for a comparatively brief and definite time. If this covering be continued and prolonged, or become the habitual state of the part, then the primary effect gives place to one entirely opposite. The *secondary* and *enduring* effect, therefore, of the retention of heat *is to diminish the activity of the circulation in the covered part*. The daily facts that attest this effect are too common to need comment. Those persons

who *muffle up most*, or live in hot rooms, are the *chilliest subjects*. The capillary circulation of their surface is almost null. Little demand for heat is there set up, and there is, therefore, but a scanty elaboration. The capillaries are idle, and might be empty. The *paleness* of the *covered up* parts of the body, and the *redness* of the *exposed* parts, indicate in the one case the *defective*, and in the other case the excessive circulation that is going on on the surface. On a frosty day, the air is abstracting immense quantities of caloric from the exposed face. The excessive capillary activity, the rapid change of corporeal particles, at the expense of which the heat is there still kept up to the standard of the body, is sufficiently shown in the rubicund face, more especially if such a person comes into a warm room, or sits down before a fire, then the blazing of his countenance attracts the notice of all; for now there is no cold to draw off the rapidly evolving heat, its outgoing is stopped, and *this effect continues till the capillary activity subsides.*

14. These facts have very important practical applications to be developed, more particularly in treating of the respective processes of the water-cure.

15. The *rationale* of the water-cure processes resolves itself mainly into these two elements:—First, *the effects of heat abstracted from the body by cooling it in various ways and degrees.* Secondly, *the effects of the accumulation of the heat of the body by covering up with non-conductors, or by its direct application from without.*

16. A derivative action towards the skin, therefore, which can only take place by a change in the interior organs, by the relief of congested viscera, by arresting morbid action and allaying irritation,—is one great aim sought by every process of the water-cure.

The same is the aim, or should be, of the practitioner of every school, but an aim very inadequately accomplished, and very often counteracted by the masses of heterogeneous drug-remedies, in which those who have had *most experience* of them, and the greatest discernment, possess *least faith.* Nevertheless, I repeat again, they contain valuable resources in many interesting cases, even during the progress of water-cure treatment; but particularly where hydropathy is not admissible, or where the time for its application has passed away.

CONVERSATION VII.—*Rapid change of structure—Reaction—Derivation and revulsion—Stimulation and revulsion.*

P.—THE scientific views you have just explained seem to me sound and unexceptional, as well as clear in their application to the matter in hand. They violate no dictate of my common sense. On the contrary, they carry with them the full sanctions of my reason, and the more especially as you have divested the subject of all technicalities.

I am now prepared, I trust, to hear with understanding and profit your elucidation of the details and instruments of water-cure practice, their specific local action, and the general constitutional changes they produce. On these points I am anxious for special information, as well as to have some precise *rules* laid down for the safe and effective administration of the water-remedies.

DR.—The science of the water-processes, as you will perceive, is narrowed to the smallest point.

As disease is *one*, essentially, in its ultimate nature and material conditions, so the water-cure is specifically *one* remedy—the various processes are but so many modifications of one appliance—of one grand curative agency. This is the true light in which the water-cure must be viewed.

The efficacy of the water-cure processes, or indeed of any external appliance of water *below the temperature of the body* is comprised, as you will now understand well, in a threefold action: the abstraction of heat, its rapid reproduction, the active determination of blood to the chilled surface, and the intensified or quickened chemical and vital changes thereupon ensuing, by which a uniform temperature in all parts of the body is kept up. The entire series of these actions produces a powerful *revulsion* (or determination of fluids) to the surface from the more deeply-seated parts and remoter organs.

P.—By this, then, clearly appears the scientific suitability of the water-cure as the natural remedy of diseased action, seeing that the characteristic condition of disease, chronic or acute, is congestion or abnormal vascular accumulation in the affected structures or viscera. No logical consequence, I think, can be clearer than that.

DR.—True, most unquestionably. The reasonable and clear idea and definition of the water-cure processes is, that *they are graduated and systematic modes of abstracting, ac-*

cumulating, or adding to the heat of the body so as to produce reaction, derivation, or determination of the blood to any amount, in any given direction or locality.

The benefits of this derivative action or revulsion are, first, the production of great activity of the capillary circulation of the surface of the body from the interior, and by its relief, thereby equalising the flow of blood throughout the body, transferring it from tissues where it is *plus* to tissues where it is *minus;* in this way operating the disgorgement of those visceral obstructions that lie at the foundation of all disease, and thus improving the *nutrition*. In the second place, the promotion of a more rapid and perfect change of matter, whereby diseased structure is *disintegrated*, abnormal particles, fluids, and secretions removed, and new tissues of *healthier materials* substituted, and thus, bit by bit, the whole corporeal fabric is renovated and rebuilt. This is effected by the quickening of the chemico-vital function of the capillaries in order to liberate heat, to generate tissues, and to compensate for those abstracted. Liebig says that in water-curing the body is nearly re-made, in an incredibly short time, with new and healthy materials.

Put the thing in this light, and you will at once have an adequate idea of the immense abstraction and reproduction of caloric that often takes place in a water-cure process. A patient will remain in the shallow-bath or in a sitz-bath, *without materially diminishing the heat of his body*, for a length of time that would have sufficed to cool down to the centre a solid metal statue red hot.

P.—That is a clear view of the matter. By the laws of physics both should have parted with equal amounts of caloric to the surrounding media, and that the living body made up what it lost in this way, is the strongest proof of the activity of the vital processes that must have been called forth to sustain this compensating action.

Dr.—I think now you sufficiently grasp a leading feature and characteristic action of the water-cure processes.

P.—Yes, I hope so. Their *derivative effect* is the great action of the hydropathic operations. In this way *they are artistic modes of cooling and heating the body to obtain certain specific ends; the change of tissues from diseased to healthy; the dispersion of abnormal accumulations of blood in organs, and especially the permanent increase of the circulation and functions of the surface of the body, the best guarantee for the soundness of the interior.*

DR.—You have it; place it, therefore, where your memory will retain it. Never forget that the object of many of these processes *in theory*, and their actual effect *in practice*, is the vigorous determination of blood to the surface of the body, so the relief of loaded parts (visceral irritation) within. The softener the body will safely endure this operation, the speedier will be the reduction of disease. The skill and acumen of the practitioner consists precisely in determining this point, and what *modifications* of the processes will best effect it.

P.—I believe I quite understand that too. For as you have so often shown, as it is the body alone that must right itself when deranged, *its capabilities must necessarily be the limit and measure of your curative efforts?*

DR.—You judge the matter accurately. The perfection of the water-cure administration, for example, in chronic disease, lies in this, viz., *so* regulating the *dose* of the treatment, that REACTION shall be ensured *invariably*, and therefore the risk and abuse of cold bathing avoided. In the power of adapting the water-cure appliances to all degrees and kinds of corporeal stamina, lies its availability for most cases and for every constitution. The degree of abstraction of heat is suited to each individual's capability of replacing that heat. The weak have a weak dose, and as their strength increases so does the amount of their treatment. The lowness of the reactive powers, the slowness with which heat is reproduced, is, *cæteris paribus*, a measure of the extent to which the body is maladive, and of the intensity of the visceral congestions in any given case. Of course, the water-cure procedure to be prudent, safe, and effective, must be in many cases by very gradual steps. The scientific practitioner, gifted with tact and quick perception, finds better means than excessive medication, which he avoids.

P.—I suppose, then, that the test of corporeal stamina and endurance is to be found in the manner in which the body responds to the abstraction of heat?

DR.—It is a valuable test.

P.—But what are the conditions necessary to the safe abstraction of heat?

DR.—It may be laid down as the fundamental rule for REACTION *that the circulation on the surface of the body be augmented before* or *at the time* the abstraction of heat is effected, *if in any way called for*. With this view various modes are resorted to. First, the accumulation of the bodily

heat by wrapping up in non-conductors as blankets, to the point of sweating or short of it. By *packing in the wet sheet*, which we shall presently see affects a gentle gradual abstraction of heat from the body; for the sheet always remains five or six degrees below the animal temperature. The efforts of the system to make up this abstraction of heat necessarily create an *additional* movement of the fluids towards the surface of the body. By the wet-*sheet rubbing*, which powerfully tends to augment the cutaneous circulation at the very moment that heat is being abstracted. An active state of the superficial circulation is effected by means of the lamp-bath, by the vapour bath, and simply by the warm-bath. Lastly, the same result is obtained by active exercise, or by the bath attendant applying friction. In any of these ways corporeal heat is accumulated or augmented, if necessary, before the patient is submitted to a process that abstracts it. All this, I speak with reference to *chronic disease*, and simply by way of general illustration of our practical principles and procedure, which in our next conversation I shall enter on without further preface. In the meantime, as we are upon preliminaries, I shall settle any more general points you may have to propose before concluding the present conversation.

P.—Well, having obtained *reaction*, by the scientific abstraction of heat, how do you maintain it?

Dr.—That is a point of infinite consequence. It is best maintained by exercise for some time afterwards. When that is not possible, then cover well up in bed, or keep in a warm room, and let the servant apply rubbing freely.

P.—What do you make of the distinction of the processes into sedative and stimulant?

Dr.—Whether they are to be sedative or stimulant in their action depends on the dose, time, and mode of any given process. Any arrangement, therefore, founded on their innately sedative or stimulant action is fallacious, because each is in itself either sedative or stimulant according as its administration is managed.

The essential, and most important action of every water-cure process is *derivative* or *revulsive*, that is, the determination of the fluids from the interior to the surface, from the centre to the extremities. Bear this fundamental principle always in your mind—*a moderate* and *temporary* derivation is *stimulant*; an *excessive* and *prolonged* derivation is *sedative*. Of course these states are relative to the *constitutional*

capabilities, and the latter must ever be the guide of the practitioner, and the *measure* of his *dose*, in administering his remedies. That which would be powerfully sedative to a weakly person, would be strongly stimulant to a robust frame.

P.—These explanations now place for the first time the whole reasonableness of the hydropathic processes in a clear point of view to my mind. In conclusion, what do you say of the shock produced by the sudden contact of cold water with the surface of the body? what element does that constitute in the curative results accomplished by the hydropathic processes?

Dr.—The production of the stimulus of shock, as you understand the word, is not by any means a necessary element in the water-cure, although it is often desirable. The judicious practitioner will use it sparingly.

Shock is a strong excitation of the nervous centres, animal and organic, propagated from the nervous extremities. Of course, it is only admissible in a potent form, in cases where those nervous centres are free from structural alterations, or any active functional excitement. At the same time remember that there are modifications of *shock* from sprinkling the face to the shower-bath, plunge, and douche-bath.

P.—Thanks; enough for one day's conversation. You have given me materials of thought for some time to come. Now that I am clearly indoctrinated in the general mode of action of the processes, the details of each individually will have peculiar interest.

THE SHALLOW-BATH.

Conversation VIII.—*Refreshing and invigorating—Tonic—Its power, convenience, and infinite adaptability—The warm or tepid bath cooled down—Rubbing in the bath.*

Dr.—On the processional method which teaches us to ascend through the *simple* to the *complex*, I shall begin with the familiar wash-down, or ablution, in the shallow-bath, or half-bath; the mildest, easiest, best, and most convenient of general bathing operations. Yet is it a powerful modifier of the condition of the skin. Seated in this bath, with the legs extended, or sitting like a Turk, the patient is well

washed and rubbed by the bath attendant, and himself assists. It is the most useful bath in the water-cure as general ablution. It is used at *various temperatures* according to circumstances. It has the advantage of being *at the bedside*, and being made to answer, with buckets, all the purposes of a plunge bath, if necessary, without any of the risk and inconvenience that frequently, and in many cases, attend the latter.

P.—This is clearly *tonic* and *refreshing*, and may be made a strongly stimulant or sedative process; the latter, as I have heard you say, by long continuance, with friction steadily kept up by one or two bath attendants.

Dr.—It is usually made to be tonic and refreshing, as you mention; because the abstraction of heat, although great, is but temporary; thereby insuring vigorous reaction, and a rush of blood (as before explained, and as you now well comprehend), to compensate the effects of the chill, and to make up the caloric abstracted, by augmented circulation and quickened chemical actions. The shallow-bath is strongly stimulant by reason of the vivid thrilling impression made on the immense vasculo-nervous web of the skin, all trembling now with vitality and sensitiveness, however dull or dead but an instant before.

The shallow or half-bath I might designate as the initiatory process for every patient, as well as the complement and finish of other important hydropathic appliances.

P.—But do you not think it an objection to this process, that from the position of the patient it unduly cools the feet, legs, and hips, more than the upper part of the person?

Dr.—On the contrary, in the majority of cases, in that derivative action on the lower and remoter parts of the body, at the expense of the higher and the central parts—as the head, chest, stomach, and liver—supplying blood thus from where it is in excess, to where it is in defect, in the general tendency to recal and fix blood on the surface; in this equalising of the circulation, in short, lies *one* of the peculiar advantages and efficacy of the shallow-bath.

P.—I had not reflected, but I now understand. The application of the principle you have laid down throws out now to my mind, in strong relief, the action of the bath. The increased abstraction of heat from the submerged parts gives them an advantage, and determines thither an increased impulse and activity of the circulation to replace the heat abstracted.

DR.—Just so, by the strong revulsion and flow of the fluids towards the surface and extremities, all the grand vital viscera, the brain, the lungs, the heart, the stomach and its complex connected apparatus, the uterus and its annexes, &c., are solicited to give up any superfluous blood they hold, and to make an effort to change their morbid and defective action.

P.—And as a sort of stagnation or congestive condition of one or other of these organs, as you have explained, exists as a predominant characteristic in most diseases, whether chronic or acute, I infer how great, indeed I should say how *general*, must be the applicability of so powerful a revulsive agent, and one, in good hands, so safe to wield, and so *easy to dose and regulate*, by TIME AND TEMPERATURE.

DR.—Moreover, the active determination towards so large a portion of the surface and extremities is not instantaneous or transient, but continues for long after the patient has left the bath, and is further promoted by the steady and active rubbing of the expert bath attendant, with the sheet and towels in drying, and by the active exercise that follows. There is also a remote reaction, as well as an immediate reaction, which I shall have occasion shortly to explain to you.

P.—I plainly perceive that in the way you describe, all possibility of chill is prevented. I should suppose such a bath to be very excellent for a healthy person to take regularly on getting out of bed in the morning.

DR.—It is first rate. I know nothing equal to it; and I enjoin it and the walk, on all my patients, on leaving me, as one of the means of *keeping in condition*, and of retaining undiminished the regained blessing of health.

P.—In what cases do you especially prescribe the shallow-bath?

DR.—It is almost universal usage after the packing and the sweating processes. After both operations it constringes and braces the relaxed fibres and capillaries of the soaked skin; it rouses the pulse, somewhat depressed by the wet sheet; it cools the body, lowers and steadies the pulse, and quiets the excitement produced by the lamp or vapour-bath, or blanket packing. In either case, it is *a potent refresher and equalizer of the circulation*, enhancing and confirming the derivative influence and the obvious flow of fluids to the surface, produced by the antecedent operations.

These measures have only to be *repeated appropriately*,

day after day, ultimately to effect an entire and permanen disgorgement of interior congestions; to restore, therefore functions imperfectly performed from defect of blood on th one hand, or from too much blood on the other.

P.—It is now to me the plainest thing possible, how, by these means, congestion of the viscera is relieved, and th circulation throughout the body equalised—so precisely even curiously, fitted are the means to the end, and s simple withal, and so within the reach of everybody almos at a few minutes' notice. I now perceive why you have s often repeated, and laid so much stress on the *fact* of you being able to REPEAT, with care, your water-cure remedies more or less modified, *for any length of time*, withou damage to the digestive organs, the blood, or the constitu tion. I now understand how the chronic inflammation o the mucous membrane of the stomach and congestion o the liver, which my physician in London told me I had were *not cured*. I remember my good doctor, who attende me with as much care and attention as if I had been hi only son, told me he dared not give me any more blue pill calomel, or alteratives in any shape—that I could not bea tonics, and that the six leeches applied once, and sometime twice a week, must be discontinued; that, in short, I mus go at once to a warm sea-side place, and trust to nature. did so, and was no better. His last solemn and repeate injunction was, "to keep away from doctors, and take n more medicine, as I valued my life." The latter injunc tion I religiously obeyed, until I came to you, and, thank to a *gentle course of water-cure treatment*, I am now so well that I should have forgotten all about medicines an mucous membranes, digestive organs or diseased livers, bu for your kind confabulations. I see clearly how the innc cent and simple water-cure processes, relieve irritatio and congestion of the viscera, and equalise the circulatio throughout the body; how also they prevent the crisp appl from decaying or becoming mealy, or as I have heard yo say, arrest degeneration of the tissues. It is, indeed, wonder to me that the "FACULTY" are so *backward* t *practise* and *inquire* into your methods, which are, as yo prove, in exact accordance with every dictate of physiology pathology, and sound therapeutics.

Hydropathy would indeed be a willing and able hanc maid to RATIONAL MEDICINE in their hands. I often pictur to myself how successful the water-cure processes would b

in private practice, when prescribed by the many eminent and clever doctors, who feel, and in secret deplore, how much they are at a loss for *real remedies*.

DR.—I perceive what you mean. Time will do wonders; even now, the tone of the best of the profession, is becoming more considerate towards the WATER-CURE. One of the most enlightened and accomplished physicians of the day, Dr. T. K. Chambers, in a recent work* of great utility, states—with moral courage to be admired—that when administered as it should be, it might be considered an *useful handmaid of* RATIONAL MEDICINE; and that, when based on physiology, its graduated doses are *entirely in accordance with the principles of rational medicine*. But there are obvious reasons why our profession is slow as a body to adopt innovations, however valuable, or to abandon old *routines* of practice however irrational. How could it be otherwise, with its present anomalous and prejudicial arrangements?

The ill-fated alliance of remedial art and *exclusive drug medication*, must first be broken off, before RATIONAL MEDICINE can be permitted to take the place of EMPIRICAL PRACTICE; and *science* must be emancipated from its *fatal* subserviency to the sale of drugs, before Hydropathy can hope to be received with consideration or open friendship. But this I will not discuss further. In dilating on the *peculiarities* of my own profession, it would most probably lead to my directing your attention to those of *other professions* also. I might ask your private opinion of the cheating and vexing processes inflicted in a Christian country on poor mortals, by ordinary law proceedings, or call your attention to the godless perversions and abuses of *Chancery* that exist in full force in the nineteenth century of Christianity. I think our profession, be it what it may, would come out the more *strong* and *radiant*, the more you persisted in trying its merits or demerits by such comparisons. I hope that will suffice you for the present.

P.—Quite so. Well, to our text. As the intensity of all diseases, you have said, is in relation to the extent and duration of this sanguineous excess in internal structures, I suppose that the length of cure will be entirely proportioned to the time it takes to produce their disgorgement;

* *Digestion and Its Derangements. The principles of rational medicine applied to disorders of the Alimentary Canal.* London: Churchill.

and I should also infer the difficulty of cure to be precisely in the ratio of the *fixity* of the blood in the affected tissues, and of the *alterations of structure* thereby and therein produced.

DR.—It is precisely so. Your premises and your conclusion are both perfectly correct.

P.—Is the use of the shallow-bath materially modified by the sweating process, as compared with the wet-sheet packing?

DR.—It is. The patient, as a general rule, may remain in it longer, for the reason that he both needs, and can bear more cooling. In this way, reaction, or the sanguineous flow to the surface, is more actively promoted, visceral congestions solved, morbid secretions and retained morbid materials eliminated, the nervous centres strengthened, and the general circulation more permanently equalised.

P.—I think I have heard it said, that appropriate rubbing in the shallow-bath, tepid, chilled, or cold, in cases of severe accident, shocks, and apoplexies, often recovers those apparently dead or dying.

DR.—It does. It is invaluable. But then it requires to be done well by active assistants, and directed by a competent practitioner. This is a most important remedial measure, which I will explain to you apart elsewhere.

P.—What regulations do you propose regarding the use of the shallow-bath?

DR.—These are few, brief, and simple, it being understood that the shallow or half-bath is the standard process that concludes all operations of packing and sweating.

I. The water of the bath may vary from six to fourteen inches deep, or more; its temperature from 45° to 85°—at an average 60° of Fahr. The duration in the bath may be from one to seven minutes, according as the reactive powers are weak or strong; and according to the amount of cooling the patient finds necessary or agreeable, if the sweating process has preceded. It is sometimes needful to commence the bath warm or tepid, and cool it down to the desired coldness; or *two* shallow-baths may be used side by side—one *warm* and the other *cold*.

II. For the sake of exercise and the purposes of reaction the patient, if able, should engage diligently in rubbing and washing. The limbs, chest, stomach, and bowels should be well rubbed for him with a towel if he cannot do it himself. In any case, the bath attendant to rub thoroughly the back

loins, hips, sides, and legs; and occasionally the patient should wash or sponge the head and face. On coming out of the bath the patient to be enveloped in a large dry sheet, and well rubbed and dried. He ought to dress quickly, to dispense with the cares of the toilet, and hasten to his prescribed exercise; taking care that *the exposed hair is well dried*, otherwise before he is better, he may take cold.

III.—If a patient *cannot* take exercise after the shallow-bath, it will be the safest plan, and best keep up the reaction, for him to go to bed for a time, to be well covered up and rubbed well all over with hair gloves, or the hand covered with a worsted sock. At all events, he must keep in a warm room, if the weather be cold; or he may take arm exercise, if he is prevented taking foot exercise. But exercise in some shape is of consequence, if the full benefits of the process are to be realized.

IV. The shallow-bath, *tepid and cooled down*, may often be substituted for the sitz-bath, or the douche or the wet-sheet rubbing, as a cooler, bracer, refresher, and cleanser of the skin on coming in *heated* from exercise, but not when perspiring profusely, or more particularly when in a state of *fatigue* or *exhaustion*. In such cases my advice is to rest quietly and cool gradually, rather adding to than diminishing the clothing, till the equilibrium of the system is restored. I then order, as preliminary to any bath, a few minutes' rubbing with a dry sheet, the patient and bath attendant assisting. This ensures a glow and feeling of warmth. You will perceive that by these rational and common-sense precautions the full benefit of my operation is ensured, without incurring risk.

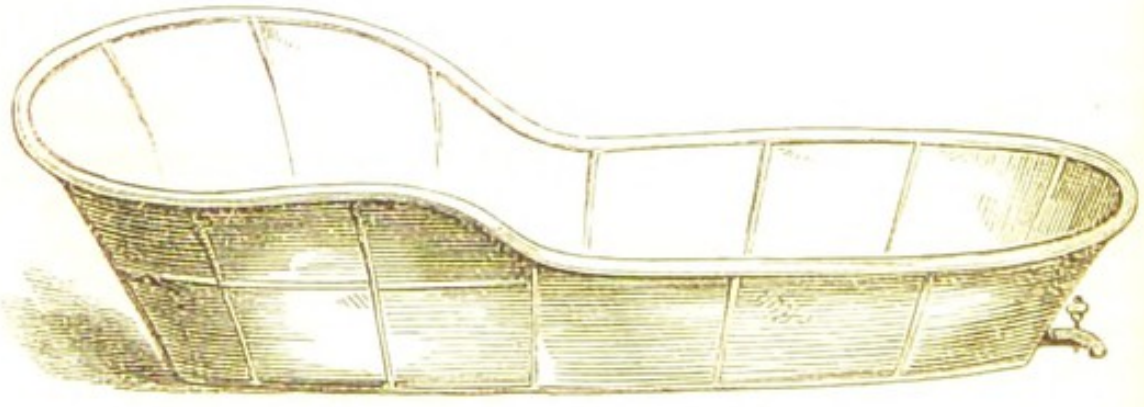
P.—I do perceive the benefit and mutual advantage of *practical* as well as theoretical teaching, and that they should go hand in hand. I find you frequently mention the *warm and tepid bath cooled down*.

DR.—It is a safe and luxurious mode of taking a bath, in some cases a necessary modification, and highly beneficial. It is of the greatest use in initiating delicate and nervous persons to cold bathing. In the treatment of children it is of great utility. It was but the other day that I had a physician here, very prejudiced against THE CURE; of pallid complexion, rather bloodless, and in below-par condition. "What could be done in such a case as his?" said he, "where cold water always produced disagreeable effects?" I persuaded him to try a warm-bath, accompanied by the

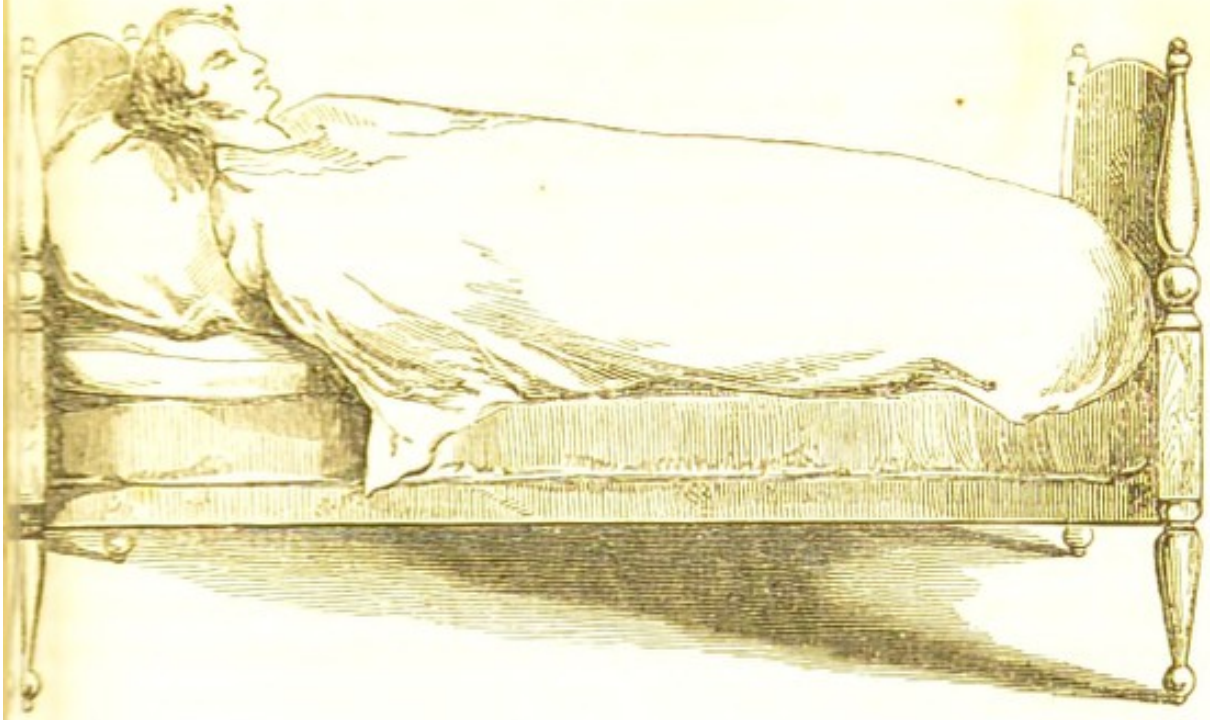
necessary performance of rubbing, &c., and then to add cold water, at two or three intervals, sufficient to cool the bath down to the natural temperature; the rubbing repeated in the intervals. When done, he expressed himself much pleased with the operation, and said he had no idea of such an agreeable modification of bathing. Had he produced a *gentle* perspiration with the lamp, before going into the warm shallow-bath cooled down, perhaps the word "*perfection!*" would have escaped his lips.

P.—I dare say now, your learned friend knew how to *mix* all the drugs in the "Pharmacopœia," their history, the numerous preparations they enter into, and their chemical decompositions—*most* of which were surely invented for man's sins, and the detriment of his memory and mucous membranes. But the *mixing* of hot and cold water, to *rouse the dormant energies of the skin*, to *soothe its sentient surface*, to *refresh the nervous centres*, and to *improve the circulation of the blood*, I will venture to say, without prejudice, never once entered the mind of your *orthodox* medical friend; a mind no doubt so profoundly burthened with heavy mildewed stores of antique medical lore, so crammed with fastidious forms, and the innumerable pharmaceutical formulæ for meddling medicinal ministration, as to leave vacant neither nook nor cranny, where NATURE—long deserted dame—might still vainly hope, with *all* her benign solicitations, to find a fitting seat or resting place for her fairest and favourite daughters, her pride and joy—true SCIENCE and SIMPLICITY.

DR.—O patient, true disciple of water-cure treatment, you are sententious. Now go and restore your patience—calm your combativeness—and sooth your nervous centres—with a packing and shallow bath.



THE SHALLOW-BATH.



THE PACKING, OR LINEN BODY-POULTICE.

CONVERSATION IX.—*A great discovery as an antiphlogistic—The degree of heat abstracted by the sheet fixed—Its soothing effects on the brain and nervous system—When the heat is equalized, forming a great body poultice—Softens the skin and promotes exhalation—Allays febrile excitement, and is followed by tranquillizing sleep—Fulfils many important indications in the treatment of chronic disease—Evidences of its power on the skin, in drawing out morbid matters—Mode of using it in fever—Rules.*

P.—I BELIEVE you water-doctors consider this soft mollifying application, the packing in a wrung sheet, one of the finest discoveries used in the water-cure?

DR.—Very true. The application of this linen body-poultice was a great discovery; whether we look at it in its admirable effects, or the extensive range of diseased states in which it may be applied with benefit, it may be truly called a most valuable resource of curative art. But, like every other important remedy, it requires to be prescribed with some nicety and discrimination.

It is as an *antiphlogistic*, or means of subduing fever in its hot stage, and active inflammations—that it stands unrivalled, being *unequalled in its simplicity, safety*, and *effi-*

cacy. It is an invaluable remedy in all diseases characterised by accelerated pulse, and dry, burning skin. Here it is certainly the noblest arm of the water-cure. It causes no loss of strength, and leaves behind it none of the debility which bleeding and strong medicines unavoidably occasion. It always *ensures*, therefore, a *quick convalescence*. It is a remedy also easy to manage. In appropriate cases the most inexperienced person can hardly go wrong in its application, provided he adhere strictly to the few rules I have laid down for his guidance.

In the next, or succeeding generations, it will be in general use, and one of the most popular remedies with all patients and medical practitioners, without distinction of sect.

P.—Having had such a fair trial here and on the continent, for so many years, I suppose it is now frequently prescribed by the *leading* medical men, in private and hospital practice.

Dr.—I believe not—*tout au contraire*.

P.—You astonish me; you surely must be mistaken. It is difficult to believe that a *liberal, learned, enlightened, philosophic*, and *philanthropic* profession like yours—ever seeking new remedies, and on the alert to seize any rational or approved remedy, that might alleviate the physical sufferings of man—have not long ago appropriated this simple one, whose great efficacy has already been proved on many *thousands* of invalids; I say again, surely you are mistaken; I must revert to this another time. Having read Broussais' admirable work, "*De L'Irritation et de la Folie*," by your kind persuasion, I imagine that this *antiphlogistic* and *febrifuge process* of the water cure, the sheet packing, would have been a powerful auxiliary in his hands. I fancy it would have saved much leeching and other modes of depletion, carried too far by many of his followers.

Dr.—If the "immortal Broussais," as the justly celebrated Dr Stokes (one of the first physicians of our day) calls him, in his Lectures, had known this invaluable remedy, *he* would not have stopped at that. The great Broussais would have thrown the whole of his immense physiological and practical knowledge into a system, whose theoretical and practical excellence would *at once* have been recognized by his original and fertile genius—nor would the simple and beneficent water-cure have appealed in vain to a soul *so honest and uncompromising*, or to an understanding *so large and unfettered*.

P.—It is clear enough, that however one might differ on many points of theory or practice, with this great medical philosopher, practitioner, and teacher, still *all* must acknowledge that he was a generous, liberal, and disinterested man, whose long and laborious life was without guile, and devoted to science and humanity.

The celebrated Dr. Currie, I have read, applied cold *affusions* with great success in certain forms of fever?

Dr.—He did, but the *sheet packing* was a much greater improvement on the *affusions* than they were on the ordinary antiphlogistics.*

P.—In what does the superiority of the packing process consist?

Dr.—First, in that, while it as effectually abstracts the morbid heat of the system, and reduces the excited nervous and vascular actions, *producing all the coolness and calm possible and necessary for the moment*, yet, by the very nature of the process, *the* DEGREE *of abstraction of heat is* FIXED. It cannot go beyond a certain point—*the heat necessary to warm the sheet*. In this there is every guarantee that the case admits of, that the vital powers shall not be unduly lowered, that an excessive amount of heat shall not be abstracted. This guarantee is presented in the shape of coverings of *dry* non-conducting materials (*blankets* and *down coverlets*), which prevent all escape and extrication of animal heat beyond what is first necessary to equalize the sheet with the temperature of the body

The second point wherein packing claims superiority over affusions consists in this, viz., *the soothing effect on the immense sentient surface*, or nervous web *of the skin*, by soaking of its tissues and the prolonged contact of the wet linen, the heat of the body converting its water into *vapour*, and constituting the sheet in fact *a great poultice*.

* It would appear that "there is nothing new under the sun." A general officer, who had been many years in India, told me that "when he first went there he heard of a case of fever (that had been despaired of) cured by a native practitioner. The night-dress of the patient, as he lay, was freely sponged all over with *cold water;* he was then covered with additional blankets. This operation was frequently repeated during the day. A napkin was placed round the head and treated in the same manner. A calm and refreshing sleep soon followed, and during the night the patient sweated profusely. The next day he was able to converse, and considered out of danger." This rude attempt at the sheet packing occurred above fifty years ago.

Again, the certain induction by the wet-sheet packing *of that moist state of the skin, which is the first condition of exhalation through membranes*, and thereby the promotion of those chemico-vital acts dependent on this exhalation. The skin and lungs are, as I explain to you in my physiological conversations, great agents in the motion and distribution of the fluids. This cutaneous evaporation is one of the aims for the practitioner to accomplish when he seeks to equalize the circulation, to determine the fluids of the interior to the surface. He acts upon the LAW that liquids move towards membranes through which evaporation takes place.

P.—I see. Here then is *one* of the sources and secrets of the sovereign virtue of the wet-sheet packing.

DR.—You are right. It facilitates and augments *exhalation* (*not perspiration*) at the time, and afterwards by the improved condition; for remember, that wherever cutaneous transpiration is *repressed*, the fluids of course cannot come freely to the surface. They therefore tend to retire inwardly, to accumulate in, or congest, the interior viscera. How powerfully, then, this *unbound function* of the skin produces *revulsion* from loaded interior viscera to the exterior, needs not a further word of comment.*

P.—These are all, I admit, very important points of difference between the refrigerating plan of Priessnitz and Currie. This development at the same time makes clear to me the elements of the action of the wet sheet; in other words, its *modus operandi*. You will admit that the first impression of the wet-sheet envelope, the feeling of cold from the sudden abstraction of heat from the entire surface, is anything but pleasant?

DR.—Pardon me, if I in a great measure differ with you. In cases of febrile excitement, and after a few repetitions in many chronic cases, it is highly pleasant. It is a sensation of great relief, of exquisite comfort. It sometimes brings calm and soothing to nervous agitation, that had resisted everything else. Very often the patient is no sooner in the

* The patient *does not*, nor is it intended that he should perspire in the sheet packing. When this is mentioned, as the object of the process, it may be received as a sure token, that the speaker knows very little or nothing of the practice of the water-cure. It *prevents* perspiration for the time, but induces and is followed by that condition of body, which permits and makes easy a natural or critical perspiration, when desirable to relieve, or to bring diseased action to an end.

sheet than he sinks into a profound sleep. Notwithstanding all this showing *per contra*, I am quite free to admit that, with some patients labouring under chronic disease, the *first* impression is not so pleasant. But after all, this uncomfortable feeling is transitory, and soon gives place to *reaction*, to agreeable warmth, and feelings of solace and composure. Hear what Sir Edward Bulwer Lytton says of the wet-sheet packing:*—

"I have found in conversation so much misapprehension of this very easy and very luxurious remedy, that I may be pardoned for re-explaining what has been explained so often. It is not, as people persist in supposing, that patients are put into wet sheets and there left to shiver. The sheet, after being well saturated, is well wrung out—the patient quickly wrapped in it—several blankets bandaged round, and a down coverlet tucked over all; thus, especially where there is the least fever, the first momentary chill is promptly succeeded by a gradual and vivifying warmth, perfectly free from the irritation of dry heat—a delicious sense of ease is usually followed by a sleep more agreeable than anodyne ever produced. *It seems a positive cruelty to be taken out of this magic girdle in which pain is lulled, and fever cooled, and watchfulness lapped in slumber.*"

As a matter of course, the *reaction* is the greater, and begins the more speedily, the more the patient improves in health.

P.—So much for the dreaded wet-sheet packing, which has been so successfully held up *in terrorem*, and has prevented so many from availing themselves of the benefits of your admirable system of treatment. I conclude that Sir Edward, when he wrote so feelingly, had been long enough your patient to enable him to state his personal experience? It has often occurred to me, when thinking of the repetitions of the wet-sheet packing practised in the reduction of fever, to ask, "Why might not the body, in many cases, if not in all, be permanently cooled down; and fever or inflammation thus *at once* checked by a lengthened affusion, or continuance in cold water, or in many folds of wet sheets lightly covered, just as you would put out a fire, or cool anything too hot?"

Dr.—As a general rule and principle, that mode of procedure would be highly dangerous, nothing more so; and

* "Confessions of a Water Patient," by Sir E. Bulwer Lytton, Bart. H. W. Lamb, Royal Library, Malvern.

no scientific practitioner would ever dream of it. The risk, nay, the certainty, in most cases, would be of its abstracting too much heat, of lowering action beyond the power of reaction, at least of determining inward congestions as formidable to deal with as the original malady. The safer plan, and in the end the plan equally efficacious, is to renew the sheet as soon, and as often, as the morbid heat returns in full force. This is denoted by very unequivocal signs, as suffused or flushed face, throbbing temples, quickened respiration, general malaise, &c. By this renewal of the sheet, the morbid heat of the patient is continuously, but gently drawn off—and this without running any risks of suddenly chilling the body beyond its powers of reaction. Accordingly, we find, that when the reductive packings are finished, and the patient placed in bed, the relief from the process is most sensibly felt. The exhalation from the surface which has thus been promoted, and the brisk movement of the fluids to the skin thus determined, have evidently been to *unload visceral congestion, open obstructions, to equalize the circulation, and to tranquillize the nerves.* There only now requires a *spontaneous perspiration* for the perfect relief of nature, and for the solution of the disease. In the majority of cases, in due time, this is sure to follow.

P.—What are the objects of the wet-sheet packing in CHRONIC DISEASE?

DR.—It fulfils many indications, according to the varying phases of disease. If you revert to what I have said of the specific actions and effects of the packing process, you will see sufficient ground for our using the invaluable aid of the wet sheet in *chronic* maladies. We often want heat to be abstracted in these diseases. We want the nerves soothed, the circulation equalized, muscles rested, fatigue removed, a movement of the fluids to be determined to the surface, interior congestions to be disgorged, the equilibrium of the fluids established, secretions and exhalations to be promoted, ill-conditioned solids broken up and eliminated, the tissues of the skin to be soaked, *its capillaries to be emptied and cleansed*, its *sentient extremities to be soothed*, and, through them, the brain to be *quieted* on the one hand, and the ganglionic system to be *roused* on the other. In this way the condition of the body is variously modified by the wet-sheet packing, and the whole system *prepared to react* under the shallow-bath, wet-sheet rubbing, or towel-rubbing, which concludes, invariably, the operation of packing.

P.—What is the object of the shallow-bath at the conclusion of the packing processes?

Dr.—It is to restore the normal action of the heart and vessels, to counteract its lowering tendency, to tonify the relaxed skin, and brace the nervous system. However depressed the pulse may be, it rouses it effectually; however dormant the nervous energies, it awakens them unmistakably.

P.—When Priessnitz saw the effects of the *sheet packing*, in the first case of fever in which he tried it, I can easily imagine his exclaiming, like Archimedes, "Eureka!"

Dr.—I can easily understand such a feeling in a natural-born doctor like Priessnitz, on making such a discovery. For a long time he only used it in *acute* cases, its great value in chronic disease only gradually dawned upon him after years of extensive practice. I was intimate, at Graefenberg, with a Captain Raven, of the Prussian Guards, who had been one of Priessnitz's first patients, when there were only *four*,—instead of as many hundreds, which I found there,—and when the water-cure was in its infancy, *simple* and *rude*. This gentleman was cured of deafness, and a complication of ailments; he paid an annual visit to Graefenberg "to embrace Priessnitz," and he interested me much by detailing the gradual progress of the water-cure, and how the discovery of each process was brought about. In this there was much to instruct and interest, but it would take too much time to relate just now, and answer no practical purpose.

P.—You make no mention of the *depurative function* of the sheet packing, upon which I have heard some stress laid.

Dr.—The influence in question is much over-estimated. The argument for the depurative action of this packing, is founded on the law of the equable diffusion of the liquids through *porous* membranes, that, in short, there is an *interchange* between the water of the sheet and the serum of the blood.

Now, I both deny the validity of the application of the law in question, and the reality of the fact alleged. The skin, I contend, on the contrary, unless when *soaked* for some hours, or unless when the cuticle is *abraded*, is not an absorbing surface, that *its function* is *purely exhalant*, that it is not (unless when the cuticle is well macerated or abraded), one through which two liquids are miscible with

each other. This assertion I ground on the simple anatomy of the skin. The exterior covering of the body is protected by a very dense compact texture (the epidermis), composed of minute oily scales *overlapping* each other like the scales on fish, or tiles on a roof. Now these impervious scales, or tiles, the layers of the epidermis, *are easily raised by the pressure of fluids from within (that is, to admit their exit) but close against the entrance of matters from without. In fact, the pressure of fluids from without has only the effect of more closely sealing down this oily tiling.* Through such a membrane so protected, absorption takes place, as I have said, only by strong *friction*, or when it is thoroughly softened by hours of maceration, as we see in the hands of the washerwoman, or in the effects of a poultice. I do not affirm that absorption may *never* take place, but that absorption does not *usually* take place; hard friction, for example, will clear this scaly barrier. It is sufficient for me to assert the natural state of the cuticle. Now, the soaking of the wet sheet never, or very rarely, is carried to the point of rendering the cuticle permeable, at least, not appreciably so, or to an extent to have any influence in diluting or modifying the serum of the blood.

Admitting that the cuticle, at all times and in all spots, were really and thoroughly porous, still the interchange in question could never take place in ordinary packings, because one of the first precautions of the process is to wring the sheet nearly as dry as possible. The moistened texture of the cloth in that case can only part with vapour, which, in that case, penetrates the meshes of the blankets, and gives but little to the skin; so that, in point of philosophy and of fact, the supposition is untenable.

I am quite alive to the part played in the phenomena of living beings, by capillary imbibition, molecular attraction, endosmose, and exosmose, &c., but they afford not the slightest countenance to this view of the action of the wet-sheet packing.

P.—Still you will, perhaps, admit, that the wet sheet is a depurating process, although not in the way you have just examined?

Dr.—Unquestionably the wet sheet is a *depurator* in the sense that all the other agents of the *water-cure* are depurators, that is, by powerfully promoting an equable circulation, opening obstructed excretory organs, enhancing the waste

of matter, facilitating its elimination, and calling upon *every power* of the organism, to substitute *pure* fluids and solids for *impure* fluids and solids.

P.—I have been told by patients, that in certain cases, after some weeks of packing, the sheet, after having been lain in about an hour, has been found sometimes quite *slimy* and *fætid*, or of the *strangest colours*, like the rose colour we see in a shot-silk; sometimes yellow, and often stained in large patches, as if with lunar caustic. How do you explain these results? for I know that the sheet is well washed and wrung every day, and the patient is well purified by enjoying at least two general ablutions daily, as well as abundant rubbing with dry sheets and towels.

Dr.—The facts you state are correct, and the explanation is not far to seek. These matters, that at critical times appear in the sheets, are the evident elimination of a *materies morbi*, retained excretions, or corporeal wasted matter, &c. The alleged slime is simply the softened scarf skin, or epithelium, which has exuded, sometimes in incredible quantities. The skin of such patients, and they are the *rarer* cases, would *pro tem.*, I admit, be likely to absorb a *small portion* of the fluids of any bath they might be placed in. But in *a well wrung packing sheet*, there is, unfortunately for the theory I have been examining for you, no free water to be absorbed.

Apropos of the power of the sheet in extracting colouring and other matters, I forgot to mention that in a desperate case of jaundice I had to treat some time ago, the sheet, after an hour's packing, was found sufficiently saturated with bile to make the many gallons of water in the shallow-bath *yellow*. My good friend and patient, Dr. Horner, who, as you know, has been in practice above thirty years, declared to me, in expressing his surprise at seeing this, that he had never attended so intense a case of *jaundice*, one in which the yellow was so general, deep, and brilliant, and the patient so completely helpless and prostrated.

P.—Verily, "there are more things 'twixt heaven and earth than we dream of in our philosophy." Did the patient recover?

Dr.—I am happy to say he did. The packing, I should observe, was but a minor part of his treatment. He had been long in India, and had gone through the *Jungle*, and several other fevers, which had left him a living wreck. Many *bones* had come away, with *all* the palate, *decayed*

and softened by the mercury he had taken. His recovery from the jaundice, so complete and rapid, caused much congratulation and surprise in all his friends, who witnessed the severity of the case and its critical nature.

P.—This sheet packing seems so simple and manageable an operation, that it is a matter of no small surprise to me when you state that it has not become a common, *every day remedy* in the hands of medical men generally, at least in the treatment of *common fever*, or indeed any marked feverish states.

Dr.—Certainly it is much to be deplored that such a remedy should be only in the hands of a few water-doctors, for, after all, there are only some dozen of us in the United Kingdom; and hitherto we have had chiefly to contend with old and formidable *chronic* diseases. No doubt there are many who know its priceless value in fever, who *dare not* use it; they fear their neighbours, or rivals, whose ignorance may be real, or prejudices insurmountable, and who might denounce them in their circle, as dangerous practitioners, given to "foreign innovations and reckless experiments." Moreover, if the *wet-sheet packing*, which *many mothers* now use as a safe and unfailing *domestic remedy* in many of their children's ailments—should *prove as valuable* in *fever*, in *medical men's as in ladies' hands*, what might happen next? If there was a desire expressed, I would willingly go into any hospital in the kingdom, take my servants with me, and show the whole working of our system of treatment, on a sufficient number of patients to make it clear and *familiar* to all the medical officers.

P.—Some fine day I hope you will be invited.

Dr.—Then I will go.

I remember seeing in the "Provincial Medical Journal," a report of many cases of fever *treated successfully* with the wet-sheet packing, by Dr. Gill of Nottingham, an old college friend. But although the result in these cases was *highly satisfactory*, still it was evident the practitioner was not quite master of the processes. His practice was not complete. I believe this is the only instance of any public trial having been given to this remedy in fever.

P.—I understand you once treated yourself in this way when attacked with fever. I should like to know your personal experience in this important matter.

Dr.—I will tell you, and as briefly as possible. After having been, to all appearance, well and robust for some

time, I had a temporary ailment, called a crisis; in *a feverish state* I had gone early to bed, from which I was suddenly roused by cries that the house was on fire. I was at the time in the little town of Friwaldan, at the foot of Graefenberg, which was also on fire. The wind blew a gale, and the wooden roofs and houses carried on the fire like a field of reeds. The whole thing was so sudden, that I had to throw my things out of the window and hurry out also. After having been up all night, and wet through, assisting the other patients at the fire, the next day I found myself with intense headache, shiverings, and pain in the limbs. Before noon I went to bed, and *burning* fever soon set in. I commenced the packing at once, and had the first sheet well wrung, changed in little more than a quarter of an hour, the next in half an hour, in the next I remained for nearly an hour, and in the last for rather more than an hour. After this I had the shallow-bath at 80°, was well rubbed for about three minutes, cold water was then added to 60°, and the rubbing continued for three minutes more. I then went to bed, the *headache* being still *very severe*. I had committed a mistake, by having in the two first packings, too many blankets and a heavy down bed, which produced great oppression and too rapid a return of fever heat. It should also be mentioned that when this severe attack occurred, I had gained above a stone in weight, and a considerable amount of good blood; I was not so easily cooled down, as would have been the case six months previously, when in a very low condition, and suffering from intense derangement of the digestive organs, of long continuance. These remarks apply to the different kinds of fever. There is another great improvement in the treatment of such cases, which I wish to point out to you. I found that getting up each time to have the sheet changed was very disagreeable; this can be obviated by merely taking off all the coverings, opening the sheet, and laying a fresh piece of wrung linen over the whole front and sides of the patient, then replacing the sheet—which has now become cool by exposure—as before. This saves any disturbance of the patient, which is of very great consequence, as you will acknowledge, if ever you have a fever, or occasion to call in the aid of this *greatest of fever remedies*. In five hours the fever returned more intensely than ever, and I was glad to re-commence the packings. The next day I had still headache and fever, and repeated the packings.

early in the morning, at noon, and late in the evening, but not so often changed. The third morning the headache was gone, and two hours after a *double packing* at five in the morning, a gentle natural perspiration broke out, which was left undisturbed until noon, when a chilled bath was taken. In the evening I was able to sit in the air, languid, but free from all pain or fever. I had all but fasted the whole time, and now felt returning appetite.

I remember, at the end of a college session, being confined to bed, for above a month, with a similar attack of fever, and in no way more severe than the one I have just described. I was attended with unremitting kindness by one of the first physicians of the day—was leeched, blistered, and had my head shaved—I rose from bed a living skeleton, and had a *long convalescence*.

P.—Your account is encouraging and satisfactory; and certainly appears very simple, safe, and effective. I should imagine it would be very fine in all the feverish ailments of children?

Dr.—It is "*a real blessing*" for mothers and their innocents. I have treated my own children always with it, and with unfailing good results. In fact, with fomentations packings, compresses, and a little castor oil, my wife can do and has done *nearly all* the doctoring in all their ailments even in *convulsions* and *scarlet fever*, I have had really little trouble. In the *latter* she condescended to call me frequently in consultation, for my little girl was prostrate and labouring under the most severe form of the accompanying sore throat. I had treated my wife and another patient, with scarlet fever in the same way at Nice, in the midst of a raging and fatal epidemic. Personal experience you perceive, gives much confidence, but we are quite alive to real danger where it exists.

P.—I am now much satisfied with what you have told me thus far of the wet-sheet process, I shall now be glad to hear all the hints and directions you can afford me as to its proper practical administration.

Dr.—Well, I shall further add the following advices which you will study and observe, as the dictates of experience:—

I. Too much caution and discretion cannot be observed in the use of the wet-sheet packing. It should not be administered through mere *routine*, never without a specific and valid reason, drawn from an actual survey of all those

circumstances in the patient's case that demand it for the moment. The skin, the presence or absence of perspiration, the pulse, the respiration, the tongue, the digestive viscera, the heart, brain, and lungs, the temperature of the *feet* and legs—all must be interrogated to ascertain whether the measure is indicated, and what *dose* of it can be borne—how far it must be carried; as well as its known and expected effects anticipated and provided for.

II. It is of consequence that the operation of packing be well performed. Negligences in this matter may mar the effects of a beneficent measure. The sheet should be of linen or calico for the delicate, of coarse linen for the strong. After being dipped in cold, chilled, or tepid water, it is wrung out thoroughly, if for a case of chronic disease, but much less completely if for the reduction of febrile excitement. The ends of the sheet should not overlap the body in front more than six or eight inches, and no superfluous wet linen should be left about the feet. The blankets should be so adjusted and tucked in as hermetically to seal up the patient from all entrance of atmospheric air. The packing about the neck should be particularly attended to, as it is at this point generally that the chief imperfection exists, and air enters, when not done by persons perfectly *au fait*. It is well to guard this part by a shawl extra, tucked well in from the back of the head all round under the chin, or two blankets placed in a triangle next the sheet, the apex downwards. A smooth diaper or silk handkerchief laid outside of all, around the neck and chin, saves the skin of those who complain of being there fretted by the rough coverings. Four large thick blankets doubled, with a down coverlet over all, is the requirement for an ordinary packing in chronic disease. In some acute diseases, the down coverlet is dispensed with, and even a blanket or two less may suffice. Some restive patients who fidget much in the packing at first, find relief from having the arms free. This is often prescribed, as *the half packing*, the feet being also left out of the sheet. The patient may be packed in the semi-recumbent posture, with the head as high as he pleases; or he may lie on his side, if necessary. The blankets and other coverings may be made to approximate nicely to the person, but *not tight*; in this the comfort of the individual should be consulted.

III. In packing to reduce feverish excitement, the frequency of the renewal of the sheets is regulated by the in-

tensity of the symptoms. The patient remains in the packing only long enough to warm the sheet. The rule for the repetition of the sheets is *so long as the skin remains dry and hot*—say at first, every fifteen minutes, then every half hour, then at longer intervals, and with better-wrung sheets, thus prolonging the duration of the packing as the morbid heat yields, and as the patient feels soothed and comforted by it, or finding it more and more *a soothing body-poultice*. When the febrile symptoms are effectually subdued, the patient remains for a considerable time in the last sheet, an hour at least, before being put in the shallow-bath, which *concludes* the series of the operations. The temperature of the bath may vary from 60° to 85°, and its duration, from two to ten minutes, cold water being added by degrees, as indicated or ordered; acting on the rule that *the lower the temperature the shorter the bath*. The patient is then well dried and put to bed. It is of great importance to change into a fresh bed, if possible; at all events, to renew the body and bed linen and blankets—to maintain the patient in *perfect quietude*, and the chamber in perfect ventilation, and always a good *fire* in it, if the weather be cold and damp. All that now remains for the perfect relief of nature is a spontaneous perspiration. *This generally ensues*. If it does not, and should the feverish heat and other inflammatory symptoms re-commence and increase, then the packings must be resumed.

IV. With regard to the use of the shallow-bath, after the reduction of febrile excitement, there is this caution to give, that should perspiration ensue during the last change of sheet, this must be respected as Nature's CRISIS, *and on no account must this salutary drain be interfered with, either by renewed packings or by the shallow-bath*. It must have free course for many hours, half a day, or even longer—in fact, till the patient begins to get weak under it, or till it diminishes or ceases altogether. If, for any reason (as for the relief of the bowels or bladder), it be necessary to disturb the patient before the perspiration has ceased, all risks of chill or exposure must be carefully avoided. The *necessary* conveniences may be introduced without uncovering the patient. Otherwise if he be obliged to leave his envelopments, there is no alternative but that he must have the shallow-bath, but always, in such a case, *comfortably warm* and gradually *cooled down*.

V. The wet-sheet packing being the *sedative* and *anti-*

phlogistic par excellence, it is an indispensable and invaluable remedy in the *active* or *incipient* stage of all acute diseases, fevers, inflammations, &c. The febrile symptoms may be those accompanying inflammations of the stomach, lungs, or brain, &c., the fever of acute rheumatism or of small-pox. Measles, scarlatina, or it may be fever without any *appreciable* local lesion (idiopathic). The wet-sheet packing, managed and restricted as I have described, is not only a *safe* process, but the best ever discovered, *wherever the pulse is decidedly above the natural standard and the skin dry and burning*.

VI. *The wet-sheet packing is improper in fever, when the pulse is feeble or slow: when the skin is cold, or bathed in clammy perspiration; or when the signs of great debility are present.*

VII. An ablution for two or three minutes in the tepid, chilled or cold shallow-bath, or the wet sheet, or towel rubbing, is an indispensable sequel of the wet-sheet packing in chronic as well as in acute diseases.

VIII If, in the packing, symptoms of oppression of the head occur, which is sometimes the case on the return of the morbid heat, or when perspiration is about to show itself, it is sometimes requisite to apply wet compresses to the head. To avoid, however, all risk, even in this shape of interference with any critical effort of nature, the compress must be more *thoroughly wrung out*, and less frequently renewed, than under any other circumstances would be proper.

IX. There is a grave error—a perversion of the ends and implements of the water-cure—committed by many patients and inexperienced practitioners, in packing, so much as they do, delicate and debilitated patients, labouring under *chronic diseases*—diseases that have *impaired* the *blood-making*, *blood-purifying*, and *blood-moving functions* so thoroughly, that the whole mass of the solids and fluids is corrupt, the whole vital powers prostrate. I have seen many such patients, undoubtedly, *in the long run*, recover, not in consequence, certainly, of the packing, but by pure force of the excellency of the water-cure regimen and appliances in other respects. For such patients the packing should be a very remote measure of treatment, except where there are *feverish* symptoms, or unless *artificial means* are used to *enhance before hand* in a high degree the vigour and activity of the circulation, even then the packing should be *partial*, and not too frequently repeated.

In rare cases, the lamp-bath may be used to the *point* of

perspiration, or, better still, the patient may lie and be well rubbed in a bath of 96° to 105°, for five minutes and well *dried quickly* in *a warm sheet*, and then at once packed in thin linen or calico to the knees. Reaction then is sure to ensue and speedily, and after half or three quarters of an hour of this clean poulticing, the patient is in an *unfeverish warmth*, sufficient to react and benefit by all the bracing and tonic effect of the ablutions in the shallow-bath, *which must not be long*.

But, as usually administered, the vitality of such patients is far too feeble to supply the heat called for, and the measure goes far to depress many patients, and make them irritable and dissatisfied with the water-cure at the first, as a thing ungenial to the *warm* instincts of an invalid who shivers before every breeze. Such a harsh and repulsive initiation into the system is not necessary; neither is it advisable or scientific, when the vital processes are so disordered, the vital viscera so congested, or so inert, the reactive powers so low, and the constitutional stamina *débile* and exhausted; directer, speedier, and more congenial means—means better tolerated and more effectual, are at hand for the resuscitation of such prostrate patients. They want *heat added*, not abstracted, unless when it has been supplied above measure, where they can spare it, and when the very parting with it is productive of the most invigorating impression the animal system can receive. But of this anon.

Notwithstanding what I have said, I am free to admit that cases do occur occasionally among the debilitated subjects in question; for example, in some cutaneous diseases, or in feverish states, where the wet-sheet packing is indicated. For such, where the previous heating process I have described is not used, a *partial* packing is sufficient to begin with. A yard of thin calico is laid over the trunk of the body, and the packing proceeded with as usual. In a week or so, or as soon as the patient can warm this well, place another piece of calico under the back. By gradually increasing it in this way, the patient will soon bear the wet envelopment to the knees; and so remarkably, in general, do the vital energies rally and augment under the treatment, that tolerance of the full sheet is often in no long time established.

X. In *all* cases where the *feet remain cold* in the sheet packing, they must be *left out* of the sheet Warm woollen

stockings must be kept on, or the feet and legs wrapped in warm flannels, and a *hot bottle* used in addition. The best plan, however, is to have the feet well warmed *previously*, either by exercise, by friction, or by *five* minutes' immersion to the calf of the legs in water as hot as it can be comfortably borne.

XI. Particular parts of the body, as the chest in nervous asthma, or the region of the heart in nervous palpitations, sometimes require at first to be protected from the direct contact of the sheet. But in all inflammatory diseases the wet-sheet, or the steaming flannel, must be in contact with the surface of the chest.

In some cases great benefit is experienced by the direct application of warmth and moisture to certain parts, as the throat, stomach, liver, or chest, *during* the sheet packing. This is effected by wringing half yards of flannel out of hot water, and placing them on the part affected, before the envelopment, and renewed from time to time if necessary, by giving the patient room to use his hand under his coverings.

XII. The precise time of lying in the wet sheet (in chronic diseases, of course) varies with the specific constitutional powers of each patient, the seat, nature, and stage of the disease, and the season of the year. As a general rule, *never unpack till the patient is thoroughly warm*, this being the great condition of reaction in the shallow-bath. This is the foundation of the next rule.

XIII. *Never pack a patient who is in a chilly state.* When the operation is inoperative on account of the ulterior ends to be gained, and for the purpose of faithfully carrying out a more general plan of treatment, then every justifiable expedient must be used *to get up the heat* previously. Of these means there are several. On account of the accumulated heat of most people after a comfortable night's repose in a warm bed, an hour before rising time has always been a favourable time for the performance of packing. The forenoon also, after exercise, is, in many cases, an excellent time. The *repose* of three quarters of an hour in the sheet, from a quarter to twelve until half-past, often starts the day anew, reviving the pristine freshness and mental sunshine of the early water patient.

XIV. Patients must not remain too long in the wet-sheet packing, three quarters of an hour is a good *average*—one hour at the outside; but, of course, there are cases wherein long packings are desirable.

XV. I frequently order, what I call the *double packing*, in cases where there is inveterate, or deep-seated irritation, which we often find in sufficiently robust subjects to bear the process. Great relief and benefit are obtained by it. As soon as the patient is well established, and comfortable in the *first* sheet, say in thirty or thirty-five minutes, then let the packing be repeated with a fresh wrung sheet for an additional thirty-five minutes, or longer if necessary. In some cases it is well to undo the packing, and to apply quickly a piece of fresh well wrung linen, without disturbing the patient, as I have mentioned relatively to the treatment of fever. You will often hear the patient express satisfaction, by enjoying all the peculiarly soothing pleasure of the packing in the *second* sheet, when unobserved in the *first*.

P.—You had something more to say about *convulsions* and *scarlet fever?*

Dr.—True, much more; but I shall now merely add, that in scarlet fever, as soon as the first symptoms of sore throat show themselves, I take care that the throat is well fomented with steaming flannels for an hour or more at a time, and repeated every two or three hours. In the intervals a *lighter* piece of flannel, wrung out of hot water, is applied to the throat, covered with a piece of oiled silk or light Mackintosh, and over this some dry flannel. All to be, mind you, *light*, *warm*, *moist*, *comfortable*, *impervious*, and *unoppressive*. Never, upon any account, apply a cold compress to the throat in such a case. The treatment of a common gastric sore throat is quite another thing; then you may apply the cold compress, well covered, going to bed, preceded or not by fomentation, and the probability is, that in the morning you will find the sore throat cured.

As regards convulsions in children,—during many years that I passed in a large private practice in London, as an *accoucheur* also, the treatment of children came necessarily much under my care and notice; I can now recall *many fatal cases* of convulsions, where I had the best assistance, and where all the most approved means were used. I believe I should have lost my own child in convulsions, but for this packing and its adjuncts; I believe, moreover, humanly speaking, that the majority of the fatal cases I have mentioned might have been saved by the same simple means.

XVI. Young children may be packed on the nurse's knees, with a piece of linen extending from the feet upwards

and passed under the arm pits, leaving the arms free, and thus avoiding any feeling of restraint—two or three pieces of flannel a yard and half square, and a blanket doubled, suffices to make them warm. Children sleep almost immediately in the packing; its *soothing* and *sedative* effects in young subjects are so remarkable, that they might almost be said to be without exception.

The bath for very young children when taken out of the packing, may always be warm, 85° to 95°, then cooled down at two or three intervals to 65° or 70°, according to circumstances. In some cases of convulsions, it is necessary to prolong the rubbing in the bath for ten or even fifteen minutes, within the range of temperature I have mentioned. This is necessary when there are symptoms threatening any severe return of the convulsions, and notwithstanding that they may have been quite arrested during the packing. The practitioner by feeling in the child's *armpit*, will be guided by the heat there, for as long as there is warmth, he will know how far he may carry the sedative effects of the bath, so as to produce the desired result, and at the same time to ensure a *slow* but *steady* reaction. In many cases the addition of fomentation of the whole abdomen for three quarters of an hour, twice or three times a day, in an hour or two, or in some cases soon after packing—produces marked tranquillizing effects on the child. If there is reason to suspect that there is any acidity, or irritating undigested matters in the stomach or alimentary canal, it is a necessary precaution at once to administer a gentle aperient—either castor oil, in a little warm milk and sugar, which make it tasteless—or some rhubarb and magnesia.

The *stomach compress*, or abdominal linen poultice, is an application as valuable as it is simple, combined with other remedies, in the treatment of the maladies of children, where there are symptoms of local or constitutional irritation. It is in fact, a minor but more prolonged packing. Of this remedy we will converse presently.

P.—From what I have felt and experienced myself of the sheet-packing, under a variety of circumstances, I understand, and quite appreciate all you have been inculcating; I feel with you, that it would be indeed "a real blessing to mothers," and I sincerely hope you will live to hear the word *packing* as "familiar in their mouths as HOUSEHOLD WORDS."

DR.—I like your sentiment; may it be as we desire. Be

assured, good patient, that in trying times of sickness, when the parent is tossed in mind by anxious doubts, with her maternal solicitude drifting mournfully on the current of painful thoughts, she will ever find this a sheet-anchor to lean upon, supported by hope and cheering confidence; for here we have remedial art with her handmaid experience, resting on the firm basis of science and certainty, of *cause* and *effect*—all lending their countenance to encourage a rational anticipation of success, and their willing aid to secure a happy result.

THE SWEATING PROCESSES.

CONVERSATION X.—*The blanket-packing and lamp-bath, the safest, most physiological, and best mode of producing artificial perspiration—A revulsive and purifying process—Tonic, refreshing, and strengthening—Contra-indications to its use—Its abuse when first used as a remedy—Lamp-bath combined with fomentations and frictions—May be used anywhere—Impromptu lamp-bath at mine Inn—Objections to vapour boxes and rooms—Rules and regulations—The blanket-packing.*

P.—I AM now anxious to hear all you have to say in recommendation of the different modes of producing perspiration, as a remedial measure in your water-cure treatment.

DR.—Our best and simplest means are the *blanket-packing* and *lamp-bath*, which I will describe to you presently. In fact, all other artificial means are comparatively defective and objectionable. Our mode of soliciting perspiration by *external* means, is widely different in its results from that produced by giving medicinal sudorifics. It is considered by medical men a matter of the greatest importance, in many cases, that the patient should be made to perspire freely, but there are grave objections to all drugs given for this purpose. 1. They are uncertain in their operation, and often fail in producing the desired result. 2. It is necessary to lie in bed to recover from the exhaustion, sickness, and weakening effects they produce. 3. In cases where sweating medicines are prescribed, the stomach and digestive organs are in an unhealthy condition, tending to inflammatory action, and are made still worse by the introduction of such drugs. 4 After the drug, cold air and water must be avoided, nor would it be safe to repeat the dose frequently.

After the *simple* and *certain method* I am now about to explain to you, a bath, and, in most cases, a walk is taken. The water-cure processes can be *repeated* frequently with evident benefit, and without that subsequent debility, and increase of constitutional disorder, which so often follows the introduction of noxious matters into an already diseased body. These admirable water-cure processes, when indicated, are equally applicable to the extremes of youth and age. They are, in proper hands, as free from all risk and danger as they are simple in their administration and excellent in their results.

P.—What is the true theory of perspiration in the simple blanket packing, or by the lamp-bath?

DR.—Heat is a powerful stimulant both of organic and of animal life. The effect of the heat of the body being retained by enveloping the body in several non-conductors, as blankets, is the same as applying so much heat from without, as it is not allowed to escape. For you are now thoroughly aware how large an amount of heat is constantly being generated by the living animal furnace. But this process of heat accumulation, or reception of heat from without, cannot go on indefinitely, cannot exceed a certain point, without deranging the animal apparatus, or without becoming a source of disease. Hence, all provident Nature has provided a safeguard against the heat of the body ever materially falling or rising above the natural standard. Her power of quickening the chemico-vital actions by which heat is elaborated, is the provision by which she compensates any undue abstraction of heat, on the one hand; and her power of increasing the exhalation from the surface, and so by the conversion of water into vapour, as it leaves the body at every pore, absorbing an immense quantity of the superfluous heat, is the provision, on the other hand, by which she prevents the temperature from ever much exceeding the usual standard. The hydropathic sweating processes are simply scientific expedients for taking advantage of this last provision, or LAW, of the organism, in order to make it subserve the purposes of the cure of disease. The abnormal accumulation of heat irritates and excites the system, and calls forth its efforts of resistance, as against a foe whose ravages are inimical to life, and whose progress must be checked.

P.—In what do these efforts of resistance chiefly consist?

DR.—Here is the point. The ganglionic nervous system

—the great controller of the purely vital or organic actions and especially of the circulation—is roused into powerfu action. The heart beats with renewed energy, the blood vessels participate in its impulse, and carry the blood for ward with augmented power and speed, clearing all obstruc tions, producing a great movement and determination of the fluids from the central to the superficial parts of the body However chilly, hard, dry, or bound the surface may be this centrifugal effort soon forces the perspiratory outlets o the skin to yield. With the pouring forth of sweat, and with it the extrication of an immense amount of the surplus heat of the body, comes instant relief—a subsidence of the whole organic tumult raised expressly to effect this purpose

P.—That *rationale* is very clear and intelligible. And i stands to reason, that the more the determination to the surface, and the activity of the cutaneous circulation is pro moted, the more the arteries, capillaries, and veins of the interior viscera will be unloaded of their morbid accumula tions. This much at least of the science of the matter; o the *modus operandi* of such a curative agent, I have learned from your explanations.

DR.—I see you perfectly comprehend this powerful *revul sive* and purifying process. Hence its extraordinary utility in chronic congestions of the LIVER and spleen, and in the obstructed viscera associated with chronic indigestion, rheu matism, gout, inveterate depression of spirits, and many cutaneous diseases.

P.—I believe complaints have been made against the sweating process, that is, against its abuse?

DR.—Yes; at one time it was carried to extremes by water-doctors and patients; and, as the tendency of mankind is always to run into extremes, there is now the danger of its being quite as unduly neglected and malappreciated It is certainly not a measure for *routine treatment*, or to be lightly, or indiscriminately had recourse to. This mode of producing perspiration, followed by the bath, was at first thought by Priessnitz, to be his great discovery. Stirring up the system and producing purgation and waste by the skin, strengthening this again, as well as the internal organs by the bath, was thought by him and many of his followers so powerful, simple, and harmless an operation, that, combined with the *other salutary adjuncts* of the cure, no diseased state could resist it. When I had been about six months at Graefenberg, I ventured to give my opinion to

Priessnitz, with my reasons, why he was carrying this operation too far and on wrong principles. After remaining with him about a year I took my departure, and soon after heard that he had made a reformation in his practice, using the sweating process with greater discrimination. Having remained so long at Graefenberg, and being known to all the patients as "the English doctor, who was making such a good cure," I was frequently referred to by all the anxious invalids, and all new comers. In fact, I was the first English (medical) man, who went to Graefenberg, and was only preceded by one of my gouty countrymen. If I had not gone there, it is more than probable that the water-cure would be still unknown in this country; but more of this anon. Although I had observed enough of the remarkable curative results of water-curing, combined with sweating and the bath, from seeing so much of those numerous patients, still I was soon alive to its abuses and misapplication. Priessnitz had so long been treated as little less than a prophet, or one inspired, that he listened to any remonstrance with much reluctance. But never was any man quicker in availing himself of valuable hints, or in putting the discoveries of others in their right places, and to their best purposes. This was shown by his use of the douche, the sheet-packing, &c., which had never been used before his time as constitutional remedies in chronic disease. Truly he was a man gifted with original genius, with the soundest common sense, and the greatest powers of appreciation.

The application of a cold bath after a profuse perspiration, is thought by the *many*, and even by *most medical men*, to be highly dangerous; but, in fact, there is nothing more innocent, or exempt from danger, when directed by a competent practitioner. It is of the *greatest utility* in *passive* diseased states, where action is below par, and in the very commencement of acute diseases; in the depression of power that precedes fevers and inflammations, for symptoms indicating the retrocession of the fluids of the body from its surface to the interior, and their undue accumulation there—in the early stage of violent or formidable diseases, of depression of power, in the collapse, shivering, *malaise* and *discouragement*, that follows a chill of the surface, or the imbibition of an infectious miasm, and *before* active irritation or acute inflammatory symptoms show themselves:

but *after* irritation, or *acute* inflammatory symptoms hav set in, it is contra-indicated and highly improper. Th sweating process is therefore *as a general rule* (but there ar exceptions), inadmissible in all *actually feverish* states, i *acute* catarrhs and influenza, whether obscurely or clearl connected with local inflammation, of important viscera wherever the heart is abnormally excitable, or whereve there is active determination of blood to the head.

P.—I see it requires some discrimination, when diseas exists, to prescribe even these simple and salutary processes

Dr.—You say truly. The following hasty remarks wer *written before* I left Graefenberg, and long before the wate cure was heard of in this country. You will find them i my *first work* on the Water-Cure, printed in 1842 :—

"In most cases, where there is much nervous debility o a tendency to hypochondriasis, where there is much dete mination of blood to the head, or the existence of chroni inflammation on the digestive mucous membrane, or th alimentary canal, or any of the internal organs, the sweatin must not be practised, or with great *care* and *discrimination* and only at *intervals*. Where these contra-indications d not exist, and the sweating still produces a loss of flesh, o an increased state of irritability, and when the patient doe not feel well, and obtain full reaction after the bath, in suc cases it is advisable to discontinue it. It is sometimes necessary to apply a wet compress on the forehead before and during the perspiration, changing it from time to time and there are also cases where the patient is made to swea in the wet sheet. but they are rare; and when it is thought necessary, it is generally better to omit the operation, for it shows some contra-indication. Whenever there is a great tendency to fever, where *acute* symptoms of a cold or in fluenza are coming on, the sweating must not be attempted it sometimes aggravates all the symptoms. In these states the sweating must be replaced by the sheet-packing. I have observed that those whose skins are white and delicate, per sons who have much fat, gouty and rheumatic, sweat easily, and in great abundance. On the other hand, where the temper is phlegmatic, where there is a tendency to piles, or congestion of the abdominal viscera, it is not so easy. Sometimes the perspiration is *partial*, not appearing at all on certain parts: this may arise from the existence of dis eased action, or the accumulation of morbid matter in the

art. When this is discovered, it is advisable, previously to nveloping the patient in the blanket, to apply a compress bandage, *wrung* out of cold water, to the part.

"With the repetition of this process, great changes take lace; at first the perspiration is small in quantity, clear in s nature, and difficult to be produced; it becomes profuse, nd impregnated with the most disagreeable odours, viscid nd glutinous, of a dark yellow, and even brown colour, nd sour, fœtid, &c., in its smell. In other cases, the patient ill tell you, that during the first two or three perspirations t tasted *very salt* and *briny*, when flowing over the lip, but fterwards became all but tasteless. When these morbid henomena appear, the perspiration may generally be con- idered critical. As a general rule, where there is no evident eason why it should not be used, sweating, followed by the epid, chilled, or cold bath, *is not debilitating;* what is lost n one way is repaired in another. The appetite is so much ncreased, and the functions of the digestive organs so im- proved, that more healthy fluid is formed than is thrown out. *Fat* is replaced by hard elastic flesh, and languor and debility give way to a state of cheerfulness and activity."

P.—Are the cases of marked debility, or delicacy of con- stitution, inherent or acquired, and persons whose nutrition is much impaired, unsuitable for the sweating process?

Dr.—By no means. But such patients require to be gently initiated into it. It is only under too frequent and excessive sweatings—the abuse of the process—that it is injurious to such patients. As I am accustomed to manage them, the gentle sweating in the lamp-bath, with sometimes a hot fomentation to the abdomen at the same time, produces most satisfactory results—soothing irritation of mind and body, taking a sensible load off the springs of life, and in a short time too, cheering on the hopeful anticipations of the patient, and *eventually bracing and invigorating the system* in the highest degree. How often have I heard patients exclaim, after this process, "Doctor, I feel young again!"

P.—It is a common opinion that perspiration is a weaken- ing process. How far is this true?

Dr.—It is quite a mistake. Sweating by other artificial processes may be weakening; but the hydropathic sweating, *properly directed*, never is. So far from debilitating, it is, on the contrary, highly invigorating. The patient is at perfect repose in his wrapping, on his chair or in bed, and nothing of the *normal* constituents of the body is abstracted,

save the saline water of the blood. This may be replaced by absorption from the stomach as rapidly as it is given out. For when the drain comes to be excessive, the supply of water is in proportion. But let me remark, it is only in very *pure* systems that pure water comes away. Where the system is impure, as is the case with most cases of chronic disease, where corrupt humours exist in great quantities, where the secretory and excretory functions are imperfectly performed, or some of them entirely arrested, the retention, whether in or out of the current of the circulation, of matters that should have been eliminated, converts them into an actual morbid matter, an element of disease.

The powerful perturbative action established in the system, the *revulsion and general movement of the fluids to the surface parts of the body*, and *the drain effected of the serous or watery part of the blood, the* PART *that* IS CHARGED *with the morbid elements*, tends to dislodge, and break up, and carry off, the palpable material principles of disease; in short, to purify the blood—literally to rinse out its channels, to cleanse the vital sewers, if you like—to solve obstructions. This is *one* source of the immediate relief to *malaise* felt by many people immediately after the process.

P.—Well; this *revulsion to the surface*, this scouring process of the corporeal passages, and the easy exit it affords to excrementitious matters, or morbid principles, being the immediate benefits to the constitution, of the sweating as you manage it, what are the most obvious of its permanent advantages?

DR.—Of course these vary with the disease under which the patient labours; and it would swell out our conversations unduly, now, to illustrate them by cases. These I will lay before you at another time. Suffice it to recapitulate, for the present, some of the common changes effected on patients, whose complaints are in other respects the most diverse. Whether the patient suffer from chronic *gout* or *rheumatism*, from confirmed or a periodical *biliousness*, from *scurvy*, *secondary symptoms*, from *diarrhœa* or *constipation*, from simple *dyspepsia* or inveterate *low spirits*—the following are the indications of the new life and energy imparted to their systems. Their *skin* and *digestive organs* are in an immensely improved condition, and augment the source of all the other benefits the health has received. Flabby fat, or unhealthy flesh, steadily disappears; or, more strictly speaking, is decomposed and eliminated (burnt off, if you

like), and its place supplied by healthy, hard, and firm muscle or flesh. The heavy languid step gives place to elasticity and buoyancy. As I have said before, hope and hilarity appear like the sunshine of day, radiating in countenances where erewhile despair, dismay, and dejection sat; the weariness and weakness that before overwhelmed the patient on the least exertion, are now succeeded by energy and endurance.

P.—I have been told that the lamp-bath has, in some measure, superseded the blanket packing?

Dr.—Only to a certain extent. The blanket packing is too valuable a means to be lightly thrown away. We often find that no other plan so well fulfils the indications in many cases where sweating is necessary. There is no doubt that the lamp-bath is the favourite; it is a much more expeditious process, and admits of more variety in its modifications. It has many advantages peculiarly its own, and when skilfully managed accomplishes many of the best aims of the blanket sweating.

When any end can be served by long sweating, when it is an object to prolong the revulsive action, where it is evident that there are morbid matters to be eliminated, then the lamp-bath may be used merely to start the perspiration, and thus save time. The patient is then laid in bed with his warm blankets about him, and packed with additional blankets, so that the process may be kept up, and go on for the time prescribed, without disturbance and without excitement.

P.—In what diseases do you find this modification of use?

Dr.—In some cases of chronic gout or rheumatism, especially in robust subjects; in affections of the liver and kidneys, and in dropsies thereon dependent; in secondary symptoms, and various forms of obstinate skin diseases, as *psoriasis inveterata*.

P.—The lamp-bath seems to be one of your favorite operations?

Dr.—It is very manageable, and may be made a most luxurious and salutary proceeding. I frequently avail myself of its benefits.

P.—Well, it was but the other day that I heard a gentleman declaiming against the lamp-bath.

Dr.—I heard him too, and he did not complain without some cause. It appears, he had been in the hands of a

person who did not understand the management of this process. I found that he was a deplorable sufferer from dyspepsia, with feet that became cold immediately after exercise, added to which, there was slight congestion of the brain. He complained that he had sat half an hour in the lamp-bath, with cold feet and a hot head, and that the longer he remained the colder became the feet, and the more heated and oppressed the head, and after all with little or no perspiration. Nothing could be more irritating to an invalid in his condition, than such a position. I have since heard this gentleman say, that he found the lamp-bath followed by the tepid bath, cooled down to its natural temperature, a "panacea, and one of the greatest luxuries," whenever it was judged proper for him to take it. The change in his opinion was wrought simply in this way: a pan of hot water was directed to be placed for the feet, during the first twenty minutes of the bath, and to apply half a yard of flannel, wrung every ten minutes out of hot water, on the abdomen, as a lady does her muff. I also ordered the lamp to be extinguished for a few minutes, two or three times during the process, or as often as the heat was felt at all oppressive. In this way he sweated profusely without any sense of oppression, and I have felt his head and face quite cool to the touch, when dripping with perspiration. I should mention, that I had ordered the bath-man, as soon as perspiration showed itself, to rub the bare neck, shoulders, back, and loins, briskly and steadily by insinuating the bare arm down under the blankets. There is no necessity whatever that the blankets should be tight about the neck, they answer better by being merely approximated, loosely and comfortably. *A soft hair glove*, instead of the bare hand, used to rub gently the oozing skin, I have found of great advantage and very agreeable. This patient, in a few weeks, found the adjuncts I have mentioned for producing perspiration no longer necessary; his feet were always warm, his head cool, his old store of pills no longer wanted, and his temper (omitting other symptoms) showing unmistakably, that rapid recovery was taking place. A simple proof of the strong derivative effect and power of this refreshing process, is the fact, that for some time afterwards, the arms and legs, feet and hands, feel *larger*, and the whole person more robust. This is fact and no fancy, for I have often myself after a lamp-bath, found my easiest boots, and I take care to have them all easy sufficiently, almost too tight to pull on.

This with the walk, slowly subsides, but you perceive that, notwithstanding the copious drain of watery particles (and I have often, as my man will tell you, sweated freely in this quiet way for above an hour), how great a body of blood must have been transferred pro tem. *to the surface and extremities of the body*, that might a short time before have been adding to the *stagnation* of a *torpid* or *congested liver*, an *oppressed pair of kidneys*, *a weary head*, or *morbid mucous membranes*.

P.—There is an objection to your remedies that I have heard remarked by many people, that is, that they cannot be obtained anywhere, as you get your prescription for pills, a draught, powders, and mixtures made up at the druggist's.

Dr.—I am glad to set you right in that mistaken view of the matter. My personal experience has been considerable as regards both kinds of dosing, and I have no hesitation in saying that my present prescriptions are quite as comeatable, cheaper, *their operation sooner over*, and last, but not least, have the addition of being much more agreeable in their working and administration. As briefly as I am able, I will give you a modern instance, to show at least, that where there is a will there is a way. I was obliged to visit London, during the last great influenza, when such crowds were laid up with it. From having sat up the small hours of the night for several preceding winters, with other necessary sacrifices of health, for what I had to do, I was not well, in fact, I was in below-par condition. In the face of this, I dined out every evening, and on awaking the *fourth* morning, found I had all the symptoms of influenza in their severest form.

P.—I suppose you had been drinking above half a dozen glasses of wine every evening with your noble friends?

Dr.—I am sorry to confess as much, in the condition I was in, and surrounded by a raging epidemic. I had taken at each dinner too many glasses of champagne, and too many of bordeaux, *premiere qualité*, you may be sure, but no port or sherry; nevertheless, I was afterwards deservedly punished. Not having been accustomed for many years to effects of alcohol, or intoxicating drinks in any shape, these nightly repetitions made my mucous membranes and nerves infinitely more excitable, and susceptible of the worst influences of the epidemic. On putting my nose out of bed that *fourth* morning, violent sneezing ensued, accompanied with chills and cold shiverings, added to which, there was weari

ness and pains in the limbs, as if I had received severe injuries. In a strange hotel, I sighed for my water-cure establishment and its appurtenances, and felt the feeling of a long laying up casting its shadow upon me. What was to be done? I called in BOOTS, and after *consulting* him, sent for some *spiritus vini rectificati*, a shilling's worth, from the next druggist. With this he brought me a teacup and a *wooden-bottomed* chair from the kitchen. The spirit was put in the cup, and this in a small bason with three inches of water, to prevent its cracking, and a penny in the cup as ballast. When this was placed under the chair I sat down, with two folded shirts as a cushion, to keep off the heat of the chair. 'Boots' then arranged six blankets one behind and one before alternately, putting me thus in a small tent, with the head out. I perspired freely for more than three-quarters of an hour; twice during the operation, feeling unnecessarily warm, my shaving box was put on the teacup, which at once extinguished the flame, and enabled me to go on perspiring at my ease. When I had luxuriated sufficiently long in this state of general thaw, for truly the feeling of relief was very great, I directed the attention of 'boots' to two sheets, and half a bucket of water, which had been placed in readiness. One sheet he dipped in the water and wrung sufficiently not to wet the room, then throwing off the blankets and standing up I was enveloped in it, and we both commenced active rubbing. Again the sheet was dipped in the water and the rubbing repeated, once not being sufficiently refreshing. The other sheet served to dry me well, before returning to bed. Boots, who had soon become an *amateur* of this novel proceeding, gave me *his* parting *opinion*, on leaving the room with the chair and bucket, by saying "Its really my belief that's a great dodge, sir, and I've no doubt you have broken the neck of him," meaning the influenza.

P.—Well, what was the result of your impromptu water curing?

DR.—In an hour I had some tea and dry toast, which produced a disposition to natural perspiration, which, of course, was encouraged. I dozed away the day in bed, fasting and keeping *very quiet* until evening, when boots was initiated into the mystery of wet-sheet packing, which he did remarkably well. I slept in the sheet for an hour and a half, and then, for want of a bath, repeated the morning ablution with the *dripping-wet sheet*. Next morn

ing the packing was repeated, in the evening I was sitting up in my room, and the next day went into the country in a close carriage, *feeling well*, but languid; hitherto I had eaten nothing but a little toast with some weak tea. I was *quite well* the fifth day, and had suffered no pain, and but little inconvenience.

P.—I suppose you would have taken some medicine if you had thought it necessary?

Dr.—Certainly. A dose of castor oil, which is often first rate, or any other dose clearly indicated. How often I feel regret when I reflect what valuable adjuncts medical practitioners (of any school) throw away, when they refuse to prescribe our simple processes, as domestic remedies in private practice. A lamp-bath and warm-bath cooled down, a packing and sheet-rubbing, a fomentation, compress or sitz, would often be invaluable as additions to some drug medication, in the common ailments that make up an ordinary medical practice. The time will come for this.

P.—I suppose your processes might be used with immense remedial results in hospitals?

Dr.—Why not? why should not the poor benefit by the same means there, as ladies and gentlemen do in *my* hospital. A hospital is a real blessing when illness overtakes an individual, for there the inmates are practised and drilled, there is no temptation for the sufferer to go wrong, and all the machinery is devoted to one purpose, to one production—health.

P.—How is it that so powerful a revulsion, and means of relief, as sweating, has escaped the medical profession, and so seldom used as a remedy?

Dr.—The act of passive or artificial sweating, without being followed by the different modes of ablution we enjoin, would not be attended by the curative results, either immediate or remote, we accomplish. The bath is the *sine qua non*; without this addition its efficacy would be lost in the treatment of slow or chronic disease. This is the reason why so great a remedial agent is all but negative in the hands of the medical profession. They know only of the *debilitating sweating* by drugs and the vapour-bath.

P.—As you consider the bath an essential complement or appendage of all sweating processes, however performed, what are its specific objects?

Dr.—In the sweating process the nerves and vessels of the skin must necessarily be irritated, and its whole tissue

at last relaxed, from the heat and stimulation they have been subjected to on the one hand, and from the copious floods of fluids that have oozed through them on the other. The *bath* taken then, at the end of the process, is a highly physiologic and philosophic procedure. I see you now perceive that it is the most *direct* and *effective means of giving immediate tone to*, and constringing the relaxed vessels and tissues of the skin.

P.—Oh! I perceive how needful, how well-timed, and how appropriate, then, is this bracing operation, and how grateful it must be to the patient. You deplete, reduce irritation, establish a grand derivative action, and then march in with your tonics and refreshers. I suppose that the more freely the skin has been acting, the larger its flow of fluids, that the greater will be the degree of cold that is desired, the better will it be borne; the more potent will be the stimulus it affords; and the better the reaction that will ensue; in short, the more decided and permanent will be its curative agency.

Dr.—Relatively to all the diversity of cases it is so. Hence the feeling of immense relief, exhilaration, of actual renovation and vigor, experienced after a process that to a superficial thinker or observer would seem wasting and exhausting.

In pointing out to you how easily you might get a lamp-bath, in case of sudden illness at your inn, I forgot to mention that if symptoms of inflammation of the windpipe (*laryngitis*), or of the air-tubes (bronchitis), had shown themselves, I should have instituted a hot fomentation with half yards of wrung flannels, to the throat and breastbone, both before, during, and after the lamp-bath, and that also in case of spasm, cramp, or pain in the stomach and bowels, the *steaming flannels* should be applied to them in the same way.

P.—I see you attack the enemy's outposts and lodgments, and circumvent his plans at all points. *Laryngitis*, I believe, is a very dangerous malady, and sometimes kills a man before twenty-four hours are passed, notwithstanding, as I have heard, his having been bled within an inch of his life, or leeched, blistered, and calomelised within an inch of the grave.

Dr.—True. A great many die in this way, but they are bad cases, and often neglected until beyond the aid of human means. The simple operation of making a small

hole into the windpipe to breathe through has saved some lives, when all else were lost. If you are ever threatened with *laryngitis* try my plan, *but without loss of time.* Perspire freely with the lamp, and foment the throat and breastbone at the same time, the feet being in hot water with a little mustard; bathe in warm water for three or four minutes, and then cool the bath to 70° for three minutes more. Return and rest in bed, and continue fomentation. The sweating, fomentation, and bath must be repeated if necessary. I have had a severe attack of *laryngitis*, indeed more than one, which, no doubt, would have ended my career in less than twenty-four hours if left to itself,—in less than an hour I could not attempt to swallow, and the larynx was immovable. I treated myself as I have advised you to act, if you should ever need it. In addition, I took a dose of castor oil. The result was, that before evening all the acute symptoms had subsided. If necessary you can bring up your reserves at once, and take an ounce of oil, or a dose of calomel, and two ounces of black draught, or any other appropriate dose, and still work away with your main forces. A powerful revulsion on the alimentary canal, under such circumstances, may be well justified. Castor oil, by the way, let me tell you, I have discovered, has a great affinity for bile; being a purgative matter and *fatty* also, it seems to draw out and join the bile, but does not *stay* to amalgamate with it; on the contrary, it goes on, very quickly, with its bitter companion, down the alimentary conduit, its destined way.

P.—I suppose you would attack the inflammations of the different parts of the air-tubes in younger subjects, much in the same summary way?

Dr.—Yes; but with modifications and additions, which I will explain to you by-and-bye.

P.—I think a great recommendation of your lamp-sweating above the *hot-air* and *vapour baths* is, that the head is cool and free, is out of the heated atmosphere. I should suppose that the breathing of the hot atmosphere of a *box*, or a *room* in which the patient is confined in such cases to be highly objectionable.

Dr.—Assuredly. An atmosphere, moreover, not only not renewed as its oxygen is exhausted, but further poisoned with steaming exhalations of diseased bodies forced to part with their noxious elements by the skin. Just figure to yourself such an odorous chamber, and being compelled to

swallow again by the lungs the morbid elements of the body. Such a process is highly objectionable, and there is *now* no excuse for it. It goes to taint the very fountains of restoration by interfering with the purification of the blood. Pure cool air, for decarbonising the blood, the ready outlet for a poisonous excrementitious principle, and the facile and ample reception in its stead of the vivifying oxygen and electricity, is the prime condition of the health of breathing animals. The highly rarefied air of such a bath is an objection too; air highly diluted in its prime vital elements is highly objectionable, as leaving the blood without the due amount of its natural purifiers. An abnormal amount of carbon therefore remains in the blood. To the noxious influence of this, the whole organism, but especially the *brain*, is very sensitive. According to the extent of the deficiency of respiration is the degree of narcotism induced, or the general symptoms of empoisonment.

P.—Pray, say no more. If such baths are persisted in, now that there is no excuse for them, *now* that a better mode is pointed out, so simple, safe, and physiological, the penalty of perverse folly must rest with those who commit the error.

You have already satisfactorily disposed of the objections to bathing the body in cold water after *passive* sweating, and I have no more questions to ask just now regarding this most interesting subject of artificial perspiration. I am now therefore prepared to hear any further counsels you may have to give me in order to ensure the due administration of so invaluable a resource of curative art.

Dr.—Several of the following cautions and directions I have already given; but, in a practical point of importance, mismanagement must be carefully avoided.

1. A point of consequence in the sweating process, whether in the blanket packing or the lamp-bath, is, that the patient has the air excluded about the *feet* and *neck*, and the latter must be done without discomforting the patient in the least. The packing in the blankets should also be as comfortable as possible, and as soon as the perspiration is fully formed it may be loosened a little, and the external air also may be freely admitted into the room, provided the patient be not in a draught, or the *weather damp* or *cold*. In waiting for the perspiration to break forth the patient may safely fall asleep in the blankets.

2. The early morning is the best time for the blanket

sweating. Everything is completed comfortably, the walk taken, &c., before breakfast. The lamp-bath may be conveniently administered about 12 a.m., and with many patients is preferable.

3. To refresh, or make up the loss of fluids, the patient, if disposed, may drink half a tumbler of water occasionally, say two or three times during the operation.

4. In sweating, and in fact under all the other processes, the brain and nerves should never be injuriously excited. Perfect quiescence therefore should reign around the patient. Much talking should be interdicted, and everything to excite the temper avoided.

5. If, before the perspiration breaks out, the patient becomes uneasy, or flushed in the face, he should be unpacked and a gentle perspiration produced with the lamp-bath, before cooling in the shallow-bath.

6. In the rare cases where there is disposition to headache in the sweating process, a compress, or fomentation to the stomach and bowels, is a good counteractive. Sometimes a cold compress to the head is useful.

7. Any inflamed, swollen, or tender part, as rheumatic or gouty joints, boils, or painful eruptions, &c., should be covered with a wet compress or fomenting flannel; the object of which is two-fold, to keep such parts meanwhile in a sort of vapour-bath till the appearance of sweating, and to allay the pains which might increase with the production of perspiration.

8. As a general rule, in febrile and inflammatory affections, never seek to *force* perspiration by direct means. It will in general come on spontaneously after the excitement of the system has been moderated by the appropriate water appliances. For in such cases, the immediate object and indication, are not to hasten perspiration, but to allay the local or general irritation; to produce, first, effectual *sedation* by appropriate means.

9. If in perspiration fully formed, any particular part of the body remains dry, it is well to apply a compress or fomentation to that part.

If a critical perspiration comes on in an acute disease, it must not be *arrested by any abrupt or violent means.*

10. After sweating it is advisable that the patient should be sufficiently refreshed, and *cooled* in the bath, so that perspiration will *not again ensue* or break out by the active

drying and rubbing with the sheet and towels which follow.

11. In some cases the *douche* is taken with great advantage after the lamp-bath.

It is of importance after the sweating, as after all the processes, that the patient be careful to promote and *keep up* reaction, by gentle exercise, as soon as possible after the operation.

12. The sweating processes are particularly suitable for passive diseased states. Wherever active inflammation exist, with few exceptions, they are unsuitable; as well as where there is high pulse and hot skin, in *acute* catarrhs, or in severe influenza, unless in the *premonitory* or *shivering stage*. It is equally improper when the heart is abnormally excitable, or when there is active determination of blood to the head. In all cases of marked delicacy and debility of constitution, it is not advisable as a preliminary measure, but may be cautiously used with great benefit as the patient begins to amend.

13. In all kinds of packing *idiosyncrasies* should be carefully observed and respected.

The blanket packing is effected in a very easy and simple manner. The bedding is removed, and a blanket or two, of large size, spread out on the mattrass. The patient laying down is enveloped as comfortably as possible, and so as to fit well about the neck and shoulders. More blankets, and a light down bed in a fine ticking, are tucked in over all. The head is placed as the patient may desire.

P.—What kind of spirit-lamp do you find answer best?

Dr.—I prefer a small tin cup about four and a half or five inches deep, and a little more than three in diameter, and this is put to stand in a small slop-bowl, with two or three inches of water. Others prefer a lamp with a wick, and when sufficiently large, is found to diffuse sufficient heat.

Before we part, I wish to remind you that the sweating by the lamp-bath is materially aided, and made very agreeable, by frequently giving the patient half yards of flannel wrung out of hot water. With these he rubs the chest, abdomen, arms, and upper part of the legs, gently. It saves time, and makes the operation more soothing.

THE SITZ-BATH.

CONVERSATION XI.—P.—WILL you define to me precisely the objects aimed at, and the effects accomplished by the sitz-bath?

DR.—The sitz-bath is, in fact, but a still more partial shallow-bath, but as it admits a much longer stay in it, its applications are more diversified. It is, therefore, a more complex process, and requires more discrimination in its use.

P.—The outlet of heat being from a diminished surface, its effects, I presume, will be more local in direction, your idea being, that although the physiological effects of the processes vary with their several kinds, yet that they are all, more or less, modifications of one and the same operation—*derivation* to wit.

DR.—That view of the matter, I believe, is unquestionable. The specific, primary, and essential effect of the sitz-bath, as of every other, is *derivative*. It is by this action that it produces all its curative effects, whether these be called by the name of *tonic*, *stimulant*, or *sedative*. It depends altogether upon the *degree* and *duration* of the derivative action, whether the ultimate effect upon the body be *tonic*, *stimulant*, or *sedative*.

P.—In that case, the *degree* and *duration* of the derivative action will be regulated by the temperature and depth of the water, and the time the patient remains in it?

DR.—Quite so; in other words, by the amount of heat abstracted. The greatest and longest abstraction of heat a patient can safely endure, is the highest sedative effect we dare operate, or can ever be called to produce. Short of this, there are all degrees of sedation. And herein precisely lies one of the greatest practical recommendations of the Water-Cure, the facility and precision with which its *doses* can be meted out, according to the necessities of the disease or the strength of the constitution. The abstraction of heat for a brief period, but intense in degree, produces a powerful stimulant effect. A series of these temporary stimulations of the organic actions results in a permanent exaltation of the tone of the system. Hence a sitz-bath administered in this way is said to be *tonic*. But the derivative action of the sitz-bath is its true *modus operandi*. It depends very much on how this action is created, and the extent to which

the bath is carried, whether the effect is to be *sedative* or *stimulant*. For these are the specific objects for which the bath is prescribed. In the latter case, action is short, but decided. The water in the bath is colder, and the stay in it briefer, say from five to ten minutes. In the former case, that is, when the object is to produce a sedative effect, the temperature of the water is higher, and the continuance in it longer, say from twenty minutes the minimum, to three quarters of an hour, or so, the maximum.

P.—I see it clearly. The *derivative* action of baths given after the hydropathic fashion is the great fact to dwell upon; whether they are to be *sedative* or *stimulant*, is just as they are used, just as the skill or practical experience of the practitioner modifies their administration?

Dr.—It is so precisely. For example, the alleged lowering effect of the sitz-bath occurs only when derivation *is pushed too far* relatively to the powers of the patient, when the outgoing of heat is rendered excessive by the prolonged operation of cold. Nevertheless, even here, the revulsive action is all in all. The part that has been the outlet for so much heat, has been the scene of an immensely active traffic in circulating materials to supply the vital processes that compensate the vital drain. Of course, the expenditure of so much organic energy as is implied in these operations cannot take place without reducing both the force and the rapidity of the pulse.

P.—What are the peculiar excellences or advantages of the sitz-bath, as a derivative?

Dr.—The facility with which we can subject so large a surface of the body, and so near the vital parts, to a temperature at an average of thirty degrees below blood heat, for a time usually varying from five to twenty-five minutes or more.

The agreeable excitation of nervous power, both organic and animal; the strong outgoing current of fluids from all the interior parts of the body to the surface submitted to the cooling influence; the immense combustion of corporeal particles necessary to the generation of the large amount of heat evolved; the exaltation, in short, of all the chemico-vital processes of the living laboratory;—all these explain the beneficial effects of the sitz-bath in the diseased conditions it is called on to remedy, show its capabilities of extensive application, and the reason of its deserved popularity.

P.—Your explanation is true to your theory, I see; or your theory true to your explanation. It seems, then, that in this powerful revulsion or diversion of the fluids to the surface, and in the disgorgement of the congested vessels of interior membranes and viscera, to supply the blood for this purpose, lies the chief value and efficacy of the sitz-bath.

You have given me, at length, a clue that will unwind me out of the labyrinth of many a difficulty. For example, I used to puzzle myself how marvellously, often, the sitz-bath acted as an opiate on sleepless nights; or on another occasion made me *fresh for a long walk, when tired and good for nothing*. The determination of the circulating fluids and the transference of nervous energy from the higher organs of the body to the lower, and the *tonic* and *refreshing* effects on the *brain*, and at the *pit of the stomach*, solves the mystery. I was fidgetty and restless, my thoughts kept me awake, my brain was excited, the circulation therein too active. By a physiological expedient, equally pleasant, safe, and prompt, determination of the blood was transferred elsewhere, the nervous excitation removed with it, and the impediment to sleep thus removed.

Dr.—You have a tolerably good idea of the matter. On the same principle this remedy, in some cases, removes headaches, nervous or bilious; stays vomiting and sickness, relieves flatulence and spasms, obviates constipation, aids in the cure of diarrhœa, because it reduces irritation, and operates the disgorgement of tissues whose congestion lies at the foundation of the deranged functions named.

P.—In what classes, or cases of disease, do you most frequently prescribe the sitz-bath?

Dr.—The sitz-bath being the *local* derivative, at once the most powerful and the most easy to *dose*, and therefore always safe to administer, besides being a bath always ready, always at hand, and taken with little trouble or assistance, it is largely resorted to, especially in chronic diseases, wherever internal congestions have to be relieved, or tone given to the digestive organs. Its measure and its frequency are determined, of course, by the necessities of the malady and the stamina of the patient. Of this the medical practitioner is the best judge, and should be the sole arbiter. The sphere, then, of its applicability embraces the entire class of visceral diseases, chronic congestions of the brain and the other nervous centres, of the lungs, heart, stomach, bowels, liver, kidneys, uterus, &c., in hæmorrhoids and

hæmorrhages associated with them, in the disorders of menstruation, in the local injuries inflicted by, and in the tendency to, miscarriages and severe labours, in constipation and diarrhœa, in jaundice and dropsy, &c., &c. But the more special applications you will find detailed in the few rules I shall attempt to lay down for the safe and effective use of the sitz-bath; and the illustrations I shall give at a future period.

P.—Will you now favour me with these rules?

Dr.—In the first place, as one essential condition of the full benefit of the sitz-bath, as of every other bath, is the taking of active exercise to the point of a comfortable glow, *before* as well as *after* its administration; this rule, when practicable, should never be neglected. Its object is, in the one case, to equalise the circulation, as much as possible before the bath; and, in the other case, to maintain reaction as long as possible after it.

II. The best time for the sitz-bath is between meals, after the digestive processes are finished, yet with ample time to allow for the necessary exercise, and due rest after it, before the arrival of the next meal hour.

III. The temperature and duration of the sitz-bath are points of great importance to regulate properly The sitz-bath has been much abused by the excessive coldness and quantity of water, its too long duration, and its too frequent repetitions. In this way they chill too much the spine and the abdominal organs, and aggravate the congestions they were intended to relieve. Patients are often injured, in this way, by what is called the "running sitz," where the water is constantly changing. When the object is to produce a *sedative* effect, to reduce excessive action, the temperature of the bath must be higher, and the continuance in it longer. The water to vary from 65° to 80°, and the duration in it from twenty minutes to three quarters of an hour. It may be tepid, or chilled, and *cooled down*. When the object of the bath is to produce a *stimulant* effect, then the water in the bath is to be colder, and the stay in it shorter, say a temperature varying from 45° to 65°, and the time in it from five to fifteen minutes. This is the bath prescribed where the object is simply to brace the system generally, to tonify the stomach and bowels in particular The *stimulant* sitz-bath is, therefore, a great resource for patients afflicted with diarrhœa, constipation, hæmorrhoids, and in the convalescence from most chronic disease.

IV. In most cases friction, with the wetted hands, of the loins and bowels, assisted by the bath attendant, while in the sitz-bath, aids its effect. In all cases where the *stimulant* effect of the bath is sought for, it is desirable for the patient to join himself in the friction. But when the bath is used for its *sedative* effects, then the patient must on no account take any part in the rubbing, or exert himself otherwise in the bath; such exertion proving too exciting to the heart and brain, and counteractive of the effect desired. In such cases, therefore, it is imperative that the bath attendant alone sedulously ply the friction, if so directed. Some patients prefer to be left perfectly quiescent in the bath, an instinct not to be violated without good cause.

V. If the sitz-bath be prolonged, and especially if the weather be at all cold, the upper parts of the body should be well covered. One blanket at least should be tucked well round the neck, and thrown over the shoulders. In most cases, the chest, front and back should have a covering extra, as a wadded waiscoat, flannel, or shawl.

VI. In cases requiring the longer duration of the sitz-bath, whether for sedative or stimulant purposes, it is safer to make them shorter, and more frequent, than to prolong them to the extreme point of the patient's endurance. In the latter case, the risk is run of their determining internal congestions. In cases of neuralgia, they might fix the pain in the pelvic viscera, or intensify it in its own locality.

VII. In all ordinary cases,—for example, chronic digestive disorder,—two sitz-baths per diem may be taken, say at 11½ a.m. and 5½ p.m. At an average these may be prolonged to a quarter of an hour each; if for a derivative effect to half an hour each, and of a temperature between 50° and 70°. In particular cases, as in diarrhœa, they may be taken every four or six hours, but not exceeding ten minutes at a time, and of a temperature not lower than 65°, with well regulated friction all the time. In such cases, however, let me enforce it upon you, this is only half the practice, and *the least half*. It is a mistake to suppose, as Priessnitz at one time did, that obstinate cases of dysentery and diarrhœa are curable by prolonged sitz-baths frequently employed. By such practice I know some mischief was committed. Such baths draw too much upon the vital powers, and exceed the just limits of reaction. Derivation, perspiration, and all tendencies to the surface therefore checked, and the intropulsive action which is set up instead, augments the interior con-

gestion, and keeps up the intestinal irritation dependent thereon. In these cases the best practice is the sweating process, with the lamp or blankets, as the patient can best bear it, to create a powerful revulsion of fluids from the intestinal mucous, to the cutaneous covering; and especially a hot fomentation of the bowels for half an hour or more should at intervals precede each bath, and in the intervals a heating compress, protected if necessary, by oiled silk, and a flannel binder. One of my favourite modifications in such cases, as well as in others, is to apply flannels wrung out of hot water to the whole abdominal region, during, and particularly at the commencement of, the lamp-bath. The attendant gives the steaming flannel to the patient, *under* the blankets surrounding the chair on which he is seated.

VIII. In cramps of the stomach, colics, &c., in addition to hot fomentations—which I shall speak of in their place in reference to this point—short cold sitz-baths of five or ten minutes, and shallow baths occasionally, *properly modified*, are advisable. If prolonged they effect decided, often immediate, relief. But they must be prescribed with great judgment, as their misuse may determine worse gastro-intestinal irritation.

IX. In nervous headaches, the prolonged sitz-bath is highly advisable, beginning first at a temperature of 70°—75°, after a quarter of an hour lowering to 65°, and at this heat continuing the bath for half an hour, or even an hour, if relief does not come sooner. But this bath is *so* allowed on the proviso that nothing in the state of the digestive organs contra-indicates its prolongation. Steady and gentle friction of the bowels and loins at the same time is necessary to ensure its full action.

X. In cases of suppressed or retarded menstruation, or hæmorrhoidal discharge, two or three sitz-baths per diem, of 60°—70°, of from five to fifteen minutes duration, with the *wet-sheet rubbing after each*, and other processes indicated, will be very likely to re-establish the secretion, by producing the disgorgement of the pelvic viscera, or of the portal.

P.—I have heard your patients call the sitz-bath by all sorts of odd and fanciful names, such as the meditative sitz, the tranquilliser, hatching health, &c. It was a valuable adjunct in my restoration, that is certain. We water-patients are certainly neither dull nor dejected invalids; "alacrity" is our motto, and cheerful spirits, with returning health, are

our reward—for *obedience to the organic laws*, and their physiological interpreter, the WATER-DOCTOR. Have you any more rules to lay before me?

DR.—I have much more to say, but I think it will be more appreciated in the form of illustration, and in another place.

CONVERSATION XII.—OF COMPRESSES AND WET BANDAGES, THE COOLING AND THE HEATING, THE SEDATIVE AND THE STIMULANT, IN OTHER WORDS, THE LINEN POULTICES AND THE WATER RUBEFACIENT OR PAINLESS BLISTER.

DR.—I WILL now give you a brief account, but sufficient I trust, to make you understand the water dressings, which are amongst the great practical discoveries of the healing art.

P.—I have read in some of your old books, that it was by a similar mode of using water—with the addition of some absurd form of incantation, to which all the good effects were ascribed—that persons in past ages performed cures so remarkable, as to gain for them the appellation of "miraculous."

DR.—Yes; in those days there were "MYSTERY MEN," who really did perform wonderful cures with "*charmed*" and "*blessed water*." Some of them, more material in their leanings, dropped a "*secret powder*" into the water, but only as much as could be taken up on the point of a pin, *so potent was it supposed to be.*

Ambrose Paré, who was a man of the greatest talent in the age in which he lived, refused for some time to apply water to wounds, as the curative effects seemed to him so extraordinary, that they could only be produced by supernatural agency, which, from religious scruples, he did not consider it justifiable to employ.* It is said, that even

* During the siege of Metz, in 1553, an ignorant quack called Maitre Doublet, as Brantome relates, "performed strange cures with simple white linen, and clean water from the fountains or wells. But he was assisted by sorcery and charmed words, and every one went to him, as if he were Maitre Ambrose Paré himself, a man so celebrated and considered the first of his day."

Ambrose Paré, who equally detested fraud and folly, in writing his report of "Proceedings of the Medical Department of the Army," speaks thus: "I do not deny that water is a good remedy in wounds and recent injuries, having employed it myself with much advantage, but I object to the mysterious words, and the vain and unchristian

Priessnitz at one time, was obliged to make the sign of the cross over the water, to show that there was no "*Satanic influence*" used in effecting such extraordinary cures by such simple means.

P.—If Priessnitz had been a man who could have made use of a *secret powder*, say as much as would go through the eye of a needle, to be put into each bath, and had transmitted the secret through faithful followers, with like secretiveness, I have a notion that by this time, you would have had all the world, and many of its doctors too, running after the water-cure, and crying out for the marvellous powders.

Dr.—Most probably. I shall now begin by directing your attention to the abdominal compress or bandage, which is applied to the abdomen, as a warm fomentation, and worn more or less, in the treatment of nearly all chronic diseases, where there there is morbid action going on in the stomach and bowels, liver or kidneys.

ceremonies, that accompany this new and singular practice, which is so simple, that it requires no aid."

The Book on Surgery, by Gabriel Fallopius, published in 1560, strongly recommends the use of natural water as a "fruitful source of success."

Laurent Joubert in his work on "Popular Errors," published in 1578, exposed the folly of using charmed water; and described common water as being most efficacious in procuring "a favourable termination and a good cicatrix."

In 1732, Samorier published "On the Use of Common Water in Surgery." He asserted that there were few wounds which could not be healed by this treatment, more promptly and satisfactorily than by any other means.

In 1785, a number of men were severely wounded in proving the cannon at Strasbourg; a miller of Alsace undertook their cure, by the leave of the Intendant of the province, with *blessed water;* these wounds were all cicatrized in six weeks. A second proving of the cannon wounded thirty-four men. They were dressed with common water by Lombard, the surgeon-in-chief, by which means they were all cured. The progress of the wounds was witnessed by Baron Percy, then a surgeon-major of cavalry. The success on this occasion produced a pamphlet from Lombard, in 1786, *On the properties of Simple Water as a topical application in the Cure of Surgical Diseases.*"

Baron Percy always afterwards employed *warm* and *cold* water, according to the circumstances. He says they often had from 6 to 8,000 wounded in their hospitals. His experience, therefore, cannot be questioned, and so strong was his conviction of the utility of this treatment, that he said, *he would relinquish military surgery if he were prohibited from using water.*"

P.—The application of wet linen to *this region*, above all others, and to be worn more or less regularly, appears to me a very remarkable idea to have entered into the head of a man like Priessnitz, granting the supposition that he had neither anatomical, physiological, nor pathological knowledge.

Dr.—It is so; and more particularly when we find that it was a highly physiological proceeding, applying his poultice to the right place, and to the *fons malorum* in the majority of cases of chronic disease. It is used in the following way:—A bandage sufficiently broad to reach from an inch above the pit of the stomach to an inch or two below the navel, and long enough to meet when passed round the abdomen, is wrung well out of cold water; this is applied comfortably tight, and another circle or two of *dry* linen continued over it. This we called "Neptune's girdle." I wore it in this form at Graefenberg, but finding some discomfort in having the wet application on the loins, I contrived a linen belt, with four strings, having the *wetted part* or compress, separate, covering the *anterior part*, and extending only half or three quarters round, as I have mentioned in my first work on the water-cure. This answers every purpose in most cases, and the wetted part can be extended over the kidneys when required. This linen belt can be taken off and replaced more easily than the long bandage, and it admits the convenience of placing oiled silk, or a fold or two of flannel *over* the moveable piece of wet linen. I find the *dry* flannel particularly useful, where additional *warmth* and not heat is required, it has also the advantage of absorbing the vapour, and preventing the dry linen belt from becoming damp.

P.—I have heard much of these heating and cooling compresses. Will you explain to me the difference between them?

Dr.—With much pleasure, for I find that the prevailing ideas of the nature and action of compresses amongst persons who come here, are exceedingly vague and confused. I shall re-examine the subject, and attempt at least to make it clear and comprehensible to you.

The division I make of compresses, is into the *emollient* or *soothing* compress, or the simple *linen poultice*, the *water dressing* of Macartney, adopted by English surgeons. Next, the *rubefacient* or gentle *derivative*—composed of linen thoroughly wrung, so as barely to suffice to keep the epi-

dermis soft for a time, and closely applied to the surface of the skin, so as to burrow, as it were, in the delicate textures, to irritate them, which irritation shows itself in an erythematous blush, and sometimes a pustular, or vesicular eruption. Lastly, the *sedative*, or powerfully derivative compress. In this the linen is well soaked, and is constantly renewed before it gets too warm, so as to prevent reaction in the part, and accomplish the purposes of *sedation*, where we have to deal with a high state of irritation or acute inflammation.

The alleged *heating* or *stimulant* effects are *relative*, not absolute characteristics. The compress may be made very *cooling* by the slightest modification. Indeed, it is always *cooling at first*, and only becomes heating and stimulant according as it is covered, and in proportion as the water evaporates with which the linen is impregnated. To make it permanently *soothing* and *healing*, it is only necessary to moisten the linen more thoroughly, and to prevent evaporation, as is done by an impervious covering, as of oiled silk. This constitutes the *water dressing* of the hospitals, and is in fact, the best sort of *poultice*—the sweetest, the cleanest, the least messing and troublesome. It consists simply of several folds of linen, or lint, dipped in water and slightly expressed, if simply for *a poultice*, in which case, it must be covered with oiled silk to prevent evaporation. But if the object of the compress be *derivation*, and to act as *a rubefacient*, then it is thoroughly wrung out. This is applied as smoothly and closely as possible to the skin, and care is taken to cover it with several folds of dry linen. This prevents all possibility of air getting in, and so lowering the temperature of the part. The surface of the part bandaged, is in fact, for the time being—in the case of the *poultice*, for instance—placed in a local vapour bath, and in the other case, the effect is the same in due time as if a rubefacient blister or very gentle escharotic had been applied, making the part very red, without pain.

P.—This is all very interesting, and will be more so when you have told me the physiological and therapeutic effects.

Dr.—They vary according as the compress has been used as a simple *poultice*, a simple *rubefacient*, or a simple *sedative*. The last I might omit, I believe, for it has nearly the effect of any local bath, as the long sitz-bath; and, I dare say, you now so thoroughly understand the action of such, that their repetition is here unnecessary. With regard

to the simple *poultice* compress, and the *rubefacient* compress, they have certain qualities in common. For example, the rubefacient compress when first applied, and until it begins to get dry or over-heated, is a poultice. They both in common produce softening of the epidermis. They in common effect also maceration of the true skin beneath, and the dispersion or *absorption* of any extra-vascular, or superfluous fluids, contained in the tissues of the part. Hence, morbid tension and swelling are reduced by such applications, as one of their most obvious results. But an effect of the *rubefacient* compress, not yet sufficiently appreciated, I have still to mention, which is, that the intimate adhesion of the comparatively rough texture of the drying cloth, to the exposed and softened vasculo-nervous web of the skin, irritates and inflames it to a certain point. That the red suffusion or *blush* on a part whereon a compress is constantly worn, is *in some measure* owing to the irritating effect of the texture of the linen, is evident from the fact, that the irritation is the livelier as its dries, and that the irritation is appeased for a time by remoistening the compress. The wet compress here acts the part of the mildest escharotic or rubefacient; in fact is *a painless blister*, a diffused *seton*, only one that has *not* disorganized the tissues of the skin.

P.—And so the wet compress is, in this view, a physiological curative agent, not a *pathological* one, as anything that produces artificial disorganization of the tissues and suppuration must be. This alone speaks much in favour of your methods.

Dr.—You justly appreciate its superiority, and the grounds of it, in some measure. But to continue—the *rubefacient* action of the heating compress being admitted, how powerful a revulsive agent it thereby becomes is a clear matter of course. You have produced and *keep up*, and this too without pain, the effects of a blister or mustard plaster—troublesome rubefacients, and *comparatively evanescent* in their action. The energetic cutaneous actions which are produced by the rubefacient compress, are evident in the increased heat of the part, which always stands some degrees above the natural temperature. To develope this heat, you already know, that increased chemico-vital acts are necessary; and for these last, in turn, an increased circulation is necessary. Hence the revulsive action is clear. But as the heat is not allowed to escape *directly*—is not drawn off (as in the cold or chilled bath) as rapidly as it is evolved, the

derivative action to the surface is by so much the more gentle. Besides, the state of the skin so produced is favourable to its action as an eliminating organ. The proofs of the *outlet* thereby of *morbid matters* are often apparent to the senses of *sight* and *smell*.

In some patients this state of matters is produced *quickly*, in others it is more *remote*, the difference depending upon a critical tendency and a variety of *local* and *constitutional causes*. In some, the *external* effects are barely appreciable; in others, *the redness soon appears formidable*, without being so in reality.

P.—I see now the reason of the frequent prescription of the abdominal heating compresses in derangements of the digestive viscera. Their clearly established revulsive action must be an immense relief to the irritated or congested organs covered by the compress. It is a perpetual blister to them, of the gentlest kind, *a blister that gives no pain!*

Dr.—You are quite right, it is a *painless* blister. For the reason you allege this compress is worn in most cases of derangement of the digestive viscera (which is at the root of the evil in a great many chronic diseases), in all irregularities of the bowels, constipation, diarrhœa, spasm, &c. The chest compress is worn in like manner in many cases of chronic diseases of the lungs, air passages, and heart.

P.—But do you not think it probable that when worn very long the compress loses its peculiar irritant action on the skin, and therefore its utility as a *revulsive?*

Dr.—In some cases undoubtedly it does, to a certain extent. The indication of their doing good in one way, as of their continuing to exercise an active revulsive power, is seen in the red (erythematous) state of the surface, and the vesicular and pustular eruptions in many cases. So long as this effect continues, they cannot be said to be inoperative. You must also bear in mind, that, although the skin *shows it not*, the compress still acts powerfully on the organs and nervous apparatus beneath.

P.—The cases wherein you specially apply the *derivative* compress, we have just spoken of, namely, most chronic diseases of the abdominal viscera, I suppose you also employ them to the chest, in chronic, pulmonary, and heart diseases?

Dr.—Yes; but with much more caution. A patient may, without prescription, venture to wear an abdominal compress. But no patient should be so foolhardy as to attempt

the chest compress without special advice and experienced surveillance.

P.—In what local ailments is your *emollient* compress, or linen poultice, most frequently used?

Dr.—It is in general use as a dressing for all sorts of critical eruptions, whether in the state of simple inflammation or suppuration, for ulcers, wounds, and bruises, of all sorts; for gouty and rheumatic joints; and wherever there is pain, tenderness, swelling, or disturbance of the functions of a part.

P.—But I suppose this local medication must always be combined with general or constitutional measures?

Dr.—Always, except in purely local injuries; otherwise we merely dabble and dally in these efforts to purify the streams, instead of going direct to cleanse the fountain-head.

P.—Well; now will you talk to me of your cooling compresses, and of the purposes to which you apply them?

Dr.—The cold compress is linen soaked, without much wringing. It is changed often, so as to operate a constant abstraction of heat, and in this way to keep down inflammatory action in the locality whereon such compress is applied, or in a neighbouring part which receives its blood from that locality. With this object they are applied to inflamed parts, painful wounds, sores, and swellings. For example, in some cases of painful sore of the hand, as a boil, a cold compress is applied as far up as the elbow, and frequently renewed. This operates a diversion of the current of blood going to the hand, concentrates the chief activity of the circulation in the neighbourhood of the elbow, and at the same time cools what blood does go to the hand. In this way, inflammation of the suffering part is kept down, and the healing process best promoted. It also *prevents enlargement* of the *glands* in the arm-pits or the groin, by preventing irritation of the lymphatics in their course.

P.—In what cases are they applied most generally?

Dr.—They are applied in all *simple* inflammations of superficial parts of the body—as inflammations produced by external injuries, and in boils and eruptions on the extremities. But mark this—when inflammation of the vital viscera exists—(*inflammation from interior or constitutional causes, and not the result of accidental mechanical violence*)—*cold* compresses ought never to be applied. For then they will be likely to determine such congestions, or transference

of the inflammation to the tissues adjacent to those already implicated, as will interfere with the chances of recovery.

In all cases where parts are suffering from *sprain*, or from being *bruised*, *begin* with hot fomentations, until perfect ease is obtained, then apply a compress, *well covered*, wrung out of cold or hot water.

P.—It has occurred to me that your *derivative* compress has a great advantage in being worn when the patient is taking exercise, which one could hardly do with a poultice, mustard plaster, or blister. I have often found that I could walk twice as far with my compress on, and with half the amount of fatigue.

Dr.—I often made the same observation during a year that I wore it almost constantly. As I have mentioned before, it is an excellent *domestic remedy*, to be put on at *intervals*, when "the stomach is out of order." Some patients find it assists the bowels in a remarkable manner, others that it assists in producing refreshing sleep. Its peculiar effects relative to individuals is soon discovered, and it is worn accordingly. It ought to be refreshed every four hours, sometimes oftener. As a general rule, when under regular treatment, the patient may put it on half an hour after breakfast until dinner-time, refreshing it at noon. Again, half an hour after dinner until 5½ P.M., when it must be refreshed, and replaced until tea-time. When the compress is prescribed to be worn during the night, it is well in some cases to apply it an hour or so before bed-time, and not to make further change. I have occasionally found, and have heard others make the remark, that by refreshing the compress before lying down, it prevented sleep for some time. At other times, when sleepless, it acts quickly as an agreeable opiate, when applied fresh during the night. It is a remedy easily managed, and on the whole an agreeable one. I had some additional remarks to make on its surgical application, which I must defer to another occasion.

OF FOMENTATIONS

AND THE BEST MODE OF APPLYING THEM.

Conversation XIII.—*Its soothing and derivative effects—Its restorative and stimulant influence on the great centre of ganglionic life—A revulsive, rubefacient, and anodyne—*

Herbæ pro fotu no longer needed—Importance of changing the steaming flannels frequently—A valuable domestic remedy, and adjunct to other remedies—Rules for its application—A process not known to Priessnitz—How to apply fomentations—My fomenting machine.

P.—From what you have already told me of the effects of the local application of *warmth* and *moisture*, your fomentation process sounds like a peculiarly comforting part of the water-cure treatment. I suppose it is a modification of the action of the soothing compress or linen poultice?

Dr.—It is; and moreover it should be called the *ne plus ultra* of poulticing, for *soothing* and *derivation* are thus most perfectly obtained, and in the greatest degree. Each operation has, on deep-seated chronic irritations, as one of its qualities, the advantageous effects of a mild blister or mustard plaster, without any of their drawbacks; and in acute inflammations, in all nervous or neuralgic pains, in the sufferings of colic, biliousness, or sickness, or relaxation of the bowels, or other digestive derangements from dietetic errors, and in the *malaise* ushering in fevers and inflammations, in sore throat, &c., or affections of the lungs and air-tubes, it is then found to be the most agreeable and potent anodyne, and equalizer of the circulation. In fact, many acute maladies, if sedulously treated in the beginning with hot fomentations, would be cut short, or prevented running a serious course.

P.—*Derivation*, again, I see, is the rationale or foundation of the wonderful curative power of fomentations.

Dr.—It is so. Strong derivation, again, from the interior to the exterior, from the *mucous* surfaces especially to the *cutaneous* surface, is an evident, and one of the leading, effects of its action. Nothing aids more promptly in unloading obstructions of the *primæ viæ* and visceral congestions, which lie at the foundation of most chronic diseases.

At the same time it is necessary that I should keep in your view, and not allow you to underrate the *anodyne* effect on the *animal nervous centres*, of so grateful a process as hot fomentations on a large extent of sentient surface, on a region previously the seat perhaps of the most distressing sensations. The reactions of the *tranquillized brain* upon the organic apparatus in turn, is a prominent feature in the *modus operandi* of fomentations that must not be omitted.

Here we have the most *salutary* operation of opiates accomplished, and this without any risk of narcotism or poisoning.

P.—No small advantage certainly on the side of the water-cure *opiate* compared with the medicinal. Yet I must say that nothing can be more agreeable than the easy flow of gilded thoughts, and the dreamy, muzzy effects produced, for instance, by the *meconite of morphia*, when it agrees. I have heard that you do administer it on occasion.

Dr.—Yes, when necessity joins with compulsion; for, remember, that I have to bear in mind, in giving my patient *morphia*, in an extreme case, to lull pain and procure sleep, —that it also *congests the liver*, that the next day *most probably* there will be *sickness* and *atony of the stomach*, inveterate *constipation*, and in many cases all but *paralysis* of the *bladder* and *lower bowels*.

P.—I am beginning to perceive clearly many of the weighty objections that must occur to the mind of the reflecting and observant practitioner, when meditating his mixture of drugs. Indeed, I can hardly see how these conflicting thoughts and grave objections could long be put aside, or how the latter could escape the observation of any except a *routinier*, as deficient in the natural faculties of perception, or the ordinary powers of appreciation, as obtuse to human sympathy and feeling, or indifferent to sinister consequences.

Dr.—I must now particularly call your attention to a marked effect of the hot fomentations to the abdomen, in the stimulation they afford to the *great centre of ganglionic life* at the epigastrium or stomach-pit. This sometimes appears to amount to the communication of so much fresh vitality to the system, especially to the *organic apparatus*, which is directly under the control of the ganglionic nerves. The amount and extent of relief to suffering organs conveyed by the fomentations, will present itself clearly to your mind when you consider the important viscera in the midst of which *the ganglionic nervous masses lie buried*, and which are all necessarily comprehended in the action of the fomentation. Here we have the stomach and duodenum, the liver and spleen, the folds of the small and large intestines, the uterus, kidneys, &c. All or any of these organs, no matter how suffering previously, are now solaced, and partake of the combined soothing and derivative effect of this simple and invaluable remedy. No nervous irritations, no visceral congestions, especially if of recent formation, but are soon

relieved by this powerful *revulsive*, *rubefacient*, and *anodyne*. With the dissipation of those interior congestions comes the solution of pains and spasms,—or flatulence which may have risen to a severe state of suffering,—the release of bilious and nervous headaches, neuralgic pains, asthmatic fits, of vomitings or purging. These have all their origin, near or remote, in visceral obstructions, congestions, &c.

These fomentations are valuable adjuncts to many medicinal administrations, and they have this advantage, too, that there can be no prejudice to get over or contend with in adopting their more frequent use.

In most cases, where for a longer or shorter time any organic action has been embarrassed, sleep banished or disquieted, and the patient irritated and exhausted to the last degree,—by aid of the fomentations, in a brief time, *organic calm* takes the place of *organic tumult*, ease succeeds to agitation, and the whole apparatus feels to work normally and with renewed alacrity. What I have just described, you may frequently hear repeated, and descanted upon in the same strain, by my patients.

During several years that I wandered over Europe, out of health and harness, and before my good fortune made me acquainted with the water-cure, this fomentation was my unfailing panacea. I have no doubt that during that long period (with the aid of dieting), it mainly helped to keep the morbid processes in check; and often since—in my life as a "water-doctor" at Malvern, since 1842, which although prosperous, has been as *you* know, *no sine-cure*—I have found an hour's fomentation arrest distressing symptoms of fatigue and irritation, that, if not relieved, might have led to prolonged illness, or inconvenient indisposition.

P.—It occurs to me that I have heard of bags of heated salt, bran, hops, oats, and other matters, being often applied to the stomach, chest, loins, and other parts, with a similar idea, I should imagine, to that with which you use your fomentations.

Dr.—Yes, and *very good* they are in their *way*, *in certain cases*, but not to be compared, as a general remedial operation, to the steaming flannels well managed. Many think that the peculiar virtue is in the heated article, and use it more willingly and confidently on that account; added to which, the bag once placed and not removed, causes less trouble than a mismanaged fomentation, and does not wet the bed or the patient.

P.—The "*herbæ pro fotu*" are as old as the hills. I dare say you have often ordered camomile flowers and poppy heads in fomentations?

Dr.—Yes; five and twenty years ago I used fomenting herbs in the water out of which the flannel was wrung; but in the water-cure treatment the *faire semblant*, or make-believe, is done away with. The heat and moisture of the steaming flannels, we teach, are the true remedial influences. In the bags you mentioned, whether their contents be moist or dry, the wrung flannels have every advantage. Their *renewal* every five or ten minutes is an *important consideration*, for each time they are applied it is like a *fresh* poultice,—*a warm douche* to the part, that sends *agreeable* and *vivifying sensations* through the stomach, which seems, as the patient will tell you, to pervade the spinal marrow and ascend to the brain. When I first introduced these fomentations into the practice of the water-cure, I was told by some enthusiastic admirers of Priessnitz, that it was a fatal and unpardonable innovation. In relating what comfort and immense relief my wife expressed from the effects of the hot fomentations to the throat and abdomen, *directly before and after* the water-cure processes, during an attack of *scarlet fever* at Nice, they replied, "That is not the *cold* water-cure!" to which I readily assented.

P.—I see you have prejudices and jealousies amongst yourselves, as well as in the ranks of your *declared opponents* of the *exclusive* and *unmitigated* drug persuasion. I suppose you are not so *insouciant* as not to know the interesting fact, that you *have acknowledged opponents?*

Dr.—With my professional engagements and private meditations, what time have I to give to opponents? In truth, I utterly forget their existence, except when reminded of them and other misfortunes by a friend like yourself. How often may a man say, with a sigh, "Save me from my friends!" As regards your first remark, no doubt we have our miserable petty jealousies, heart-burnings, envy, hatred, and malice, like the rest of humanity It is said that the medical profession is notorious for having more than its share of these tormenting sentiments—"*a jealousy known only on the stage*"—hence the want of *esprit de corps*, so much needed; hence the oppression and advantage taken of medical men in public offices, which forms a subject of such just and frequent complaint in the medical journals.

it do not suppose that our profession has any *monopoly* the *forbidden* and *unphilosophical* feelings I have just entioned.

P.—Well, such is human nature!

Dr.—We must take Human Nature as it is—and have e not cause to be thankful!—for what a fund of good, hat endurance, what forbearance and long-suffering it ossesses, what sacrifices it can make! The great human eart, with all its responding sympathies, will never cease beat. It is, therefore, worth cultivating, and reasoning ith, for in due time, prejudices—*our own as well as others* -will give away, and the love of truth, and seeds of good, lanted so freely by Providence in the breast of every man, ill flourish, grow, flower, and fructify.

P.—I shall be glad now to hear any further instructions ith which you may favour me, for I intend indoctrinating y wife thoroughly in all matters relating to the water- ire, beginning with compresses and fomentations for the hildren. She is a lady with a warm heart and warm stincts, and I have no doubt will take kindly to what I all your particularly comforting processes; the rest will llow, although as yet greatly prejudiced, and dreading our "*damp-sheets*" and *cold* ablutions.

Dr.—You will do well and wisely. If once tried they ill never be abandoned, for she will find the fomentations valuable *domestic remedy*, either for an infant or an octo- enarian, for her baby or her grandfather. You understand learly from what I have told you, that the fomentations ac- omplish ends, that nothing else will do so *surely*, *innocently*, nd *promptly*, besides being *a valuable adjunct* to so many ther remedies.

I will now make a few passing remarks for your guidance, nd end by explaining the best mode of using the flannels, nd also describe my *fomenting machine*, which only requires o be known to be prized. I modestly think the *inventor leserves* to be immortalized—whether he be or not.

P.—If I know you well, I think you value your *machine* and the soothing *fomenting flannels* much more than any 'mortal immortality" to be obtained in this *mortal* world.

Dr.—Sie haben recht. I believe I forgot to mention that in cases where there is *inveterate low spirits*, and in the most deplorable forms of hypochondriasis—whose seat is incontestably in the alimentary apparatus and *ganglionic centres*—these hot fomentations are of pre-eminent utility.

Now to give you a few of the promised rules :—

In the *first* place, in the performance of this process, use every care to protect the patient against all risks of taking cold, when the hot flannels are renewed. Needless delays, open doors, windows, and draughts, must be guarded against.

2. The temperature of fomentations is of great importance. To be *strongly derivative*, to be *rapidly rubefacient*, they must be as hot as they can be *comfortably* borne. This is required, for example, where there is intense irritation, or the *very commencement* of an inflammatory affection, as of the throat or larynx, of the lungs, stomach, bowels, bladder, or womb.

3. In cases where the irritation to be subdued is chiefly *nervous*, the object being then more to *soothe* than to *revulse*, the fomentation must be only comfortably warm.

4. In all fomentations, take care that the simply nervous irritation of the skin be not roused; for this exceeds the healthy point of *ganglionic stimulation* on the one hand, and is known by its unduly exciting the action of the heart and arteries; and, on the other hand, it unduly stimulates the *animal nervous centres*. In this double way, the process, instead of being soothing becomes exciting. This morbid effect is apt to occur on the subsidence of the internal irritation, against which the fomentations have been employed. The passing of the due point of the salutary action of fomentation, is indicated by their producing palpitations, tendency to headache, *malaise*, restlessness.

5. The effect of fomentations, therefore, must be well watched, and their abuse or morbid action guarded against. When they have done their work, when they have reduced irritation, they must be discontinued.

6. In the reduction of inflammatory action, when the pulse has lost its sharp jerky character, the hot fomentations may be discontinued. Their prolonged use, under these circumstances, would render it small, weak, and irritable.

7. Wherever the vital powers have been *temporarily* lowered, as by the *shock* of a severe fall, injury, or accident, and reaction is slow to set in, or is very imperfect—the hot fomentations sedulously applied on the abdomen, as well as any local injury, for a sufficient time, will prove the *greatest cordial*, and *restorative*. Nothing will so augment the failing or exhausted ganglionic power in such cases. If the animal centres give evidence of injury, as from being over

xcited by the view of danger incurred, or as participating
n the general shock and nervous failure, the fomentations
n such case also operate a powerful revulsion from the
gitated brain, yet *send back to it* all the soothing influence
f the moist heat upon the cutaneous nerves. This measure
oes not prohibit the cautious internal administration of the
eedful cordials, of which wine, &c., in gruel, often admi-
istered, *but in small doses*, is perhaps the best. *Small*
oses, I mean for teetotallers. *Tipplers, &c.*, require often
arge doses to bring them through the effects of accidents,
hat to the temperate whose *nervous centres* are strong and
ealthy, would be comparatively innocuous.

8. In all persons exhausted by inveterate chronic ailments,
whose organs of corporeal repair are thoroughly prostrate
that is, the blood-making, blood purifying, and blood-circu-
ating functions, are all radically defective)—in the *debili-*
ated, the *anæmic*, the *cachectic*, the *consumptive*, the *catar-*
hal, and in certain forms of *asthma*—in all such cases, hot
omentations and kindred processes are of the highest value,
nd of indispensable use. They greatly advance the treat-
ment and progress of the case. They effect this end by the
reduction of irritation, and by preparing the skin for reac-
tion under the processes generally, and thereby enabling the
patient to proceed safely and advantageously to the more
tonic and bracing stage of a course of treatment.

9. After feverish symptoms have been reduced by pack-
ing, &c., *when a return to bed* is necessary, fomentations will
often induce perspiration.

10. Local fomentations to gouty and rheumatic joints, to
seats of neuralgia, in certain painful eruptions, erysipelas,
&c., may often be applied as an opiate, with the certainty of
their *relieving pain, reducing irritation*, and therefore arrest-
ing or mitigating the *progress* of *morbid action*. Their
temperature, of course, must be regulated by the feeling
and state of the patient, and their duration by the relief
they afford.

11. In chronic diseases of the chest, asthma, consumption,
&c., a short fomentation at bed-time is often a great relief,
and of the greatest utility.

12. When over excitement has been produced, by indis-
cretions, worry, and vexation, or occasional excesses of
treatment—shown often in nervousness and feverishness—
hot fomentations and *repose* should be had recourse to for
their sedative and restorative qualities.

13. As a *general rule*, fomentations should be performed when the patient is in the recumbent posture, and can take rest after them, and during the process his mind should be kept free from excitement. Their *soothing* effect on the nervous and vascular systems would be diverted and in a great measure neutralised by active exertion either of the limbs or of the brain. Neither should they be applied for at least two and a half hours after a meal. Bed-time, in most cases, is the best time for them, that is, when applied to the abdomen or chest in chronic diseases, and when the patient is not confined to bed. In *diarrhœa*, hot and warm fomentations, combined with repose, &c., according to the stage of the malady, is a valuable adjunct to other remedies.

14. On the other hand, hot fomentations applied *occasionally* to the abdomen for half an hour, as a *derivative* and a *rubefacient*, before the *tepid shallow-bath, cooled down*, enable some patients with chronic duodenitis, and many dyspeptics, with tendency to flatulence, acidity, liver congestion, &c., to walk *briskly* for half an hour, or more, *without sense of fatigue*, who would otherwise have felt languid and indisposed to exert themselves. After the bath, the region on which the steaming flannel has been applied, will assume a *florid redness* for a short period, making the operation of the nature of a mild flying blister, but painless, and leaving no marks behind it.

15. In cases where parts have been severely bruised, with ragged or lacerated wounds, if there is much bleeding, the cold compress should first be applied and changed frequently, until bleeding of any consequence has ceased. Then, as soon as possible, the fomenting flannels should be applied, diligently changing them every eight or ten minutes. This must be continued until all *sense of injury*, or feeling of discomfort has disappeared. A piece of fine linen should first be placed on the injured part, and not removed, the flannel being each time placed over it. When this soothing application has done its work, apply wet linen or lint, with the water partly expressed, and a piece of oiled silk, or fine Mackintosh, extending an inch over the wet edges. Should pain and throbbing return, repeat fomentations. By these simple means the cure of wounds and injuries appear all but "miraculous."

Although I have compared the *water dressing* to a *poultice*, as being a household word, familiar to all readers, still the effects are very different. A poultice has not the healing

qualities of water dressing. A poultice is made of materials, which soon become sour and dry, and thereby, after a short time, it becomes an irritating application. A poultice favours the formation of pus, but water dressing either prevents or diminishes its secretion. Instead of the throbbing which continues under a poultice, all pain is reduced by this remedy, and its tendency is to cure wounds by an *approximating* and *modelling process*, without heat, pain, or discharge.

P.—I suppose, from what you have already told me, that Priessnitz knew nothing of the fomenting process you seem to prize so highly?

Dr.—It is to be regretted that he did not. At the time I was at Graefenberg, I have reason to know that the remedy would not have been received by him. He was as obstinate and headstrong as any advocate of *exclusive* drug medication. In the treatment of many delicate patients, especially where the nervous centres were much implicated, where the nervous system had suffered much, or was in *below-par* condition, he was often quite at fault. He had no idea that the influence of the brain had anything to do with bodily labour (*internal* or *external*), nor did he understand that all bodily labour or muscular exertion, *under the control of the will*, draws its energy and supply of power from the brain. He had never been directed to the study of their sympathies or reciprocal influences. He knew he had volition or will, but the source of the continued supplies of that power, and how injury and morbid conditions were produced, by its too long continued or excessive expenditure—he knew not.

P.—I suppose the same remark would apply to the practitioners of any school, whose education had been neglected, or who were indifferent to all physiological studies and reflection?

Dr.—Certainly, and it is well known that, unfortunately, they are a numerous class.

I believe I was the first who ever mentioned the word *repose* in connexion with the water-cure treatment; Priessnitz, from not appreciating all that this word indicates, was deficient in his management of all the cases where nervous complications existed. He had really no *soothing treatment*, properly so called; drive on and work away, was the idea that mainly possessed him; *rest* of *brain* or *body* was not understood by him as an *element of cure*. His theories were necessarily crude, and many of them erroneous; still

it is a matter for reflection and wonder, how much he did, and what *pregnant truths* he hit upon, and what wonderful cures he made, without the aid of any elementary knowledge.

It is a painful, if not an invidious office, to criticise one to whom we owe so much; but, in truth, many of his uneducated followers, both in this country as well as in Germany, commit great blunders, and cling with greater tenacity to his errors, than they have profited by his more perfect and judicious application of the processes.

It has been truly said that Priessnitz created the Water-Cure—for, although water had been used as a remedy for ages, and justly vaunted for its *wonderful efficacy* in many cases, still there existed really nothing worth calling a system for its application before his time. He had many great advantages that we have not; the majority of the patients remained as long under his care as he pleased; they were far from home, and out of the way of domestic, and other anxieties or vexations; but, in a great many cases, from excesses of treatment, *indifference to diet*, and his not knowing the meaning of the word *repose*—or how valuable a remedy and adjunct to the water-cure, he would have found in fomentation—much time was lost to the patient.

I will now describe the best mode of applying fomentation, so as not to mar the operation, or cause any discomfort to the patient

It is as follows:—To prepare for the process, *two* blankets must be folded so as to be about two and a half or three feet wide, less or more, and stretched across the bed, so placed that when the patient lies down they extend from under the hips to a few inches higher than under the pit of the stomach. This is for the double purpose of keeping the bed clothes dry, in case of the flannels dripping at the edges, from not being sufficiently wrung, and for wrapping round the patient after each hot flannel is applied. The many folds of the blankets retain the heat, and absorb the ascending vapour. The night-dress must be *carefully tucked up* to the arm pits. Four folds of *thick* flannel, something more than half a yard, large enough to cover the abdomen, from the pit of the stomach to the pubis, and from loin to loin, are well wrung out of hot water, and dexterously placed, as indicated, either by the patient or the attendant. The ends of the blanket bandage are then quickly brought over the steaming flannel, and tucked in on each opposite side,

repeating the same with the under blanket. The bed clothes are then comfortably arranged about the patient, and he is left in quiet. Every five or ten minutes, as the flannel cools, or as soon as the genial feeling of warmth is less perceptible or gone, it is replaced by another. Two flannels, of course, are requisite, to prevent delay in the changing; some patients require, and like to have the two flannels applied at the same time, in that case, there should be four at hand.

The best plan we had for obtaining the flannel *hot and sufficiently* dry, before I contrived a machine, was by placing it in a basin, and pouring sufficient boiling water to soak it well, then taking it up with a towel, which was rolled round and wrung, but this did not ensure all that was required.

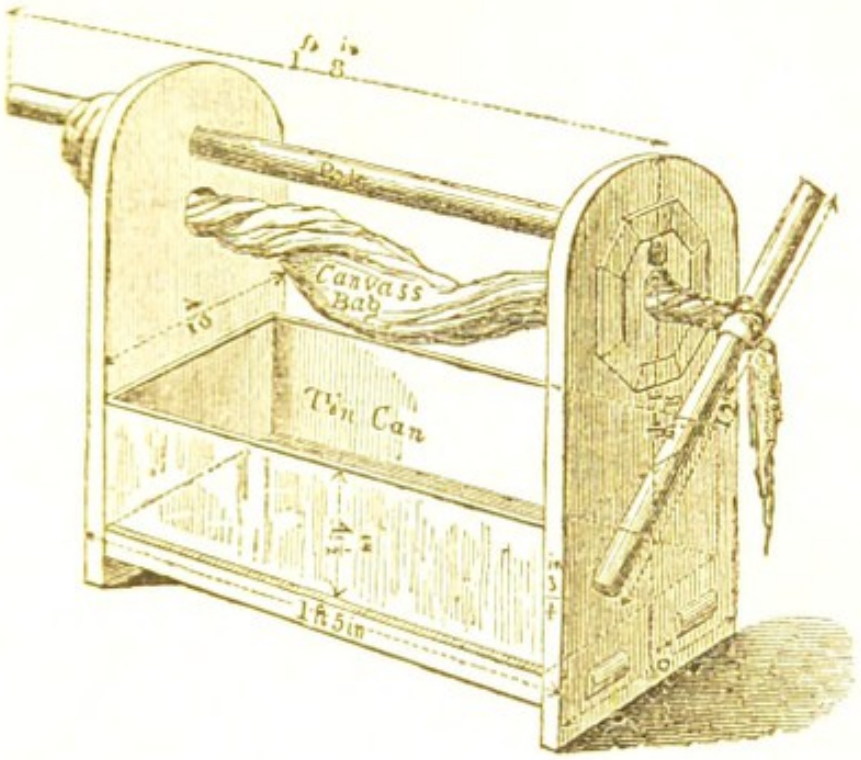
P.—I have no doubt that this simple and salutary process, the importance of which must strike every one, has failed in its *popularity* and *frequent use* from mismangement. I had it applied in town, late at night, some years ago, and found, when it was over, that the flannels had dripped at the edges, that the bed under the hips was quite soaked, and my night-shirt, not well out of the way, was also wetted. In fact, though much relieved from pain, and made sleepy by the operation, I was much vexed, and got chilled by having to get up and change the wetted linen. This disturbance put me out of conceit with the whole thing. I had only a towel applied over the *half-wrung* flannel—the effectual protection of *two blanket bandages*, was left for the care and ingenuity of the *practical* water-doctor to suggest.

Dr.—Many good things in this world, in remedial as well as other matters are lost, or thrown away, by not being used properly. I will now briefly describe this simple fomenting machine, and how I came to contrive it. Riding a fiery horse up to fifteen stones with hounds, we went at racing speed at a rail and fence, but unfortunately he made a mistake, brought the rail down, and went over on his head into a deep ditch. The pummel of the saddle rested for a time on my breast, crushed the ribs, and in getting up the horse broke some of my small bones. When I had recovered from the stunning, a cold perspiration broke out and continued. I was assisted home, and as soon as possible, got myself placed under the operation of the lamp-bath. During the sweating, flannels wrung out of hot water were handed under the blankets, which I applied as well as I

could to the chest and ribs; this soon converted the *cold* into a *warm* perspiration, which was continued for half an hour. I was then assisted into a bath at 100°, where I reclined for ten minutes, and then had it cooled to 80° for two minutes. When in bed I had hot steaming flannels well wrung applied to the chest, ribs, ankle bone, &c. Great pain now commenced, and I could only with great difficulty draw sufficient breath. The fomenting flannels were renewed frequently for seven hours, before I was quite free from acute pain. The change every eight or ten minutes was neatly and pleasantly managed, without discomposing me in the least, but the hands of my servant and his assistant were sore, from the frequent wringing. I tell you these simple particulars, that you may know the best thing to be done, in the event of you ever experiencing such an accident. A very clever surgeon, who was in the house under my care at the time, expressed his surprise at seeing me on the sofa consulting with my patients two days after the fall. This I undoubtedly owe to the *fomentations, hot baths cooled down, compresses*, and the *genial revulsion of gentle sweatings*. The injuries were very severe, for I felt their effects for many months.

P.—As—the *aid* of your *magic lamp* when from home—"*Boots*" would say, the water remedies "*broke the neck*" of the accident, that nearly *broke yours*,—that is, as you would say, by dissipating all *sense of injury* as soon as possible, and with it the stagnations and other morbid phenomena that follow in such cases, and interfere so much with the rapidity with which Nature *undisturbed*, sets to work with her reparative processes.

Dr.—Whilst still in bed, and reflecting on the value of fomentation, and the obstacles to its use, I drew a complicated and expensive machine for wringing flannels, and marvelled I had not done so before. This, in a few more sketches, I simplified to its present state, which answers perfectly. It may be obtained at Mr. Lamb's Library, Malvern, or made by any carpenter, for a few shillings.



FOMENTING MACHINE FOR WRINGING A FLANNEL OUT OF HOT WATER.

The wooden bar, an inch and a half in diameter, serves to carry the machine, and is a little thicker inside the holes, to resist the inward pressure, when the piece of canvas is tightly twisted. It is held firmly by the left hand when the handle is turned round. The piece of canvas is simply tied with twine to the protruding end of the bar, and the same to the handle. The piece of canvas should be thirty inches by fourteen inches, to hold the flannel, and to leave some to spare for the fastenings, and the shortening when twisted. The tin can, to receive the dripping, is moveable, and made to fit. There is no iron work, and it can be taken to pieces in a few minutes. The half yard of flannel is dipped in a can of boiling water at the side, and laid on the canvas, and twisted as dry as possible.

P.—Every mother of a family ought to get one made, for at the beginning of all the ailments of children—as I have witnessed in my own family—fomentation is a *panacea* and "a real blessing." It often leaves, comparatively, very little for the doctor to do.

Dr.—Truly. In teething, and in all their stomach and bowel complaints, coughs, measles, scarlet fever, croup, &c., it acts like a charm. The mother who has witnessed the result of this simple application, properly applied, will feel that she has in her possession an invaluable remedy.

P.—It strikes me very forcibly, since our late conversations on the water-cure processes, that your fomenting machine, with the lamp-bath, sheet-rubbing, compresses, and partial packings, would have been of great use in the hospitals at Constantinople. My impression is, that they would have saved hundreds of lives. They are so simple and manageable—and their effects so evident and immediate—that the assistants and nurses would, I have no doubt, have taken kindly to them.

I have still a vivid recollection of the first winter of horrors in the East, and of seeing, day after day, the long columns of the *Times* filled with the dire account, and long lists of deaths by diarrhœa, dysentery, and fever.

Dr.—My impression was the same as your own, and so strong was my conviction, that I wrote to my good friend, Lord Rokeby, requesting him to offer my services, through Mr. Sidney Herbert. I offered to go, and remain there, entirely at my own expense—not as a "water doctor," but as an ordinary medical practitioner, willing to lend a hand, and make himself generally useful. I stated that I had almost lived in Hospitals for seven years; had afterwards witnessed the practice in nearly every great hospital in Europe, and could undertake simple operations, and any amputations, with little preparation; had been twenty-five years in practice, and had now a hospital of my own, &c. After some weeks I received a polite letter thanking me, but fearing it could not be done, not being quite the custom. About this time, there was an outcry for medical men, those at the hospitals were too few for the work—they were worn out with fatigue—many also had died, and many more invalided.

In my practice here, I have had a great many patients suffering under chronic diseases, from climate, exposure, and want of care, &c,—patients from India, Ceylon and the Antipodes—with long continued diarrhœa, dysentery, and intractable fever, of an intermittent character. From the success of this simple treatment, in these cases, I have not ceased to regret, that I did not go to Scutari, on my own account, without a permit or introduction. I might have introduced the practice gradually, being sure that it only required a trial, to have been adopted by the medical staff, with great satisfaction.

The medicines that I combine with the hydropathic processes, in many of these cases, are the meconite of morphia, quinine, mineral acids, bicarbonate of potass in large doses

of pure water, and port wine. When the liver is much disordered, castor oil in small doses, at appropriate intervals, is a valuable remedy. These medicines act very differently, —that is, with more certainty and efficacy—when given as adjuncts to the hydropathic remedies we have been discussing. The gentle and long continued perspiration by the lamp-bath, with or without fomentation, produces a feeling of great comfort, and when the patient is refreshed by a simple ablution, he is then in the best condition to respond to any drug medication that may be indicated. When there is burning skin, &c. the packings and fomentations, answer the same purpose, and give the practitioner a fair start of the enemy, and afford him favourable intervals, to be judiciously employed, for other remedial and defensive measures.

THE WET-SHEET RUBBING.

CONVERSATION XIV.—THE wet-sheet rubbing is a modification of the shallow bath, or any ordinary ablution, and may be used as a preparation or substitute for either. It is a powerful tonic and stimulant.

P.—I find the wet-sheet rubbing so refreshing, that I have got quite to enjoy it.

DR.—I cannot speak too highly of it. This process is one of the admirable practicable discoveries of Priessnitz. I do not know a more beneficial bath in certain cases; and so generally applicable as an adjunct to other treatment. It is safe to administer, salutary in its results, and very exhilarating and refreshing for the moment. It is a strong revulsive to the surface, and powerfully rouses the organic and animal energies—summarily removing languor both of mind and body. It answers for almost every case, and under almost any circumstances. It does not permanently chill; there is but one *chill*, and it is instantly warmed by the body. It does not, therefore, abstract a great amount of animal heat; yet it may be made at will to give a shock or stimulus of considerable power so as to act most beneficially on the languid system, as it can bear it. By the active friction it permits, it *ensures* reaction, and tends permanently to *fix* an increased circulation on the surface.

P.—In what cases do you recommend the sheet rubbing?

DR.—In the beginning of the treatment of chronic diseases, when the patient is much debilitated. It is an excellent substitute and preparative for the shallow-bath. It is

then a safe test of the condition of the skin, and of the reactive powers of the patient generally.

It is used as follows :—the sheet is steeped in cold water, and wrung just sufficiently to prevent its dripping. In this state it is thrown over the patient, who, embracing the fore part with his hands and arms, commences rubbing the face, chest, and fore part of the person, at the same time that the attendant pursues the same process on the back, loins, and lower extremities. This may be continued for two or three minutes, when it is replaced by a dry-sheet, and the rubbing repeated until the patient is well dried. The impression of cold seems only to be skin deep before it is followed by a pleasing and general warmth, approaching a glow. In very cold bloodless subjects, it may be advisable to continue the dry rubbing in a blanket for two or three minutes.

With nervous patients, the sheet may be placed gently over the shoulders, the head being left out, so as to avoid all shock. This is requisite in some cases of asthma, congestions of the chest, or head, or determinations of blood to either.

It may be applied with advantage in many cases before, and after a short sitz-bath,—then a dry rubbing-sheet. Many delicate or enfeebled subjects will find a TOWEL-RUBBING sufficient to begin; that is, towels half wrung out of cold, chilled, or tepid water, the patient using one and the bath attendant the other, briskly.

I may here describe the WASH-DOWN—a sort of intermediate process. The patient stands in an empty bath with a bucket of water by the side, and two large coarse towels. The bath servant from behind lays a dripping towel on the patient's head, which the latter seizes and draws down all over the front of his person, rubbing well with it the face, neck, chest, &c. The attendant uses the other dripping towel with similar effect on all the back parts of the body. This operation may be repeated two or three times with the strong. Once will be sufficient for the feeble. Some patients when the first rubbing is over like to produce a succession of small shocks, by pouring water over the head, shoulders, and different parts of the person, with a quart or pint jug.

THE FOOT-BATH.

CONVERSATION XV.—P.—I SUPPOSE the foot-bath is of

great use in your water-cure practice. According to your *rationale* (which appears to my humble judgment very rational indeed), it must powerfully determine *revulsion*, drawing the current of the fluids from the upper to the lower parts of the body.

DR.—Without a knowledge of this *revulsive action*, all attempts at explanation of the water-processes would be vain.

The most valuable boon, in the shape of a remedy, that man could receive, would be that that would enable him perfectly to *control the circulation*—to equalise the distribution of the blood—to slacken its currents when too rapid, to accelerate them when too sluggish. And to do this without injury to the digestive apparatus, or nervous centres. This the agency of the water-cure accomplishes better than any other curative means yet revealed to us.

P.—From what I have seen of its working, I think it might be affirmed to be, without presumption, omnipotent to cure most, if not all, diseases, if resorted to *in the beginning*, before disorganization of the solids and fluids has taken place.

DR.—You have *reasonable* grounds for much that you believe. In many acute diseases, in malignant fevers, in *neglected* cholera, plague, and other endemic and epidemic diseases, this destruction of solids and fluids sometimes occurs with awful suddenness, so as to make of no avail the best directed curative efforts of man.

The *extremities* properly managed, are powerful means of *derivation* from the central and upper parts of the body. They can be very conveniently subjected to the processes of cooling and friction, by which the circulation, and calorifacient actions can be powerfully promoted. The new or augmented physiological actions set up, take place at the expense and relief of engorged tissues, excessive circulation, or painful nervous action elsewhere. By this revulsive action they relieve pain, fidgets, lassitude. They afford very decided and prompt relief in most cases of nervous headache, even toothache, &c. They are sure, by repetition, *permanently to warm cold feet*.

P.—But why may not foot baths be used of *warm* or comfortably *hot* water, as well as *cold*, since you say that the cold water-cure is a misnomer—being only *cold* water-cure when patients can tolerate and enjoy the tonic and refreshing effects of *cold* water?

DR.—Why not? With scientific practitioners of the water-cure, they are frequently used, and are found a very available resource in cases demanding sudden relief, as in colics, diarrhœa, vomitings, sore throat, incipient congestions of the head, &c., occurring during states of exhaustion, after great exertion or exposure to cold. Then a foot-bath or leg-bath, to near the knees, of 100°—110°, from ten to fifteen minutes, with or without mustard in it, will often operate like a charm, with a stimulant cordial administered internally. These measures will *not* dispense with hot fomentations to the bowels or throat, which should be afterwards more or less prolonged, according to the relief afforded.

P.—But I suppose cold or chilled foot-baths avail you most in the treatment of chronic disease?

DR.—Yes; by their nature they are most fitted for such cases. They tend to operate the disgorgement of loaded or obstructed circulation everywhere, by the afflux of fluids they determine, or call away, from the seats and centres of morbid action. Notably they relieve congestion of the digestive viscera, and of the animal and organic nervous centres. Thus with a man's brain and stomach both often relieved promptly by one remedy, can he feel otherwise than hilarious and comfortable?

P.—But is not the powerful impression on the nervous system an important element in the beneficial effects foot-baths produce? How quickly that lady the other day came out of her hysterics, by having her feet well rubbed in cold water.

DR.—As I have impressed upon you before, it is beyond all dispute, that the nervous or dynamic impression on the vasculo-nervous web of the skin, and its reflexion thence on the nervous centres, go for a great deal in the soothing, refreshing, and exhilarating effect produced by bathing processes of every kind. The contact of cold water with the cutaneous surface, may be said to propagate a series of electric flashes of sympathetic nervous excitement over the whole body. In this the nervous centres, especially the visceral ganglia, receive the largest share, and in turn they as powerfully *react* on the viscera, rousing especially their sluggish circulation and tardy or arrested secretions. *In the soles of the feet and the palms of the hands, the plexus of vessels and nerves is highly elaborate in consequence of their functions as tactile organs*, the most useful and most used

nstruments of the mind and will of man. It is because of ne exquisite fineness and sensibility of their nerves, that ain in these organs is so painful. Hence they are preminently fitted to be sources of salutary impressions to the est of the economy when agreeably stimulated.

P.—According to your account, then, foot-baths are powerul auxiliaries of the sitz-bath and other processes, in chronic iseases of various kinds?

Dr.—They are. But to be of *permanent* benefit they reuire to be systematically and perseveringly used. If reorted to merely now and then, of course they can only be alliative. But so would be packing, or sweating, or the itz, or the douche, or any other occasional and merely emporary measure.

P.—What rules or limits do you intend to give me with eference to the use of the foot-bath?

Dr.—The foot-bath, like the sitz, and others, being essenally derivative in its action, whether its effect is to be *timulant* or *sedative* will depend upon the degree to which is pushed.

I. For the merely stimulant operation, or for the simply efreshing purposes of the foot-bath, its duration should not xceed ten minutes, its depth four or five inches, and its emperature 55° to 65°. Active friction all the time, whether f one foot against the other, or by the hands of the bathttendant, is indispensable—never by the patient, if he be ebilitated, nervous, or irritable.

II. For purposes of *sedation* (as for cerebral excitement, eadache, toothache, and face-ache, congestive pains of the nest, &c.), the water may be six or eight inches deep, and s temperature 70° to begin with, gradually lowered to 60°, nd its duration from twenty to thirty minutes. The friction lso must be unintermitting and well laid on—and never by ne patient himself. The bath may be repeated after a few ours, if the symptoms recommence.

III. The wants of a case, the pathological condition of ne patient, must be the guides of the sort of foot-bath to e given. Too large a quantity of water, too cold water, o prolonged a bath, or insufficient friction—in short, the bstraction of heat carried beyond the safe point of reaction, ould militate against the end proposed by the bath, would ermanently chill.

IV. When it can be done, active exercise should be taken,

before and after the foot-bath. In this way it is the best remedy for *curing* habitually *cold feet*.

V. Never place the feet, if cold, in a foot-bath I have been describing; better, if there is no other way, to warm them thoroughly first, by four or five minutes immersion in water of 100°—110°, and then cooled to 55°. The subsequent warmth and reaction will be more perfect.

The same remarks that I have made in regard to *foot-baths*, apply to *hand-baths*, and elbow-baths, &c. The benefit of the hand-bath, and its refreshing effects, consist in the stimulation of the nervous extremities being propagated to the nervous centres by the same nervous sympathies and connexions, and by the same derivative actions being set up. The elbow-bath is used exclusively as a revulsive in cases of wounds, critical boils, &c., that are painful, to arrest inflammation, and to keep the hand cool. The elbow is either placed in a basin of water, or cold compresses are kept applied and constantly renewed; the water dressing being simultaneously used to the affected hand. By this means the activity of the circulation is concentrated in the neighbourhood of the elbow, the afflux therefore to the hand moderated, and inflammation thus kept down.

P.—What remarks have you to make on the subject of HEAD-baths?

DR.—Used in the proper case, at the proper time, and of the proper temperature and duration, it is a bath that produces great relief to suffering. The essential of the bath is that the back of the head be kept in cold water,—the duration, from five to fifteen minutes, and at an average temperature of 62°—to 70°. But observe well of this bath, it is not recommended where there is any *active* mischief, acute or chronic, within the head, where any determination of blood or tendency to apoplexy exists, but purely and simply in cases of nervous pains of the head, neuralgia of the face and teeth, cephalagia, tic, migraine, or intractable rheumatic pains of the scalp, nervous exhaustion from fatigue, or excitement of the brain, in deafness, diseases of the eye, chronic coryza (*vulgo*, snuffles).

P.—Why do you not recommend this bath when there is active inflammation in, or determination to, the brain?

DR.—Because the abstraction of heat from the immediate neighbourhood of the disease, would only tend to increase the rush of blood in that direction, and thus augment the

evil. This is the foundation of the grand therapeutic canon, not to operate revulsion but at some distance from the diseased tissue or locality. It is, therefore, bad practice; it is contrary to the genius of the water-cure, and to the dictates of the true knowledge of derivation, to operate exclusively upon the head itself in cases of *active* disease, or where there are inflammatory symptoms, within the head. In such case, *the rest of the body*, and action on a *larger surface*, must be evoked. But in all, what might be called dynamic diseases of the head, it is a valuable remedy.

This bath is taken in the horizontal position, and on the floor; I prefer it given on a sofa or bed, without a pillow: a shallow basin with a little water in it is placed under the head. The water, as it gets warm, can be absorbed by a sponge, and replaced, if necessary.

THE DOUCHE-BATH.

CONVERSATION XVI. P.—I see by some of your old prints that the use of the douche-bath is of very ancient date.

DR.—It is so; but you must have remarked that it was only used as a *local* remedy. Before the time of Priessnitz, there was only a rude mode of letting water fall on such parts as joints, or where there was stiffness from local injuries. For a long time this was the only way in which it was used at Graefenberg; then it occurred to Priessnitz to apply it to the whole body, as a powerful revulsive and stimulating bath.

P.—He was the first who used a cold douche-bath as a constitutional remedy, for daily use, or to be frequently repeated?

DR.—Yes, it was reserved for the great original water-doctor, to hand this powerful remedial operation down to us. It is a highly intensified degree of the action and effects of the shallow-bath, the plunge, or the wet-sheet rubbing.

P.—The douche, I suppose, belongs exclusively to the treatment of chronic diseases?

DR.—It does; and it is then properly admissible only, in most cases, in the advanced stages of the treatment, or in decided convalescence, when all the more pressing indications of *visceral irritation*, or local inflammation, have been removed. It is, therefore, unfit, as long as constitutional

excitement is unremedied, when any active local disease exists, whenever there is fever or inflammation. Before prescribing the douche, the judicious application of *fomentations*, *packings*, *sweatings*, *compresses*, *local baths*, and *proper dieting*, must have done their work, in reducing all intense irritation or inflammatory action in the primary viscera.

P.—And you would add, *due exercise* and *repose*. How is an uneducated or non-professional man to know all this?

Dr.—He does *not* know, and is therefore liable, and often does much harm to persons who are unreflecting enough to trust their persons to his care.

P.—I am puzzled to know, with such incompetence, how they manage to keep up appearances, and get on with their patients?

Dr.—Simply because the patients are a *shade* more uninformed, and more ignorant than themselves on such matters. Knowing little or nothing of disease, or diagnosis, and very little of the water-cure, they must prescribe in the dark and at random. Priessnitz was a *rare* man, backed by immense experience and keen perceptions, but, although from years of close observation he had formed to himself a crude system for detecting morbid action, or changes affecting the different organs, he nevertheless could not avoid committing many deplorable mistakes, from want of this indispensable knowledge of pathology and diagnosis.

P.—I hope our conversations will aid a good many, by *inducing a desire* to pursue a course of studies in the right direction.

Dr.—I trust so, that is an intention I have always kept in view.

P.—What are the physiological effects of the douche?

Dr.—The douche is a powerful stimulant of the whole system—one of the most powerful we can administer. Organic life seems intensely roused in the first instance, and the animal life seems to participate in the exhilaration. The heart beats full and steadily, but *more slowly*,* and the circulation on the surface of the body is immensely quickened and stimulated. In this way it is powerfully revulsive from the interior to the exterior, from the centre to the surface—thereby operating to unload congestions and to liberate ob-

* In ninety cases out of a hundred, notwithstanding this exhilaration and powerful stimulation, the pulse is *tranquillized*. A remedy to please a physiologist.

structed secretions. The douche seems a highly *perturbative* process,—stirring up, as it were, from its foundations the whole system, and casting forth by the natural channels or outlets the *lees* or *dregs* of disease, morbid humours or *impurities*, that have long tainted the fountains of life, and poisoned all its currents. Hence, in proportion as the douche is well-borne and perservered in, as its powerful determination to the surface by transfer from the interior, is daily repeated for weeks in succession, and adequately sustained by the organic powers, a great constitutional effort comes at length to be put forth, and perhaps long pent-up materials make their way to the surface, or force an exit by some of the natural discharges. This constitutes the water-cure *crisis*, so gladly hailed both by patient and practitioner —whether it be as the *sign*, or as the *agent*, of relief.

P.—Would you be so good as to examine for me the particular elements of the action of the douche!

Dr.—These may be divided into its *primary* and *secondary* effects. In the *first* class I rank the immense abstraction of heat, the rush of fluids to the surface, and the activity of the chemico-vital actions to replace it. *Secondly*, the vivid stimulation of the nervous extremities, and the reaction thence on the nervous and circulating centres. Lastly, the excitement of the superficial capillaries, the friction of the skin, and the kneading of the subjacent muscles, induced by the powerful impingement of a heavy column of water descending from a height—the strokes of which may be likened to the blows of so many small hammers.

In the second class of the results of the douche are to be included the perturbatory actions referred to, the unloading of visceral congestions, the removal from the remote recesses of structural, from the byeways into the highways of the body, of a *materies morbi*, and the resortation once more of a free course to arrested or pent-up secretions; in all this is implied the removal of every impediment to the free play of the grand vital viscera.

P.—I presume that the greater the strength of the patient, the colder the water, the harder the friction (that is, the thicker the column of water, and the higher its fall), and the longer the duration of the whole process, the greater will be the action, and the more decided its benefits? I have often come from under the douche as red as a boiled lobster, and in a state of extraordinary exhilaration and muscular vigour. The pulse only 64.

Dr.—This is all very true. But do not run away with the praises of the douche. It is not a measure to be hastily recommended or indiscriminately applied. I do not know a process that requires more caution in its prescription for a continuance, or more safe for a single application. It is powerful, I admit, for good; but it is equally powerful for evil. It has, therefore, been much abused, and this often through no fault of the doctor. However formidable the douche may seem to the uninitiated, nevertheless it soon becomes familiar and divested of its terrors; and its high relish and appreciation by those once accustomed to it make it a favourite, so that patients are often with difficulty restrained within the just limits of their prescriptions. And not only are they apt to over-do the douche, but every other part of the treatment. Conscious of daily growing benefit, and clearly referring their amendment to the hygienic measures pursued, they are very apt to think they can never have enough of them. Besides, what makes the douche most liable to abuse is, that being considered by many the crowning measure of treatment, and usually the prelude to a curative crisis—the breaker up of morbid elements within the body and the hastener of their elimination—it is often eagerly anticipated, and prematurely snatched at as something that will certainly realize the patient's long cherished hopes of an emancipation from ailments that had previously poisoned the cup of life.

P.—What are the specific morbid effects of the douche?

Dr.—The morbid effects of the douche are best appreciated wherever there is diseased brain or heart. These organs, when not diseased centres in themselves, nevertheless receive the reverberations, as it were, of diseased actions everywhere else. Thus sympathising, the tonic excitement and perturbations of a process like the douche, are too much for organs already enfeebled or excited by their own derangements.

P.—What are the directions you would mention for the due administration of the douche?

Dr.—The following, I think, you would do well to bear in mind:—

1. The douche should be taken only by prescription, and never on the responsibility of the patient. Before taking the douche the heat of the body should always be a little elevated by exercise. A brisk walk of twenty minutes, therefore, should usually precede it: however, if the respira-

tion and circulation be much accelerated by the walk, it is advisable that the patient rest a few minutes previously. Noon is the best time for the douche.

2. The douche must always be taken *after*, never *during*, the labour of digestion.

3. Begin gradually. A douche of weak power should first be used, and according as the patient takes to it, or the system bears it, proceed to the douche of the highest power, which should not exceed a fall of twenty feet, and a column of water of three or four inches diameter. The duration of the douche may be, for the minimum, half a minute; for the maximum, two to eight minutes.

4. The douche must not be allowed to fall directly on the head, or on the region of the heart and stomach. The two last should be altogether avoided. The douche when falling on an erect person is always slanting, so that what some people call a "slanting douche," which projects the water at the person, has really the effect of what they imagine a perpendicular fall produces. This projecting douche has every objection; it has the same effect as if the patient was in the recumbent posture under the fall of the ordinary douche. A pain may be *fixed* in a part by this ill-judged proceeding.

5. During the douche the patient should exercise himself by moving the body in all directions, as if he was on board ship in a swell. It is a good plan first to let the water splash over the head, breaking the force of its fall by the hands crossed and held above the head; this breaks the ice, refreshes and removes any feeling of chill; it is then allowed to fall on the back, shoulders, sides, hips, thighs, and legs, giving *preference* to the *best covered* and more fleshy parts. The *soles* of the feet are also for a few seconds presented to it, once or twice.

6. When douching, move from side to side, across the spine, *not up and down*. An *over-chilled spine* produces very disagreeable effects. The nape of the neck should also be avoided, except by a quickly passing brush occasionally.

7. Care must be taken to dry the body thoroughly after the bath, by active rubbing with the sheet,—to refresh and replace compresses, and dress quickly, and to walk, or otherwise to exercise briskly—*walking is the best*. Thus the glowing reaction is maintained.

8. In order to avoid any *chances* of chill after the douche, it is prudent to avoid drinking much water, only sip enough to refresh, except when the health is all but perfect, and the

stomach so natural and sound as to be able *rapidly to absorb* larger draughts of water.

9. In some cases of paralysis, or any chronic lesion of the nervous centres, the douche should be prescribed with great discrimination; *care* must be taken, even if the malady is of ancient date, the morbid focus relieved, the appetite good, and the general health encouraging.

10. In winter, if the weather is severe, none but the convalescent and robust patients should take the douche.

11. In "used-up" patients,—cases characterised by shattered nerves, feeble circulation, languid secretions, &c.—where a long depraved digestion, or great dietetic improprieties, have radically impaired the constitution of the solids and fluids—the douche must be tried with great caution. Precursory, general, and local measures must first be used, to *get up* the prostrate organic energies. Nevertheless, occasionally, such patients—especially those of scrofulous constitution—and many *very delicate looking* ladies, are found to bear a *gentle* douche, in fine *warm* weather, better than anything else, and to improve rapidly under it.

12. The douche must be used with great caution, and only after some preparatory measures, in what is termed "sluggish," or obstructed states of the digestive viscera, in "torpid bowels," "congested liver," &c. The brain, in such cases, is generally as abnormal in its action and sympathies as the organs primarily affected, and will not bear the stimulation of the douche. Here again, the *reduction of irritation* must *precede*, by the use of fomentations, packings, gentle sweatings, chilled ablutions, sitz and foot-baths, compresses, and wet-sheet rubbings, &c.

13. Where the ganglionic system has been much abused, where inveterate dyspepsia prevails, accompanied with gloom, depression, and that cohort of miserable mental feelings constituting hypochondriasis, the douche must be tried with the same cautious reserve, as is indicated for the last two kindred categories of cases. The preparatory or *soothing* treatment is more judicious, and within the scope of the tolerance of the patient, and much more *genial to his feelings*, as well as more *curative* in effect.

14. In cases of rheumatic joints and limbs, when the faults of the digestive functions and blood-making,—which lie at the foundation of those diseases,—have been remedied and general measures counteractive of the constitutional effects of the disease have been successfully administered

then *local* douches, with a brief application to the whole body, may be tried, but with caution. All active irritation, all chronic or acute inflammation, must first have been subdued. Then, no other means will so speedily rectify the lingering faulty action of the muscles, sinews, nerves, and secretions of the joints.

THE PLUNGE-BATH.

CONVERSATION XVII.—P.—I FIND you do not use your plunge-baths as much as I expected.

DR.—Only in the case of the robust patients, or those far advanced in the cure. The shock that may be thus received is perhaps as great as any we could possibly give; provided there be sufficient constitutional stamina, or if the system be powerfully roused by passive perspiration, it is followed by strong reaction. But I do not like shocks of any kind, if not agreeable; even in the plunge-baths, I would rather the majority went in quietly.

P.—Had I not, in the course of your practice, felt in myself, and seen in others, the innocuousness of cold ablutions, or a plunge-bath, after *free and long continued passive* perspiration, I should have *theoretically* supposed it attended with great danger.

DR.—So many people think; but that is only one of the "vulgar errors." The theory on which such danger is grounded is based on prejudice, disingenuousness or *ignorance*,—not on physiology and experience. The danger is a fiction.

P.—Of course the practice is not to be indiscriminately adopted by patients, or at their own option or suggestion?

DR.—Of course not. *No part of the water-treatment* should ever be advised without a minute reference to all the circumstances of each individual case; and these may vary frequently, with the thousand modifying elements of human existence.

P.—What rules do you propose for the safe and effective administration of the full cold-bath or plunge?

DR.—As this bath, like the douche, is a highly bracing measure, it is generally used cold.

1. It is, therefore, only advisable for the more vigorous patients. It may be taken simply on getting out of bed or warm from the blankets in the morning; after the wet-sheet

packing; or after the sweating process; or at noon, after a *refreshing* but not a fatiguing walk.

2. The patient should walk to the edge of the bath with his blanket envelopes about him, so as to avoid the risk of chilling the skin before immersion. Before plunging, dip the hands in cold water, and with it lave the forehead, face, neck, and chest, or let a wet-sheet rubbing of half a minute precede it. The duration of the bath will vary according to circumstances—the minimum time is that necessary to get in and out; the maximum time three to five minutes. Active friction of the whole person with the hands, and active movement in every way possible, must be practised all the time of being in the bath. The head should be once or twice dipped under water, or washed freely with the hands.

3. Under no circumstances must the patient remain in the bath till any sensation of numbness or chill is felt. There is no danger so long as vapour arises from the arm held out of the water,—for this shows that there is a sufficiently elevated temperature of the body. On issuing from the bath, the patient to be instantly enveloped in a large dry sheet, and very *active*, but not *rough*, friction used in drying. The patient should dress quickly, and then walk briskly for half an hour at least. The morning, or three hours and a half after breakfast, is the best time for this bath. If a patient is unable to use exercise after this bath, he is unfit to have it at all. The shallow-bath, the best of all baths, with friction, and modified in temperature, is then required.

4. The cold plunge is to be forbidden to persons having a predisposition to cerebral or thoracic congestions, or with any organic disease of the heart, lungs, or brain. It is also to be renounced, if any marked stupor, oppression, giddiness, sense of fatigue, or *malaise*, takes place, on coming out of or after the bath. In all such cases, the safer measures are, the chilled or warm shallow-bath *cooled down*, with sufficient friction for a few minutes at each interval, with or without the wet-sheet packing, or the sweating process.

P.—I now begin to understand clearly, why *so many* are disappointed with the results of seaside and indiscriminate bathing, where there is no reference to *time* or *temperature*, *dieting*, or *bodily condition*.

THE SWIMMING-BATH.

CONVERSATION XVIII.—P.—I AM surprised you have not a swimming-bath, and so make your bathing department complete. It is a bath I should now enjoy immensely.

DR.—I have often thought of having one, for my more robust and convalescent patients. I should frequently like a good swim, as well as yourself. I have given a plan, to be executed forthwith and without delay, for two swimming-baths, about sixty feet long, to be placed *side by side*, the one to be cold, and the other tepid. So that you can go, or vault from one into the other. In the dressing-rooms there will be every convenience for all preparatory processes that *may be prescribed*, as advisable and valuable adjuncts, in certain cases, such as packings, vapour and lamp-baths, warm, tepid, and cold shallow-baths, &c.

WATER,

AND WATER DRINKING, UNDER WATER-CURE TREATMENT.

Heil! Heil! auf's neue!
Wie ich mich blühend freue
Vom Schönen, Wahren durchdrungen— — —
Alles iſt aus dem Waſſer entſprungen!!
Alles wird durch das Waſſer erhalten!
Ocean gönn uns dein ewiges Walten.
Wenn du nicht Wolken ſendeteſt,
Nicht reiche Bäche ſpendeteſt,
Hin und her nicht Flüſſe wendeteſt
Die Ströme nicht vollendeteſt,
Was wären Gebirgen, was Ebnen und Welt?
Du biſt's der das friſcheſte Leben erhält—
Du biſt's dem das friſcheſte Leben entquellt!—

GOETHE'S FAUST, Second Part.

CONVERSATION XIX.—P.—I REMEMBER reading, in your first book, your laudation of water, which, with most of your readers, I at that time thought rather superlative. I should like now to hear what you have to say, after so many years of practical experience.

Dr.—I have nothing to unsay—but could add, with unvarnished truth, much that would be thought still more exaggerated.

The great importance of water to the animal economy you may infer from the large proportion it bears to the entire composition of the solids and fluids, being *seven-eighths* of the whole.

P.—From this—the necessity of its free use in health, and the advantages of its scientific administration in disease—is apparent enough to me as a non-professional man.

Dr.—And this, because the moisture of the body is not like the water of a stagnant pool, but like that of a running lake—ever renewing, ever filling, ever emptying; the large waste of the body, its incessant exhalations, secretions, and excretions, creating a constant and copious drain. Independent of the purely *chemical* operations promoted by water in organised structures, its simply *mechanical* agency is all-important. Viewing the various parts of those structures as so many pieces of a nice machinery, unless the relative proportions of water in them were kept up, derangement or disease would occur alone from the want of that smoothness, softness, and expansibility of parts, which its presence confers, and which are conditions indispensable to the due performance of their functions.

P.—You have referred to the *chemical* agency of water in living bodies. What is that more particularly?

Dr.—Water presents the essential conditions and materials—*conjointly with the air received by the lungs*—for those decompositions and recombinations by which all the component parts of the frame are incessantly renewed.

P.—I wish you would now tell me, what are the more particular *mechanical* functions of water in the animal economy?

Dr.—In the first place, it modifies the composition of the fluids in general, and of the blood in particular. Secondly, is a diluent and solvent of the solider alimentary matters and their waste constituents in the intestinal canal. Lastly, it is a vehicle for carrying the nutrient principles therein prepared into all parts of the organism. It serves also as a menstruum in which to dissolve and *carry out* of the frame its *wasted*, *deleterious*, or *diseased* particles. In this last item of its *mechanical* utility, water is to be regarded as the grand purifier of the innumerable canals and reservoirs, pipes, sewers, and passages of man's complex machinery.

This is no low or unworthy idea. It is an idea that has been advanced by some of the *first* names in science, as explaining the undoubted *cleansing* efficacy of the water-cure in frames corrupted by the combined impurities of disease, diet, and drugs. Every drop of water absorbed by the stomach-coats, I have reason to believe, does not necessarily course the entire round of the circulation, for there are the passages of pitti, which lead directly to the kidneys. But it is highly probable, that they are brought into requisition chiefly when there is an *excess* of fluids to be disposed of. Under ordinary circumstances, and in the generality of cases, there is every reason to believe that the water is absorbed at once into the general circulating system, and chiefly by the veins, and that it goes the entire round of the body, dissolving and abstracting more or less the crudities it meets with in its course, and finally passing off charged with their impurities, by the various excretory outlets of the body. The copious dilution of the fluids is literally and truly a washing out of the solids.

What, I would ask you, can exceed the *beauty*, *freshness*, and *purity* of a glass of water taken from the spring? It leaves behind it no mawkish taste, no factitious or unpleasant odour. When it is taken during a walk before breakfast, after a bath, general ablution, or some hydropathic process, what can be more refreshing? it cleanses all the passages, purifying the mouth, filling it with sweet and pleasant fluids, and making the individual cheerful, hungry, and wide awake.

P.—It just strikes me as curious, that in dilating, as I have often heard you, on the properties, uses, and abuses of the contents of your medicine chest, its many specifics, new and old, its lacerating chemicals, deadly decoctions, and poisonous extracts, I have never once heard you use the word "*refreshing*."

Dr.—You remember well all I have told you of the *abuses*, forgetting my explanation of their *uses*. To return, this drinking cold water moderately in the morning, I beg you will particularly remark, also ensures, with other parts of the cure, the regular relief, so salutary and much desired after breakfast. *This is the rule*, the exceptions are few, and easily accounted for. How many there are now in this country, who will cheerfully respond to the observation I have just made,—invalids, who having adopted this simple

plan, can now relate, that the pill-box and purgative draught, so long thought indispensable, have for years been laid aside, no longer needed—discarded as "domestic plagues, disagreeable, and injurious."

I am also free to confess, that I never enjoyed such robust, uninterrupted health, as during nearly two years, that I took no fluid—with the exception of an occasional glass of milk—except water. During that period (although I had for a long time previously dreaded eating, finding everything disagree), I ate *all* that came in my way, in moderation. *I did not know that I had a stomach.* This is much for one who had been an old dyspeptic to be able to say, and that too, after having gone through so many years of fast living, combined with the incessant occupation, night and day, of a large private practice in London.

When I found the water-cure, I found a blessing. Now, when mounting the hills, after a bath, with the refreshing coolness of a glass of water still on the palate, in time for the first rays of the sun just gilding their summit, how often I find myself with buoyant heart and thankful spirit, repeating the appropriate and beautiful lines of Tasso :—

> *"O liquidi cristalli, onde s'estingua*
> *L'ardente sete a miseri mortali!*
> *Ma piu salubre e, se tra vive pietre*
> *Rombendo l'argentate e fredde cora*
> *Incontra il nuovo sol, che il puro argento*
> *Co' raggi indora."*

Notwithstanding that theory and practice, have demonstrated in every possible way that "*water is best*," the majority of mankind have yet no idea of the extent of its salubrious effects, when taken as a remedy in proper quantities internally, or applied in different ways externally. The long indulgence in *bad habits*, produces an unhealthy state of feeling, a deadening and perversion of the *body-conscience*, attended with the fear that cold water must necessarily produce unpleasant sensations, and some injury to the stomach. There is, therefore, with the multitude, backed and fostered by much erroneous medical opinion, a barrier to its use, made up of interest, dislike, fear, prejudice, and custom. When I returned to this country, half a dozen tumblers of water, less or more, prescribed to be taken before breakfast

after a bath, and during a long walk for a particular purpose—was thought a very dangerous and dreadful proceeding.

P.—I have heard you and your system held up to ridicule, with reprehensive insinuation, that you countenanced or advised twenty or thirty tumblers of cold water to be swallowed before breakfast, as a matter of course, finding it so *very* refreshing.

DR.—Malice, humbug, and nonsense. In the published account it was stated that such doings were only "experiments," made on his own corporation by a zealous water man, in "*perfect health*," who also adds in a foot note, "that patients should not make such attempts, but rather be on the right side of doing too little, than too much."

P.—Well, it really is a comfort, and I *am* happy to hear you say, that you do not insist on thirty tumblers, as the ordinary morning modicum. Moreover, I have also heard, that "water drinking produces dropsy—dilutes and impoverishes the blood—and that disease of the kidneys follows as a matter of course." Late even as last summer, when there was not a vacant room in your house, many of your patients told me, that they were *confidently informed* before they came here, that the water-cure was "quite done up," that although there might be *something* in water for *certain cases*, "it certainly would not do for *their* case," warning them at the same time that, "*most probably* the *first* bath would prove *fatal*."

DR.—Set it all done for what it is worth,—that is, the emanation of interested malignity and innate malevolence. But many know better, and it is therefore of the worst forms of dishonesty and untruth—hypocrisy, with cultivated cunning, wearing the mask of candour, and so adroitly assumed on every fittting occasion, as to lure the unsuspecting to receive the *shadow* for the *substance* of honesty.

P.—From your large intercourse with mankind, no doubt you are aware of the fact, that there are people occasionally to be met with, whom one never has heard, by any good fortune, uttering a word of approbation of any living being, or acknowledging even the possibility of good, in one mortal thing, *not their own*. They seem to labour under the egotistical delusion, that to confess even to themselves the perception of merit in others, would be tantamount to accepting a tacit reproof of their own unworthiness, and moral deficiencies. Before we part I must also tell you, *as a friend*,

that I have often heard your sanatorium denounced as "unprofessional," and all that sort of thing, with other inuendoes too flattering to mention.

Dr.—In reply to your amiable candour, the question may fairly be asked, whether medical etiquette or vulgar professional prejudice, should be preferred to the real interest or well being of the patient? there are persons who think not. It is to be regretted that the majority of the profession do not appreciate, or regard with complacency the new institution of water-cure establishments; but, however displeasing it may be, there is no doubt, that in the next and succeeding generations, they will be very numerous. The water-doctors, and their patients also—the persons most concerned—have come to that conclusion. Now, no more of your *friendly* reminiscences, if you please, but let us resume our subject.

P.—So!—Well, you have given me a very *tangible* and *practical idea* of what the water-drinking part of the water-cure is and does. It is a very straightforward, common-sense, and feasible means of clarifying the fluids and solids of the body, of cooling and moistening heated and morbid localities, of remedying their faulty constitution, of giving vent to surcharged humours by opening the natural outlets and safety-valves—sweeping out, in short, long accumulated rubbish, that had encumbered and caused stagnations in the highways as well as the byeways of the system, impeding the living traffic. I suppose you fitly compare the canals, conduits, and reservoirs of the animal structure, to the streets, lanes, and courts of a teeming city. You make it out that these corporeal thoroughfares from the lungs, intestinal tube, and the capacious sanguineous main pipes, down to the smallest veins, arteries, and capillaries, or hair-like vessels, go daily through a process of rinsing—are literally scoured out, as you would a dirty sponge or sewer—by the copious use of water, without and within. All this comes very home to us. We understand this. In this way, at least, you give nature clear and clean ground to work upon, with one of her own unsophisticated elements; and you afford her besides the *pure air*, the *wholesome nourishment*, the *corporeal exercise*, and the *mental quiet* necessary,—and leave her then unimpeded to rebuild the dilapidated structures of diseased man.

Dr.—And she does build them up when *seconded*, and every *fitting material* and *condition for successful labour* is

afforded her. By the whole hydropathic appliances secretion and excretion are stimulated to great activity, and are enabled to liberate, and to eliminate morbid elements, waste materials, crudities, and impurities of all sorts, lodging in the organism. Great is the power of the nervous system, I admit; but without purified passages, and without cleansed and healthy blood, in vain will it be stimulated or soothed, flogged or coaxed to do its work.

P.—I see, it would necessarily fall back into the doldrums and a maladive condition. Well, what have you to tell me of the *vital* agency of water in the animal economy?

DR.—In consequence of temperature, and most probably of some more secret and indescribable influence (electric?) on the nervous system, water powerfully modifies the vital actions and endowments of the frame. It especially controls the circulating system, and the organic and animal nervous apparatus, and acts alike in both on their centres and on their extremities. Hence its immense power and universal applicability as a remedial agent. It reduces action when above par, and exalts it when below par. Water, skilfully administered, can thus become a *stimulant* or a *sedative*, of all others the most innocuous. When taken internally, this soothing or stimulant effect of water does not end with *relieving the oppressed functions* of the interior parts it more directly comes in contact with,—that is, the mucous membranes, their vascular and nervous tissues,—but its action, one way or the other, is transmitted to the nervous centres, the intestinal ganglia, the brain and spinal chord—their morbid sensibility is diminished, their vital endowments intensified. These vital centres being tranquillized or stimulated just as they require it, they are in a condition to exercise their healthy control over the muscular, circulating, secretory, and absorbent systems. The *stomach*, the *bowels*, the *heart*, and the *lungs*, the *head* and the *mind*, the *sensations* and the *movements*,—even the *thoughts* and *affections*, all participate in the genial influence. This is called *reaction*, when induced by water applied to the cutaneous surface. It is the same phenomenon in the interior, when cold water is duly ingurgitated in its time of need. Not only are the necessary elements for chemico-vital operations affected, when water is swallowed by the thirsty, feverish, or choleric patient, but by the abstraction of internal heat the operations in question are augmented in order to supply its place. In this way, the functions of nutrition, of deposit

and of waste, are quickened. Bit by bit, aided by diet and regimen, &c., morbid processes are checked, abnormal tissues broken up, and the impediments to healthy function are removed. In an especial manner the remedy addresses itself to nervous derangements and vascular obstructions, that obstruct the path of nature,—that constitute, in fact, the *material conditions of disease.*

P.—And so, in this way, the *vis medicatrix*, liberated from all drags and entanglements, resumes her sway and works her wonders.

Dr.—It is just so. The *vis medicatrix* is another expression to signify that the body was so originally constituted, that its organs should functionate in one direction, *health*, so long as every normal law and condition of the structure is fulfilled; but every abnormal agency acting on the body is a suspension, *pro tempore*, of its original constitution. Disease or derangement of healthy action then takes place. When the abnormal agency is removed, then the original conditions and constitution of things come into play, and *health is the result.* So that the phrase, *vis medicatrix naturæ*, does not imply an *entity*, but simply expresses the tendency of the organic actions to proceed in the straight path appointed them at the first by the Creator, when the CAUSES OF DEVIATION are removed.

P.—That too, is clear. Well, from your exposition of the nature, uses, and operation of WATER as an essential constituent of animal structures, it will not for a moment be disputed that its methodical introduction into the system, over and above the mere ends of thirst, may answer the most valuable curative purposes.

Dr.—With your *theoretical* conclusion, the *practical* experience of medical men of every age fully coincides. From the views laid down, which I have no doubt the physiologist will find conformable to truth and nature, and from my own observation for the last dozen years, in a great multitude of cases, as well as on my own person, of the internal operation of water as a therapeutic agent, I have deduced the following, as hints for your guidance :—

General rules for water drinking under the water-cure treatment.

1. The *purest water*—that of springs and that most charged with oxygen, or carbonic acid gas—is the fittest for the general drinking purposes of the cure.

2. It is desirable that the water should be drunk fresh from the springs, during the walk, if possible.

3. Never drink great quantities of water in a short space of time, except when prescribed to relieve the stomach of its contents, or to promote a salutary diarrhœa. With the beginner, the water should be drunk slowly, and gradually increased in dose, according to the *absorbent ability* of the stomach. For only that amount of water is beneficial, which is absorbed without much discomfort. From ten to fifteen or twenty minutes should intervene, between each glass of water, or half a tumbler, drunk slowly, may be taken at shorter intervals. This rule is especially necessary to be attended to by patients not accustomed to much water drinking, and with stomachs very sensitive or much deranged, in short, by all those in whom absorption is slow. As the treatment advances, and the patient's capabilities increase, such intervals as the above may be allowed between each couple of glasses, until the prescribed quantity is taken. A glass with us is nearly a half-pint measure.

4. A great aim of the water-cure being to produce a revulsion from the interior organs, to determine blood to the surface and extremities of the body, and to allay any irritation in these organs, all chills, from too much, or too cold, water-drinking, are especially to be avoided, as tending to defeat such aim. Bodily activity is therefore to be promoted by every means.

5.—Walking is very necessary during water-drinking, as the exercise that best quickens the circulation, developes heat, excites the secretions, and exalts the exhalant functions of the skin and lungs. To facilitate the increased organic decompositions comprised in these processes, and to repair the corporeal waste they effect, water as well as food are necessary. But under the condition now insisted on, the water drunk, however freely, within certain limits, does *not* remain in the blood. What is not used for vital and chemical purposes, *passes off with great rapidity*, charged with the *impurities* of the blood. Water, therefore, duly taken, however freely, cannot dilute the blood. On the contrary, it cleanses it, as well as its channels, and hence one clear and great advantage of the water-treatment, even in cases where it fails to effect a cure.

6. The greatest quantity of water is to be drunk when the stomach is *empty*, in the morning before breakfast. Then the coats of the stomach are fittest for the absorption of

water; and the brain, refreshed with rest and quiet, is in the best condition to receive and communicate its salutary stimulus: besides, the fluids of the body then most need replenishing, drained as they have been by the long fast, and the unwearied organic operations tending to exhaust them. The average morning dose of water for a patient under full treatment, is from *four to six* tumblers. The length of the walks, the amount of treatment, and the strength of the patient, &c., determine the precise quantity. The doses may be taken as follows:—half a pint in two portions, with a short interval, as soon as well dried, after the bath. The same when dressed. Two or more when out walking.

7. The next most suitable period for water-drinking, is towards the end of the digestion, and after the digestion, of a meal. Half the morning's dose will then, as an average, be sufficient: this taken before dinner and supper. Drink only a very small modicum before bed-time.

8 Water-drinking may be indulged more freely in summer than in winter, because the excretories are then more active—with water of moderate temperature than with *very* cold, because much of the latter may produce *spasm* in the unpractised drinker, or in the weakly.

9. A sure rule is to drink short of oppressing the stomach.

10. Never drink profusely if heated, and more especially if tired with exercise. In *passive* perspiration, free drinking, if gradual, is innocuous.

11. Young children and old men must be more restricted in water drinking than adults; because of the feebler organism and lower reactive powers of the former.

12. Patients of strong constitution, of sanguine or bilious temperament, and whose digestive organs are not much at fault, may drink more largely, as in them it is absorbed more rapidly.

13. Patients of lymphatic temperament, and persons accustomed to alcoholic liquors, stimulant spices, strong tea, coffee, &c., must use great discretion in water drinking, for a time, as they absorb it more slowly, and pass it off less quickly.

14. In cases of *nervous* dyspepsia, when there is much morbid sensibility of the stomach, and great irritation of its nervous ganglions, small quantities of water must be begun with, quarters and half tumblers at a time. It is sometimes necessary in these cases, also, to raise its temperature, because of the susceptibility of the irritable brain and

stomach of such patients to receive and reproduce morbid impressions.

15. In cases of *mucous* dyspepsia, frequent *sips* of cold water, and lounging quietly in the air, during the fever of digestion, refreshes the stomach and sustains its flagging energies. In all other cases of dyspepsia, no fluid should be taken for at least an hour after a meal.

16. In persons of *strong* stomachs, moderate cold-water drinking with meals, materially aids digestion—by diluting the ingesta, cooling the stomach, provoking its muscular contractions, and stimulating its glandular secretions. It is then rapidly absorbed.

17. In patients with good appetites, but whose maladies would be aggravated by its indulgence, it is advisable to drink more copiously during meals to ensure the satisfaction at least of a distended stomach! For that feeling, in any innocent way produced, some of such patients will be duly thankful; at the same time it often makes digestion more easily gone through, and with less feverish depression.

18. When there is much febrile irritation in the system—in cases of severe critical eruptions and discharges, in the hectic of bronchitis, consumption, lumbar abscess, and other scrofulous ulcerations—water drinking may be recommended, and allowed *ad libitum*, in graduated doses.

19. In simple cases of nervousness, where the *fons malorum* is more in irregular determinations of blood than in decided vitiation of the fluids—(although the effect of *all* congestions, by locking up secretions, or impeding chemical changes, is *pro tanto* to vitiate the fluids)—the drinking of *large quantities* of water is injurious. In such cases, the blood is thin at the best, and an excess of water introduced, by too greatly diluting the circulating mass in the brain, even for the *short time that it lasts*, materially aggravates the nervous symptoms—producing palpitations, and often, a sort of tipsy feeling.

20. In *anæmia* and *chlorosis*—diseases characterized by an impoverished state of the blood—in patients who have been bled largely, or have suffered accidentally great loss of blood, or who *periodically* are subject to profuse drains—until the blood-making functions are nearly restored, and the peculiarity in question counteracted, great care must be taken not to drench their systems with copious and repeated doses of water.

21. In fevers and inflammations—in cholera, dysentery,

and diarrhœa—especially when the skin is dry—the patient's thirst and relish for water should be the measure of its quantity.

22. When there is much congestion of the intestinal mucous lining (as in chronic *gastro-duodenite*, enterite, &c.), the too free and sudden introduction of water, by producing too strong reaction in the parts affected, may only aggravate the morbid condition it was meant to allay. Here the brain as well receives the unkindly shock, *and resents it*—sending down through the viscera increased morbid reverberations; calling forth, among other effects, those irregular contractions of the stomach, that determine in various degrees, *spasm*, false sensations of hunger, unnatural cravings, gnawings, sinking, faintness. These are frequent results of self-treatment. In such cases, increase the water doses very gradually, and also their temperature to between 50°—55°.

23.—In cases of simple congestion of the brain—from the same exciting effect of water on the circulation and nervous centres—much water-drinking is injurious, until the *digestive organs* are *repaired*, and the advance towards cure has produced a more equable distribution of the blood over the *surface* and in the *extremities*.

24. In cases where the obstructed circulation of the brain is so great as to oppress its functions, and produce sluggishness of movement and sensation, lethargy or stupor, or an approach to these states—water-drinking (from its stimulant effect) in a moderate degree, under judicious management, is indicated.

25. The season of the year, the age, sex, constitution, condition, and habits of the patient, the nature of the case, and the state of rest or motion, are the modifying circumstances that regulate the inward administration of water. Under the heads of the various *kinds and classes of disease*,—about which I hope to converse with you on a future occasion,—I shall endeavour to fill up the want of *personal* professional direction, to lay down *specific* directions, as well as data for judgment. In the mean time, suffice it to remark, that *habit* influences much the ability to drink water. *But large doses, even when they agree*, as they generally do with myself, *should never be long continued*. They bootlessly fatigue the stomach, gratuitously absorb much animal heat, and needlessly excite the nervous system.

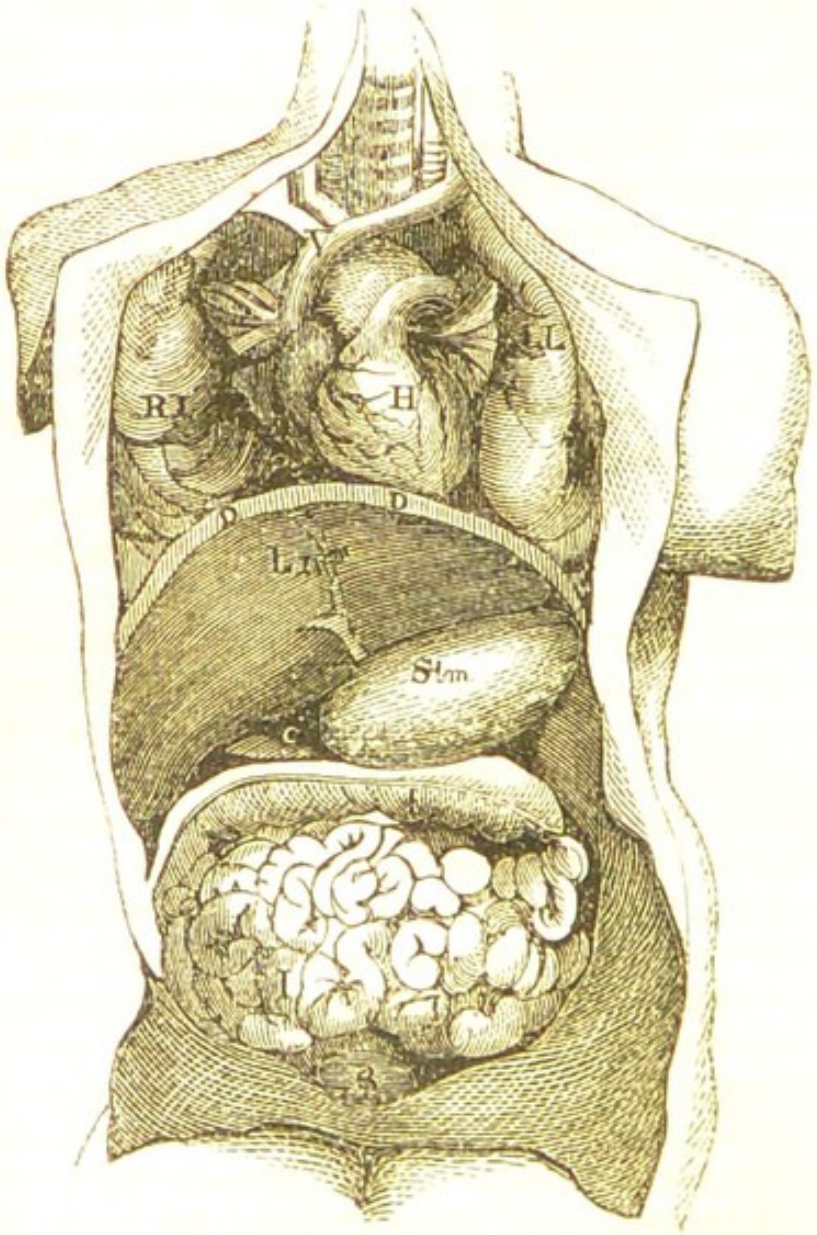
26. Water enough to refresh, should be drunk after each bath, in most cases.

I may here repeat that a properly administered bath does not cause the blood to flow inwardly, the effect and the fact are quite opposite. It clearly derives *from the interior* to the surface, unloading its accumulations, and even drawing away, for a time, its normal supplies, in order to throw the blood powerfully to the surface. This increased circulation *there* is necessary to replace the rapidly-abstracted heat—so rapidly abstracted, often, that a red-hot metal statue subjected to the same process would be cooled to its very centre in the same time. Yet has the living surface retained its standard temperature to within a few degrees. Whence, then, has all this immense evolution of caloric come from, if not from the surges of blood brought (from every spareable quarter in the interior) to the surface—like so many hot-water pipes keeping up the temperature. This heat, so largely abstracted, is evolved from the waste of the tissues, the burning up of structure. The decompositions, quickened to that end, powerfully draw upon the supply of oxygen, and therefore of water. *This* is the *real* reason for the necessity, or rather the great advantage, of cold-water drinking and exercise after the baths.

27. Lastly. For the interior, as the exterior, operation of water to be *highly beneficial*, it is an indispensable condition that the *brain be at rest* from worry and anxious cares, from literary labour, and from the operation of intoxicating drinks of any kind, from opium or tobacco in any shape. For the stimulus of water, directly received from the stomach, or transmitted indirectly by the route of the circulation, or from the shock on the outer sentient surface of the body, most of all tells on the nervous system. To exalt the functions of this part of man's wondrous structure is one great aim of the water treatment throughout: because the nervous system, the *primum mobile* of all organic power is, as it were, the electrical battery wherein it is elaborated, and whence is propagated that mysterious influence that imparts life, sensation, and movement to every fibre, tissue, nerve, and vessel of the economy. Hence the supreme importance of exalting the functions as we now do,—in a *normal*, or *healthful and rational manner*,—of this prime regulator of corporeal health, and dispenser of mental well-being. For the Creator has inseparably allied, in this world, the condition of the *morale* with the *physique*. In order, therefore, to give the nervous system unimpeded scope for exalting the restorative powers of the animal economy, all

disagreeable impressions must, *for a time*, be as far removed as possible. On the other hand, it is also well to be observed, that the agreeable sensations indulged in, be of a kind that entail no exhaustion and admit no regrets. *Verbum sapientibus.*

CONTENTS OF THE CHEST AND ABDOMEN.



R. L. *and* L. L. *Right and left lungs.* H. *The heart* D. D. *The diaphragm.* L. *The liver.* S. *The stomach.* I *The colon or large intestine.* I. *The small bowels.* R. *The bladder.*

PHYSIOLOGY.

CONVERSATION XX.—*First principles of physiology—Organic and inorganic matter—Phenomena, forces, or properties of bodies—Vital properties—Vital stimuli—Motion, perpetual, physical, or chemical change—the primal law of nature—Animal processes a ceaseless round of reproduction and decay—Character of organisms determined by the mode in which they are constituted to be nourished—The anatomy and physiology of the higher animals exhibited in a series of deductions from the laws of repair and waste.*

P.—OUR late conversations have much increased my desire to understand the machinery and functions of the human body, at least sufficiently to comprehend the Water-Cure, and for my own personal management. I understand the steam-engine, and read popular works on astronomy and geology with the greatest pleasure, but of the "*wondrous house I live in*," I must confess I know little or nothing. I do not know why I am obliged to draw air into my chest so frequently, or by what miracle the warmth of my body is sustained, when all that surrounds me is cold,—why or how my heart beats, or for what purpose I perspire—in short, how I live or move or have my being.

DR.—Many cogent reasons may be given you for devoting some of your leisure to so intellectual and useful a study. The "house you live in," is a sentient structure, liable to grievous pains and sore decay, and made of very perishable materials; it is not intended to last long, but from ignorance, neglect, and mismanagement, even that short period is often brought to an untimely close, and at a time too, when the loss is most to be deplored.

History affords most interesting and abundant illustration, but a modern instance or two will suffice, to impress on you, that a little common sense and easily acquired knowledge of self, is of the greatest importance. In the cases I am about to mention there was no valid excuse to make, for the errors and neglect that led to premature death. There was intellect, and the best education, with freedom of action at their command, and every means and appliance for the preservation of health, within easy reach. To begin with a notable case.

It is not long since the nation had to lament the untimely loss of Sir Robert Peel. He died from the shock and

effects of an accident on horse-back, that to his groom would have caused but a temporary confinement. Had he turned a little of his attention to the laws of health, and been assured of the penalty of their infringement, he would have known by observing his own symptoms that—with dwindling extremities, enlarged abdomen, exhausted nervous centres, and the accompanying morbid condition of the vital organs—his valuable life was in peril from any trifling shock or ordinary vicissitude.

Much the same may be said of the more recent case of Sir William Molesworth. Here again was a condition, as easily to be understood as avoided, by a non-professional man. He neglected a long standing and steadily increasing congestion of the abdominal organs, that required but little provocation to be roused into an acute state. This took place, and brought his career to a close, in the prime of life.*

I will end with another instance. Lord Byron, when labouring under simple fever and extreme excitement, was freely bled, when more blood was needed; he died in consequence, with his greatest works still unfinished. He paid this penalty for having abused his nervous system, and by a mistake, then common in medical practice.

P.—These are indeed melancholy facts, that make one reflect. It is clear to me, from all I have experienced in my own person, that in the two last cases, the water-cure treatment would have produced the happiest results.

Dr.—I have had so many similar cases that have recovered, under this simple physiological treatment, that I believe your prepossession is not without good grounds. The fomentation judiciously applied, with partial packing, and warm baths cooled down, &c., would have allayed irritation and all feverish symptoms, affording important aid to other remedial measures, and thus giving time for nature to work the restoration. But to proceed with our physiology.

In order to comprehend the symptoms and the course

* These comments have not been made without sufficient data. During the fatal illness of Sir William Molesworth, I was staying at Lord Zetland's, and there heard all the particulars of the case from one of his most intimate friends, who was in great anxiety about him. This friend had just recovered from a condition equally perilous, by simple water-cure treatment, and was deeply impressed with the conviction, in which I concurred, that the same remedies were as clearly indicated in Sir William's case,—and in all probability, if applied, would have been attended with equal success.

of human diseases, their causes, and their cure, you must first understand the functions of the body in health, the properties and laws of life, and at least so much of the *generalities* of anatomy as are necessary to unfold the mechanism by which these functions are performed, and through which these properties and laws take effect. Man's physical constitution is the basis and substratum on which all his other high attributes are laid. The latter are infinitely modified by the varying conditions of the health of the former. To understand, then, the reciprocal dependencies and relations of mind and body, and how they are influenced by material and psychical agents in the world without, we must study the laws, structure, and operations of the human mechanism in health (*physiology*), and its deviations in disease, its functional disturbances, and organic alterations (*pathology*).

P.—Well. Begin at the beginning, if you please, for I am anxious to hear all you have to say, and desirous of laying a broad and deep foundation, on these deeply interesting and practically useful sciences.

Dr.—All matter is divided into the two grand classes of ORGANIC and INORGANIC. The solid globe we tread on is the inorganic matter: but the beings that people its surface, whether in earth, air, or ocean—and the vegetable products that clothe it with beauty and primarily impart sustenance for all—are instances of organised matter. All bodies have certain properties in common, as bulk, weight, form, colour, &c. The distinguishing characteristic of organised bodies, however, is, that they possess an elaborate mechanism, displaying such design, executing such results, and holding such dependencies among themselves, and such relations to the earth whence they spring and are nourished, as only a SUPREME BEING, all-wise, all-powerful, all-benevolent, could devise, establish, and sustain.

P.—How do you classify the phenomena, forces, or properties, which belong to the different forms of matter?

Dr.—They reduce themselves to three great classes. First, PHYSICAL, or MECHANICAL; second, CHEMICAL; third, VITAL. Each of these is totally diverse from the others in character, conditions, and operations; and is alike inimitable and unsubstitutable the one by the other. The first of these forces—the *physical*—is in operation at all times and under all circumstances. The second class—the *chemical*—only operates under certain given conditions of one particle

with another. The third class—the *vital* forces or properties—is shown only in peculiar forms of matter and in obedience to certain *stimuli* (exterior or interior agencies, as food, air, heat) which provoke their actions.

P.—You have said that we know nothing of *the ultimate nature* of physical, chemical, or vital causes.

DR.—We have not faculties to discern the ultimate nature of anything. We only take cognizance of matter *by its properties*, sensible and visible; and we recognise these properties only by their effects. A *property*, as applied to an organised being, may be defined to be, "a particular susceptibility attaching to that being or a capability of taking on certain actions, which it assumes only on the application of appropriate *stimuli*; *i. e.*, under certain conditions, or fitting circumstances." Thus the sensitive plant evinces the property of contraction on touching it. Contractibility is also a property of *muscular fibre* (the lean part of animal food), which is called forth by certain stimuli, as the motions of the stomach by the presence of food, of the bladder by the distension of the urine; those of the heart and arteries, by the quantity and quality of the blood; the voluntary muscles are excited by the stimulus of the will (*pure innervation*).

P.—In the same way you would say that combustibility, or the capability of burning, is a *property* of wood, coals, wax, oils, spirits, resins, &c.

DR.—Yes; only it requires a peculiar combination of circumstances, or conditions, in order to develope this property in these substances.

P.—A force, power, or property is, therefore, distinct from the action which it produces.

DR.—Clearly. What *gravitation* is, as a simple force, we know not. What it is *to be attracted*, we do know.

P.—I suppose the same argument applies to LIFE. What VITALITY is, as a simple power or property, we do not know. What it is TO BE ALIVE—to exhibit living action—we do know.

DR.—Unquestionably. We shall discuss this more fully in our conversation on *Life and Organization*. The microscope has fortunately come to the elucidation of many of the difficult questions of physiology. By bringing into view the retired, remote, and otherwise viewless recesses of the organism, it has shown that what are termed *vital properties* or the constitution and endowment of organised bodies, are

dependent on certain modes of arrangement and combination of the elementary particles of matter. In order that vital phenomena show themselves normally, two great conditions must exist: 1st, a sound constitution of the structure; 2nd, appropriate stimuli to act on it, and to call forth its powers. These stimuli may be comprised in temperature, heat, moisture, food, drink, volition, instinct, desire, passion, the contact of exciting substances.

P.—Up to this point everything is clear. Can you give this exposition, so far, a practical bearing on Pathology?

Dr.—Its application to disease is sufficiently clear. Diseases being *perverted vital manifestations*, *i.e.*, the deranged play of organs, or exercise of functions, the *causes* of such disordered states reduce themselves (on ultimate analysis) to two simple classes, comprised in the failure of the conditions under which the normal properties of a structure, or the functions of an organ, come into play. These are, 1st, some (abnormal) change produced, or, (some normal change) prevented in the ultimate tissues of an organ. The nutrition of these tissues, *i. e.*, the molecular change there taking place, is excessive, defective, or perverted; 2nd, the stimulus requisite to call forth, or keep up vital manifestations, is either excessive, defective, or unnatural.

P.—That is indeed a very comprehensive application of abstract physiologic truth. To revert to the ultimate material principles or particles of both organic and inorganic bodies, are they not composed of essentially the same elements?

Dr.—What the form, essence, or qualities of the primary molecules, or atoms of matter may be, we have not faculties for knowing, and it is certainly not the business of philosophy to determine. The peculiar character, forms, and properties of bodies depend on peculiarities of atomic or molecular arrangement, not on peculiarities of essence or nature. Each individual form of matter has its own peculiar laws, constitution, and properties, in consequence of specific differences in the arrangement of its ultimate particles; and it has, besides, definite, fixed, unalterable laws of relation with all other forms of matter. The chemical elements oxygen, hydrogen, nitrogen, carbon, with light, heat, electricity, and magnetism, *may* perhaps acknowledge one *basis*, element, or principle in common. Their diversities of pro-

perties may depend on the extent to which they are simple or compounded; *i. e.*, on the quantity of some second element added to the common basis. This at least is certain, that the peculiar aggregation and confirmation of their primary particles, constitute the palpable differences in the forms and qualities of material bodies.

P.—There is then a great probability that the difference between brain and bone, nerve and naphtha, sand and salt, iron and indigo, muscle and mucus, tendon and tears, hair and horn, &c., is only *in the arrangement of the primordial atoms*.

Dr.—All analogy, the simplicity and uniformity of the means employed by the Creator to accomplish the most diverse and complicated ends, lead to the supposition of the *oneness* of the basis of all forms of matter.

P.—The *laws of life*, I presume, the same as the laws of physics or chemistry, refer to the *conditions* under which their respective phenomena make themselves evident to our senses. I presume, also, that the whole difficulty encompassing the study of vital phenomena arises from the highly complex nature of the living mechanism in the midst of which they originate.

Dr.—Quite so. The excessive complexity of structure, and the difficulty, or rather the impossibility of isolating vital actions from the intimate mutual dependence of parts, vitiate physiological *experimentation*, in the strict scientific sense. The entire, absolute and specific action of any agent is very difficult to be determined. You cannot modify the condition of one organ of the body without modifying more or less every other. For a living being is a unity; *quoad* organisation, it knows no divisions or compartments; the series of organs is a circle without break, without beginning or end; among themselves there is no priority or inferiority. The organism is "one and indivisible." In experimentation on the living being, therefore, it is hard to say whether any given effect be due to primary or to secondary causes. Not so with experiments on inorganic bodies. Here it is in our power accurately to appreciate effects, because it is possible to eliminate all disturbances and conditions, all influences except the one sought. We can perfectly test, for example, the relative powers of two reaping machines, because we can measure accurately the amount of space allotted for the experiment, and the time taken. Besides this inherent diffi-

culty in the way of physiological experimentation, we have to deal with organisms no two of which, even of the same family, are alike.

P.—I conceive it very possible that many of the changes occurring in organised beings are affected by the same chemical and physical forces as operate in the inorganic world.

DR.—Undoubtedly. Others of the phenomena in question, however, are not so explicable. They are the result of *vital* properties, a class entirely diverse from physical or chemical properties.

P.—What would you say was the *primal law* of the material universe?

DR.—MOTION—perpetual physical or chemical change. This we find, alike in the busy chemistry of inorganic nature, as in the ceaseless operations of organised bodies. It is seen in the gradual wear and tear of all mundane things; in the revolutions of day and night, in the phenomena of the seasons, in the rising and setting of the heavenly bodies; in the tides of ocean, and the flow of rivers; in cloud and rain, in vapour and dew, in lightning and thunder, in wind and tempest, in frost and snow; in the central fires of earth, and in the eternal smoke of the volcanic chimneys whence they find vent.

P.—You have said that in the *organic kingdoms* the same law holds equal sway.

DR.—Yes. Here there is no permanence, no stand-still state, any more than in the inorganic world. The same restrictive force unceasingly operates the disintegrating changes that take place in living as in inert matter. *This is the law of decay or decomposition.* It consists in a perpetual molecular change of structure, or chemical alteration of the particles of which bodies are composed; in other words, *a tendency to separate into more simple combinations.*

P.—Are the changes that mark the decay of organic and inorganic matter, alike?

DR.—No; there is this wide difference. Interstitial changes, or the disintegration of structure, operated from within, outwards, or occurring through every part of its texture, is the characteristic of the decay of organised matter; in inorganic matter, on the contrary, these changes are operated from without inwards, i. e., on the surface.

The oxygen of the atmosphere is the disintegrating or consuming agent; by its means iron rusts, rocks wear away, and the greatest works of man crumble into dust.

In like manner, when the body pines and wastes away under the ravages of disease, or the deprivation of nourishment, it is the same *oxygen* that takes down, that literally eats or *burns* away the structures piecemeal.

P.—Will you illustrate more particularly, if you please, this law of incessant change, in the case of the functions of the animal body?

Dr.—The whole processes of animal life are one ceaseless round of reproduction and decay. Secretions are ever going on; oxygen is absorbed at each inspiration; water, carbonic acid, and the invisible halitus from the skin, are essentially given off. The out-putting of power, the movements of muscles, the discernments of the senses, even the manifestations of thought, will, emotion, &c., occur not without disintegration and waste of matter. The radiation of the corporeal heat in air, and its evaporation in moisture, largely contribute to this waste. But the power of renewal is quite co-equal with the rapidity of waste. The structure is thus constantly changing itself, particle by particle, the old momentarily gives place to new matter, is absorbed, and removed. The new structural deposit in its turn having fulfilled the purposes of the economy, again comes under the power of inorganic affinities, is decomposed and eliminated.

P.—So that from time to time the whole organism is renewed?

Dr.—Completely so. *Blood* is the means by which the new materials are introduced, and the channel through which the old, decayed, and useless particles are let out. This effete animal structure, which has accomplished its ends in the economy, and is removed, is not, therefore, wasted, or thereby lost. But being reduced again to its inorganic form, it is capable of contributing once more to the support of life—the life of plants.

The mode in which organised bodies are constituted, to receive the supplies of matter needful for their development and maintenance, determines the character of their organisation. Vegetables are supported solely by the constituents of the soil, and air, and by water. Hence they only require a fixed locality to grow in, and roots, stems, leaves, &c. as the instruments of their nutrition. Animals, on the other hand, as possessing the power of locomotion, and requiring to go about in search of their food, possess receptacles for holding beyond the mere supply of the moment, and for

digesting it. This necessitates the play of a much more elaborate mechanism. Hence the foundation of the grand characteristics of animals (especially of those of the higher classes), *their twofold vital systems*, and the organs subservient thereto. 1st. THE SYSTEM OF INDIVIDUAL AND INTRINSIC LIFE, that which concerns their automatic actions, or organic processes. 2nd. THE SYSTEM OF EXTRINSIC OR RELATED LIFE, that whereby they are connected with the great world without, whence they are to draw the materials of their nourishment.

P.—It seems to me that *the law of recomposition*, or the inherent renewal of the particles of which organised bodies are composed, is only a modification or another expression of the law of mechanics, viz., *that all moving bodies, in order to the continuance of motion, require the repeated renewal of the moving power;* in other words, the replacement of new ingredients or elements of motion.

DR.—Precisely so; the animal body is no exception to this law. It needs the continual addition of new materials of motion.

P.—Periodical winding-up, as we should say, or ever and anon supplies of fresh fuel to keep alive the vital fires?

DR.—Yes, that is the idea. The whole complex apparatus of animals is constructed in reference to those two primary laws of organic change (those of repair and waste). In fact, from the provisions necessary to ensure the perfect operation of these fundamental laws, may be deduced, in a beautiful chain of sequences, the whole structure and functions, the anatomy and physiology of the higher animals, as follows:—

I. A SOLID FRAMEWORK OF BONES, THE SKELETON, *a simple mechanical apparatus on which to hang, and within which to lodge the several pieces of animal mechanism, the muscles, nervous, circulating, and other systems—the levers, pulleys, wheels, pipes, conduits, reservoirs, boiler, furnace, flues, chimneys, down even to telegraphic wires of communication, signal posts, and central offices, by which behests are sent, and from which government emanates.*

II. A PRIME MOVING-POWER, *the* CEREBRAL, SPINAL, *and* GANGLIONIC NERVOUS CENTRES, *and the transmitters of this power,* THE NERVOUS CHORDS, *or nerves proper.*

III. *Organs taking every part of the ever-consuming living structure into direct relation with the elements of renewal; in other words, organs to distribute the materials necessary to*

replace its loss of heat, and to repair its wear and tear. Hence the existence of a CIRCULATING APPARATUS.

IV. *Organs in which to receive and elaborate the occasional supplies of the materials of animal heat and nutrition. Hence the provision of a* DIGESTIVE APPARATUS.

V. *A furnace in which to prepare the fuel, and to receive the supports of combustion—pipes or flues through which to distribute the heat—chimneys whereby to liberate the smoke and ashes. Hence the necessity for a* RESPIRATORY SYSTEM, *and its adjuncts.*

VI. *Organs to overcome the inorganic affinities of the nutritious materials, and to convert them into living matter. Hence the necessity of an* ASSIMILATIVE, SECRETORY, *or* VITAL-ELABORATING APPARATUS. *This is the office of the Lacteal system, and, perhaps, to a certain extent, of the Lymphatic system.*

VII. *Organs to decompose, or take down, and take away, the structure where and when it has fulfilled the purposes of life. Hence the necessity for a* CAPILLARY *and* VENOUS APPARATUS.

VIII. *Organs to separate the products of decomposition; to admit the quiet exit out of the economy of the effete elements of food or structure. Hence the necessity for* A GLANDULAR APPARATUS, *or* A SYSTEM OF EXCRETORIES, DRAINS, AND OUTLETS.

IX. *Organs for the perpetuation of the species.*

X. ORGANS OF RELATION, *i. e., to connect the animal with the world without, to search for, to seize, and appropriate the materials of its heat and nutrition. Hence the necessity for a sentient, nervous, and muscular system, respectively instruments of locomotion, of special senses, and of psychical acts.*

XI. *Organs, lastly, characterising exclusively the highest animal—man, endowing him with those* high attributes *by which he is to develope his divine nature, as a being made in God's image, and fitted by heaven for a great destiny.*

P.—A fitting commentary on the words of our immortal bard,—"What a piece of workmanship is man? How noble in reason! how infinite in faculties! in form and moving, how express and admirable! in action, how like an angel! in apprehension, how like a God! the beauty of the world! the paragon of animals!"—(HAMLET.)

DR.—The conjoint work of this entire series of organs, each in its own department, within its own limits, and to its

own ends, is the production of one grand result, viz., the perfect functional operation, and corporeal purposes, of the animal organisation; and the consequent happiness and well-being — however perceived, however expressed — that accrues to every creature from fulfilling the laws of its constitution and the will of its Creator?

CONVERSATION XXI.—*Sketch of the general philosophy of the animal economy continued—Products of animal decomposition, carbonic acid and nitrogen; how eliminated—Digestion a simply chemical act—Vitalisation of chyle commences in the lacteals—The functions of the lymphatics.*

P.—WILL you please continue your sketch of the general philosophy of the animal economy? I am content in these more purely scientific details and generalisations to be a listener rather than an interlocutor.

DR.—*Carbonic acid* is the first product of the decay of all organised bodies. This poisonous gas is most largely evolved in the animal system. The decarbonising of the blood is so paramount an object that two special organs are set apart for it, viz., the *lungs* and *liver*, besides the skin to a certain extent, and a special heart is provided for propelling the blood through the lungs, *i. e.*, for bringing it into extensive contact with the atmospheric air, in order to replace its carbon by oxygen. There is this difference in the function of the liver, that the superfluous hydro carbon of the system is not burnt off, but drawn off, in the shape of biliary secretion, which subserves the process of digestion.

P.—Are there any other products of decay, save carbon, thrown off from the animal system?

DR.—Animal substances in decomposing throw off NITROGEN as well as carbon. To eliminate nitrogenous decay of the system is of as essential importance to the due play of the functions as the extrication of the carbon. Its non-separation from the circulating fluid invariably causes death. The nitrogen goes off in two combinations—first, with carbon, forming *cyanogen*, and, secondly, in union with hydrogen, forming *ammonia*. These exhibit the benevolent provision for the comfort of the creature—ammonia being too offensive to be eliminated by the lungs. An excreting organ, supplementary to that of the lungs and liver, is necessary to separate these nitrogenous products of decay.

This is presented in the *kidneys*. Their specific creation—UREA—is identical in chemical constitution with cyanate of ammonia.

The retention of the urinary fluid in a reservoir (the bladder) is not an essential element of the function, but is merely a convenient provision—I need hardly say how benevolent a one—for the exigencies of animal existence.

P.—What have you to say of the generalities of the nutritive function?

DR.—*Digestion* is a purely chemical act; the gastric secretion is a chemical solvent. The elevated temperature and the muscular movements of the organ, are joint accessories with it, in resolving the swallowed mass into chyme. This again is further elaborated in the next intestine, the *duodenum*, by the mixture of the biliary and pancreatic secretions. Unreduced and refractory elements are made conformable or absorbable. The more residual (or excrementitious) portion is precipitated from the more nutritious chyle. The blood-vessels and absorbents of the intestinal walls (the lacteals), take up the nutritious portion as the mass is being propelled along, by the contractions of the alimentary tube. Finally, the unabsorbable debris of the food, with the excrementitious secretions of the liver and smaller glands, are voided by a reflex muscular exertion, under control, however, of the will.

P.—When is there reason to suppose that the nutritious fluid becomes vitalised?

DR.—Not till it gets into the intestinal absorbents (the lacteals). Up to this period the changes are merely preparatory, simply of a physical or chemical nature. The lacteals do not absorb by patent mouths, as long supposed, *but by the growth of* CELLS. (*See next Conversation.*) *These fill with the nutritious matter, break, and give up their contents to the lacteal absorbents. Cell-formation* has no analogy in any physical or chemical operation. It is a purely *vital* process. With this cell-development in the lacteals commences the first real vitalisation (or assimilation) of the nutriment. The chyle is still further elaborated (or organised), in passing through the innumerable *glands* that stud the lacteals.

P.—How intensely interesting are all the plans and operations of nature. To what do you attribute the propulsive power of the lacteals?

DR.—Analogy impresses us with the conviction, that the propulsive power of the lacteals is a pure *reflex* act, the

stimulus of their contents sufficing to call forth their contractions. Perhaps the vital actions going on in the lacteal glands have some share in determining the chylous current in them; in the same way as the cutaneous and pulmonary exhalations, are actively concerned in propelling the blood forward in its course.

In proportion as the nutrient current winds its way, through the tortuous glands and ducts of the lacteal system, the alteration in its properties becomes more and more decided. The cell organisms seem commencing at the mouths of the lacteals, become more perfected, and the organisation of the fluid is more advanced. The microscopic appearance demonstrates this. It will be shown in its proper place, that all organisation, every vitalising process, commences in cells. These absorb, elaborate, change, vitalise the nutritious fluids amid which they float. When they have accomplished their function, their term of life, they burst or liquify. The chyle thus elaborated, thus vitalised, is conveyed into the blood-vessel system, and flows directly to the heart. Therein it joins the general circulating mass, and undergoes in its transit through the lungs, and by contact with the air, its further and final vivifying process. The blood discharges at this part its carbonic acid, the dead debris of the system, and receives in lieu OXYGEN—and in all probability, also, the atmospheric ELECTRICITY, a co-vivifier.

P.—Is the function of the absorbent apparatus, to remove the effete or used-up materials of the body?

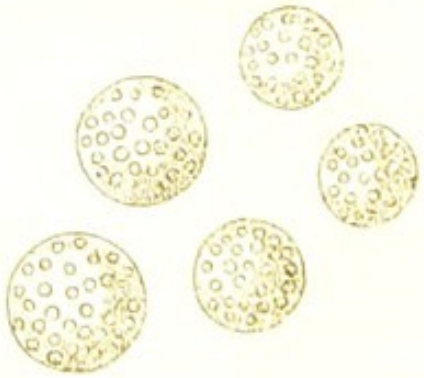
DR.—I do not believe so. The lymphatics, as well as the lacteals, are for the purposes of nutrition. The wasted and useless elements are separated from the body in various ways, and by various outlets. The excess of nutriment is laid aside in the shape of fat, or strained off in other ways. The veins are the chief carriers-off of the superfluous carbon. The nitrogen is eliminated by the kidneys; the superfluous water, and other elements, partly by the kidneys, partly by the skin. The immense glandular apparatus concealed in the coats of the intestines, are no doubt for the elimination of other animal products, whose retention is incompatible with health or life. I am quite clear that the function of the lymphatics, is subsidiary and supplemental to that of the lacteals. They make their course to the same points, and blend in the same channels. Their contents are the same in chemical constitution. The same knots of

glands everywhere present along the junctions of their communicating lines. Of the decomposed tissues a part only is truly effete, and unfit for any nutritive purposes. Substances that may still be elaborated into nutritive materials, are (with nature's usual economy of her resources) taken up by the lymphatics—viz., such crude portions of the blood as may have transuded from the walls of the capillaries into the interstices of the areolar (or cellular) tissue, which you may have observed blown up on veal.

CONVERSATION XXII.—*Of the elementary constituents of the human body—Cell-theory of structure—A nucleus or cell the type and starting-point of all organisation—Vegetable cells transform inorganic elements into organic compounds, the nutriment of animals—Growth or development of cells more or less persistent—Secretion a successive crop of evanescent cells—Materials to be separated from the blood absorbed by the cells—Fatty particles so abstracted from the circulation and deposited in the shape of adipose tissue—Basement membrane.*

P.—You stated in our last conversation *that all organisation began in* CELLS! I am anxious to hear the full details of this cell-theory of living structure.

DR.—Plants and animals—the higher as well as the lower—agree in their elementary parts. They consist of an aggregation of CELLS. *All vital processes commence in cells. All organised structure is developed from cells.* The cells are minute microscopic objects*—*closed sacs whose walls are composed of a delicate membrane.* They are actual organisms, each possessing an independent vitality of itself, and only requiring proper nutriment and proper temperature for its growth and function, till its term of life closes. The cell has the power of drawing into itself (endosmose) the nutrient materials around it, and of incorporating them with its own substance. Whilst the growth of the cell is thus taking place, preparations are simultaneously making



* Simple isolated cells, containing reproductive molecules.

for its renovated existence, *by the development within, of the germs of new cells*—nuclei.

P.—All cells, then, originate in germs that have been prepared by some previously existing cell.

DR.—Precisely. The germ, nucleus, or reproductive molecule, is a minute granule adherent to the inner wall of the cell, only visible by a microscope of high magnifying power. Afterwards these granules separate from the wall, and move about in the cavity of the cell. At a later period the parent-cell bursts and sets them free. This finishes the life of the parent cell, and begins the life of the succeeding new generation. The young germs propagate their kind by a precisely similar process.

The germs are developed in two ways—first, *dependently*, *i.e.*, within the parent-cell; second, *independently*, *i.e.*, when set free by its rupture. In the former case, the granules derive their nourishment from the fluid of the cell; their growth comes at length to fill the whole cavity of the cell.

P.—You stated that these cells absorb, elaborate, change and vitalise the nutritious fluids through which they float. So that the peculiar endowments of cells are the simplest idea we can have of *life, or vital properties*. A cell is then, the type and starting-point of all organisation.

DR.—It is the primary recipient of life, and imparter of life. When the cells have accomplished their function, their term of life, they burst or liquify. The successive generations of cells produced, undergo various departures from the original type, forming varied but associated structures. These are endowed with peculiar properties correspondent with, and dependent on, their peculiar modes of development and arrangement. Hence the variety of actions exhibited by the component parts of living structure. The several groups of these actions concur to some specific effect, and constitute *function—digestion, respiration, secretion, circulation*, are examples of the concurrence of many complex minor actions, and of the mutual relations of each group of them to the whole.

But the properties and endowments of the vegetable and animal cells differ materially. The peculiar action of the cell-growth of plants, is to elaborate *organic* compounds from *inorganic* materials existing in the earth, or floating in the air. Animals, on the contrary, in their cell-formations, have no power of this kind. They cannot, like plants, *create* organic compounds. Their nutrition consists of the organic

compounds formed for them by plants. For the elaboration and assimilation of the materials so organised, for the introduction of the new materials of structure, and the expulsion of the old, a vast proportion of the animal fabric is set apart.

P.—In this view of matters, then, the vegetable kingdom is strictly to be regarded as nature's great laboratory, wherein *inorganic* matter is transformed into *organic*.

Dr.—Simply; plants are a true *vitalising apparatus* or contrivance, by which *carbon*, *oxygen*, *hydrogen*, *nitrogen*, &c., &c., are converted into *wood*, *bark*, *juice*, *leaf*, *flower*, *fruit*. This is nature's grand provision for animal nutrition.

P.—You intimated that the constant renovation of each tissue is accomplished by the generation of cells. How is this brought about?

Dr.—These are developed as the structure grows. The constituents of the cells may be of a nature to give solidity and durability to the structure. For example, the cells of the epidermis (scarf-skin) are strengthened by a deposit of horny matter, those of the bones and teeth by a mixture of mineral and earthy matter. On the other hand, the contents of the cells may be of the most evanescent nature, and therefore fluid, admitting easy decomposition. We find this to be the case in the cells of glandular structures. Therein successive crops of cells are generated as fast as the demands of the secretion require. In proportion as tissues are actively concerned in the vital functions—animal and organic—so is the rapidity with which one generation of cells is reproduced after another. This is at once the *rationale*, and the foundation, of the great law of animal organism, viz., *that the rapidity of the decay and renewal of structures, is in proportion to their high organisation and high functions.* Hence, those parts of structure that are subject to the most active vital change, are the softest and least permanent.

P.—By parity of reasoning, the most solid textures, as the bone and tendons, will undergo comparatively little change, will longest defy the disintegrating *hand of time*.

Dr.—That is, the *action of the elements*. It is precisely so. For example, the nervous and muscular systems are the prime instruments of vitality; their particles, therefore, are of short-lived duration, compared with the bones and other solid parts, whose offices in the system are chiefly mechanical. This explains the need felt by the higher animals for constant supplies of food, to compensate decay

by renovation, to replace the portions of the fabric lost by wear and tear.

P.—This explains, too, why the young and growing require more food than adults; and adults more than the aged.

DR.—You quite comprehend the idea I wished to give you of nutrition. In proportion as the animal is young, so unconsolidated is the composition of its texture, so rapid their development, decay, and renewal. The same law and mode of development exist with regard to morbid growths, or tumours, called malignant. They are in their elements CELLS, with the fatal power of indefinite reproduction. Removal is no guarantee for cure, so long as germs may remain in the system.

P.—I already have a glimpse of the bearings of all this philosophy of man in the sound state, on man in the diseased state. Can you explain why it is, that there is so great a variety of products, from cells so apparently identical?

DR.—No answer can be given, or need be given, to this, but that so is the will of the Creator—so is the constitution of the cell. It lands us in an ultimate fact. As well ask—why, from the water, ammonia, lime, magnesia, soda, potassa, iron, and other elements of the soil, and the gases of the atmosphere,—why from principles so few and simple, should grow such an infinite variety of vegetable products, roots, trunks, stems, leaves, flowers, and fruits?

All true secretions are performed by the agency, the selective power of cells, developed in the interior of the secreting organs.

P.—That is a doctrine that astonishes me; nevertheless there is something on the face of it very like truth.

DR.—It *is* truth. The materials to be separated from the blood are absorbed by the cells. The cell distended with fluid which it has elaborated into the given secretion, presently bursts, and yields its contents to the ducts by which the peculiar secretion is conveyed away. Adipose tissue is a secretion of FAT from the cells of the tissue so called.

P.—Are all animal tissues in the first instance developed from cells?

DR.—All; except what is called *basement-membrane*. In this no cell-structure can be detected. It is a delicate structureless lamella, the consolidation of a plastic fluid, that has been elaborated by the cells. It is akin to the simple

structure of the walls themselves. This is the foundation-element of other structures.

CONVERSATION XXIII.—*Elements of structure—Characteristics of the several groups of tissues*—1. *Simple membranous tissue*—2. *Simple fibrous tissue (areolar or cellular tissue)*—3. *Simple cells floating in the animal fluids—Blood discs or corpuscles, red and white; their respective functions.*

P.—I SHOULD like to know the minute details of the ultimate structural arrangements and elementary constituents of the human fabric, as revealed by the microscope.

DR.—For this I refer you to distinct treatises on anatomy Those details are more within their scope. They hardly comport with the objects of a *brief exposition* of physiology, and its bearings on water-cure theory and practice, which is all that the limits of our conversations permit me to give. Nevertheless, I shall not leave your desire entirely ungratified. I shall glance at the characteristics and functions of the several groups of tissues which go to form the various parts of organised structure. The interest of the subject in itself, and its connexion with the matters of physiology and pathology afterwards to be discussed, will be ample amends for any little tax on your patience it may exact. We begin, then, with

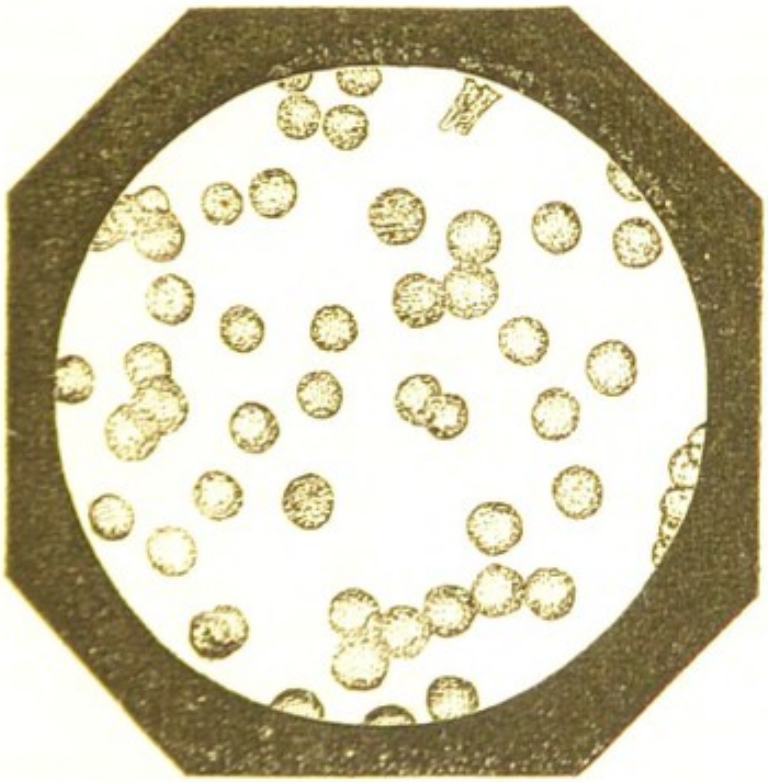
1. SIMPLE MEMBRANOUS TISSUES. These scarcely exist alone in the body, but go to form other compound tissues. *Basement-membrane* is the type of these. This is a delicate lamella, without structure and without cells, the simple consolidation of a plastic fluid that has been elaborated by the cells. It is best represented by the walls of the cells themselves.

2. SIMPLE FIBROUS TISSUE. This used to be called *cellular tissue*. But it is now more properly designated AREOLAR TISSUE. It consists of a net-work of minute fibres and bands, interlacing in every direction, leaving innumerable interstices which communicate with each other, and which are filled with a serous fluid. It is very elastic, receives few blood-vessels, and fewer nerves, and possesses no sensibility. It is easily regenerated by the simple consolidation of the organisable lymph of the blood deposited on surfaces, or poured out in inflammatory effusions. This tissue is of two kinds, white and yellow. The white enters into

the structure of ligaments, tendons, fibrous membranes, and muscular sheaths; the yellow enters into the middle coat of the arteries. Being little subject to interstitial change, it requires little renovation.

P.—For the same reason, I conclude, it will have less tendency to spontaneous decomposition than any other part of the fabric.

Dr.—A true conclusion. Such is the fact. Of the elementary constituents of our corporeal fabrics we have, next,



The human red blood corpuscle, showing its natural form and appearance when brought fully into focus.

3. Simple cells floating in the animal fluids. The red colour of the blood is due to these cells, which vary in size in different parts of the same body. They are flattened *discs* (like coins), not *globules*, as formerly imagined. The membrane that constitutes the cell-wall is readily permeable by liquids, so that the contents of the cell vary with the density of the fluids in which it floats.

P.—According, then, to the law of endosmosis, I believe they call it, too thick a circulating fluid will empty and shrivel the corpuscle?

Dr.—Yes, precisely so. By the same law, on the other hand, too thin a menstruum will cause the blood-corpuscle to absorb, till the cell wall gives way, and the contents are effused through the surrounding fluids. This will happen

when the serum of the blood is of too low specific gravity, as in *anæmia*, *scurvy*, *purpura*, and other disorders of sanguification. There are *red* and *white* blood-corpuscles. They are nearly of the same size.

P.—I presume it to be probable, then, that such alterations of the blood-corpuscles, from the varying density of the medium in which they float, lie at the foundation of many disordered states of the system.

Dr.—It is beyond all question,—seeing the extent to which we can modify the constituents and consistency of our fluids by diet. It is well ascertained, moreover, that abnormal substances in the circulating current, as soda, bile, and urea, exert a peculiar solvent power on the blood-corpuscles. In this way alone can we explain many of the morbid effects of the retention of these substances. The contents of the blood-cell are called *hæmatine*. *Iron* enters into the composition of the *tunic* of the *red* corpuscle. The blood-corpuscles, like the isolated cells, have the power of reproducing themselves with greater or less rapidity, according to the varying exigencies of health and disease, blood discs being developed from the granules, or cell-germs, they contain.

P.—What is the function of the *red* blood-corpuscle? It seems strange to me that it should have *iron* in its composition. This indicates something special.

Dr.—The function of the red blood-corpuscle is a nice question. Such blood-disc is only found in the higher, or vertebrated class of animals. In the lower classes, and in the very young embriæ of the higher classes, the colourless corpuscles (presently to be described) alone are found.

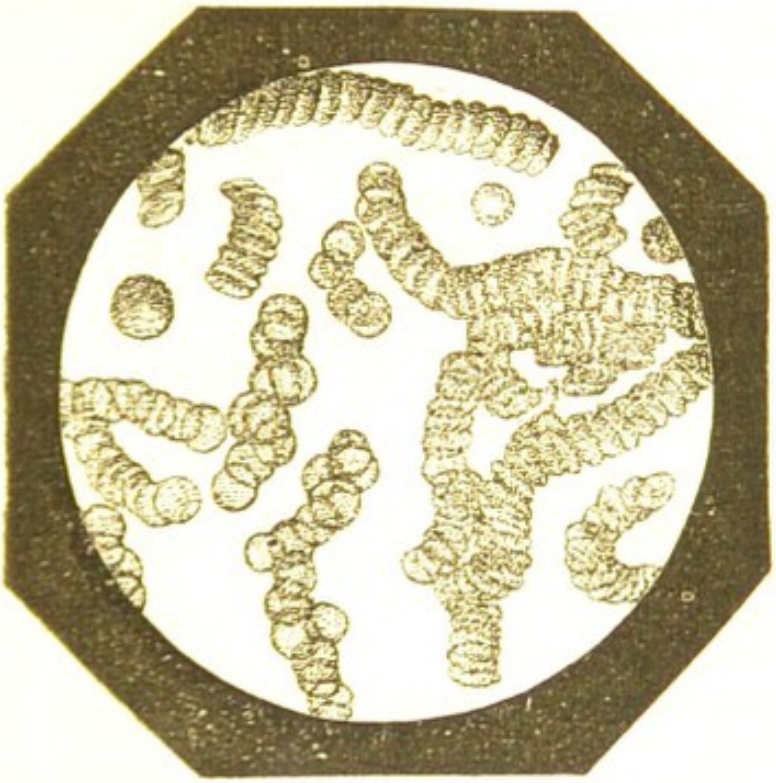
P.—That would favour the idea that red corpuscles are not essential to simple growth?

Dr.—It does certainly favour such an idea. In my opinion the red globules subserve more the function of *respiration* and *animal heat* than that of *nutrition*. The abundance of the *red* corpuscles bears a close relation to the temperature of the animal, to the amount of oxygen introduced into the system, and to the activity of the organic functions. They are, therefore, more numerous relatively in birds and mammalia, and least so in reptiles and fishes.

P.—Do the red corpuscles undergo much change in the course of circulation?

Dr.—Great, both in the pulmonary and in the systemic circulating systems. In the former, their colour is con-

verted from *purple* into *vermillion;* in the latter, from *vermillion* to *purple*. In fact, the red blood-corpuscles are the



The red blood-corpuscle, united into rolls, as of miniature money.

carriers in of oxygen, and the *carriers out* of carbonic acid gas. In this way the blood is at once and at every instant rid of its impurities, and has fresh vitality imparted to it, by being brought into contact with the subtle ether, or magnetic principle pervading space, and mixed up with the more palpable gases of the atmosphere. These principles are co-essential to life with food. The *iron* of the cell-wall, by its affinity for electricity and oxygen, peculiarly fits it to carry these principles into the remote recesses of the organism, vivifying all they reach. Accordingly we find that acuteness of sensibility, and energy of movement, are animal endowments that rise or fall with the increase or decrease of the proportion of red corpuscles in the blood. This subject will be resumed when speaking of the function of respiration.

P.—What is the function of the *white*, or colourless, corpuscles of the blood?

Dr.—The elaboration of fibrine from albumen. Their proportion in the circulating fluids of animals of all classes, bears a relation to the activity of the formative processes. In the very young embryo of the mammalia, *i. e.*, at the

time when growth is most rapid, there is a preponderance of the white corpuscles. As the energy of the formative processes of embryonic life diminishes, so does the amount of white corpuscles. In like manner they are found most numerous in the periods preceding the changes in the larva and pupa state of the insect, and in the blood of well fed frogs. They are scanty in frogs kept without food! Their proportion greatly increases in an inflamed part; that of the red corpuscles is unchanged. When the blood has been drained away the red corpuscles diminish, the white increase or remain the same. The white corpuscles do not peculiarly or exclusively belong to the blood. They are also found in the *chyle* and in the *lymph*.

These cells are, probably, the great vital transmuting agents, by which vegetable or animal nutritive principles are absorbed, elaborated, vitalised, and made part and parcel of the living structure.

CONVERSATION XXIV.—*Elements of structure continued—Cellular covering of the outer and inner linings of the body—Epidermis and epithelium—Compound structures, mucous, serous, and synovial membranes—Tissues hardened by calcareous deposit—Tissues hardened by aggregation of cells.*

P.—WILL you proceed with your further elucidations of the elementary forms and principles of corporeal structure?

DR.—The free membranous surfaces of the body, the delicate protective outer lining of the skin and mucous membranes, consist of *cells*, which are developed from cells furnished by the subjacent membrane. The varying contents and endowments of these cells differ according to the varying function of the parts they cover. The epidermis, cuticle, or scarf-skin, consists of a series of cells, which when first formed are spherical. These cells gradually secrete a horny matter. They dry up, become flat and scaly, as the layer approaches the surface, and finally desquammate. The horny matter is identical in composition and structure with that of nails, hoofs, horns, hair and wool. It has no vitality in itself. It has neither vessels nor nerves. It is pierced by the excretory ducts of the sebaceous and sweat-glands, and by the shafts of the hairs. The soft layer of cells lying on the *true skin* used to be called the *rete mucosum*. It was supposed to be a tissue of a distinct kind, and

the exclusive seat of the colour of the skin. The thickness of the epidermis depends on the number of layers of its cells. This varies in various parts, according as they are the seat of pressure; the activity of cell-deposits being always in proportion to the irritation set up in a part, and the amount of blood that irritation determines thereto, as we see on the thick skin of the soles of the feet, and on hands of labouring men. The colour of the skin is owing to the secretion of minute granules of pigment in the cells of the rete mucosum. This deposit is found remarkably on the inner surface of the choroid coat of the eye—the *pigmentum nigrum*. The development of these pigment-cells in the skin is much influenced by light.

P.—That explains to me how people are *tanned* by exposure to the sun.

Dr.—True. Such is the tanning process. But to proceed. The layer of cells covering the internal surfaces of the body, the internal epidermis in short, is named *epithelium*. This continuous layer of cells constitutes the exterior coating of all the *mucous membranes*, and dips down into their follicles and glands. It also covers the serous and synovial (joints) membranes, and the lining of the heart, bowels, blood-vessels, and absorbents. The forms of the cells are various. Some are laid in a tesselated way, constituting the pavement-epithelium. Others are cylinders, laid side by side, resting on the basement-membrane. These epithelial-cells are continually being exuviated and renewed from the subjacent surface, according to the activity of the function of the part. *By the continual growth and casting off of the cells that line the glandular follicles (crypts) the various products of secretion are separated from the blood.* The alleged "microscopic organisms" in the rice-water dejections of cholera patients, and which, inhaled from the atmosphere, or swallowed with the food and water, were supposed to be the material cause of the epidemic, are in reality only these epithelial cells separated, scoured off, in unusual quantities.

P.—According to your account of the *cell-origin* of secretions, one would expect these appearances in such diseases as diarrhœa, dysentery, and cholera?

Dr.—So it turns out.

P.—I am to understand, then, that these *membranes*, *fibres*, and *cells* (which have occupied us in this and the

preceding conversation) are the elementary components of the tissues of the human body?

Dr.—Yes; we shall now proceed to expound the simple compound structures, as MUCOUS, SEROUS, and SYNOVIAL MEMBRANES, which the union of these elements goes to form. The tissues in question consist of three chief parts. 1st, the *epithelium* or *epidermis* covering its free surface; 2nd, the *basement-membrane*, the larger beneath the first; and, 3rd, the lowest layer of all, the thickest, the laxest, the most elastic, viz., the *areolar tissue*, with the capillary blood-vessels, nerves, and fibrous filaments that interweave it with the parts it lines.

P.—The mucous membranes and skin are identical structures, I have heard you say.

Dr.—They only differ in their outer layer of cells, hardening in the case of the skin, constituting the epidermis; and in the origin of the nerves distributed to them, the mucous membranes being supplied with organic nerves chiefly, and the skin with animal or sensitive nerves.

The mucous membranes, as well of the exterior of the body as of its interior tubes and cavities, are the great highways and thoroughfares of the corporeal traffic and interchange with the external world; the surface on which is spread the apparatus of external sensations and internal perceptions, or *reflex actions*, which I will explain by-and-bye. The mucous membranes of the digestive canal constituted the *medium* by which the nutrient materials of the body are elaborated and absorbed; also, the drains and gratings through which are cast out matters resulting from the decomposition of the body, the refuse residuum of the food, and whatever elements are unappropriated, through excess of supply, or defect of assimilation. The peculiarity of the mucous membranes is, that the stratum of epithelial cells, which covers them, *is constantly undergoing renewal.* This is the source of the protective mucus of the interior linings, whether in the *air tubes*, *digestive canal*, *gall-bladder*, *urinary bladder*, or other open passages.

P.—What are the serous and synovial membranes, and what is the character of their elementary structure?

Dr.—They are the linings of the shut cavities of the body, which contain less or more fluid; the synovial membranes are those lining the joints, and secreting "joint oil," their free surface is covered with a single layer of pavement-epi-

thelium, spread on a sheet of basement-membrane. This is attached to the substance beneath by a layer of condensed areolar tissue, which gives the membrane its chief thickness, toughness, and elasticity (the subserous tissue). The filaments of this membrane are chiefly composed of yellow fibres, marvellously interlaced, and traversed by blood-vessels, nerves, and lymphatics.

P.—I am puzzled to explain to myself how such *hard* structures as bones and teeth are formed from *soft* cells, and how they are nourished.

Dr.—Tissues are hardened by *calcareous deposit*, or by simple aggregation of cells. In the former case, a degree of interstitial change is necessary to adapt them to the purposes of growth. The substance of bone itself is non-vascular.

P.—There's just the difficulty, it seems to me, to provide for the permeation of a nutritive fluid through a dense mineral matter, like bone or teeth, which must necessarily be without blood-vessels.

Dr.—A human artificer, truly, would be here conscious of his limited powers; but the resources of Divine contrivance are illimitable. This point, which puzzles you, is gained by a series of minute chambers, connected with still minuter passages, excavated in these solid substances. In this way the blood-vessels of the nearest surfaces supply nutritive materials for bone, and render it capable of self-repair, in disease or injury. The nature of the ossifying process, or the regeneration of bone, cannot be entered on here. Teeth are allied to bone in structure.

P.—What are those tissues you have just referred to, as consolidated by the simple aggregation of cells?

Dr.—(*a*) The mouths of the intestinal absorbents hold a cluster of such cells. From these the lacteals take their origin. Before food is supplied, or absorption takes place, they appear a collection of granular germs embedded in the *villi*. But when surrounded with nutriment, they develop themselves, select, absorb, and prepare the nutrient matters. They then burst or deliquesce, and deliver over their charge to the lacteals.

(*b*) The substance of the liver, pancreas, and, in short, that of all the solid glandular bodies, is a congeries of such cells. These cells are the efficient instruments in the secreting process.

(*c*) Fat cells, or adipose tissue. These are held together by the net-work of areolar tissue.

P.—What are the uses of fat in the animal economy?

Dr.—Manifold. In one capacity it serves as a veritable *body-casing* and *padding*, to cushion the various structures of the fabric, to fill up interstices, to admit facile motion between contiguous parts, as a non-conductor to retain animal heat. In another capacity it serves as a reserve of combustible matter, to be drawn on when directer sources of supply fail (as in starvation), and as a sort of waste-pipe provision or stow-away place, to prevent the injurious accumulation of alimentary matters in the blood, over and above the real wants of the economy.

P.—But does it necessarily follow that an abundance of fat-forming materials in the blood should show itself in the generation of adipose tissue?

Dr.—The two are not always combined. Many take even a great excess of fat-forming nutriment without getting fat. In that case, what would injuriously accumulate in the blood, is eliminated by the liver, sometimes by the kidneys. Hence those who should become fat, from the quantity of carbonaceous matters that they take, are apt to have the liver disordered, from the extra labour thus imposed on it.

P.—That, then, must be the cause of the eternal and miserable complaints of *biliousness* by lean people, who are disposed to *cram*. Such an one was Pope, and others I could name. Who will trace for us, and develop as a beacon to future generations, the cause of the gratuitous sufferings, and premature deaths, of many of the great luminaries of literature, art, and science?

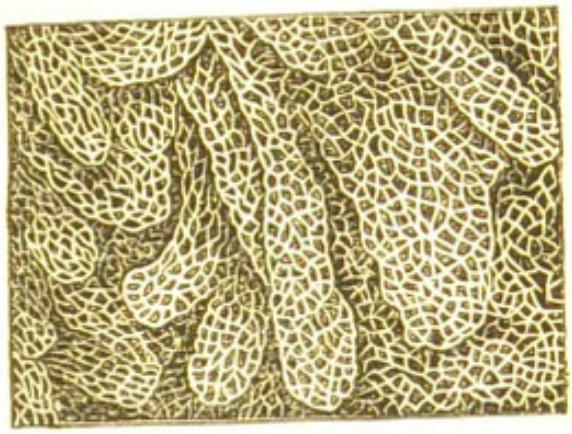
Dr.—The same cause explains the comparative immunity of fat people (healthily so) from the bilious complaints in question.

P.—Proceed, then, with your illustrations of cell structures.

Dr.—(*d*) Cartilage (gristle) is another instance. It has a large quantity of peculiar inter-cellular substance for the basis, or mesh-work, on which the cells are laid. The *cornea*, *crystalline lens*, and *vitreous humour* (interior fittings of the eye), are structures essentially the same as cartilage.

(*e*) Solid tubular tissues. The formation of capillary blood-vessels takes place *by the conversion of a string of cells into a continuous tube, by the breaking down of their transverse*

partitions. In the valves of the veins we have an instance of these original partitions preserved in part. This capillary tube coalesces with others in like manner, so as to form a vascular net-work, by which the materials of growth and renovation are conveyed to all parts of the animal tissues.



Distribution of the capillaries in the villi of the intestines.

P.—Are the *capillaries* similar in function to the large *blood-vessels?*

DR.—No. They are quite distinct. The latter are simply a circulating apparatus, mere conveyance-pipes to and from the interior recesses of the organism; the former, nature's laboratory and *penetralia*, wherein are carried on the functions of the animal. In those minute vessels take place the organic changes referred to—nutrition, secretion, respiration, &c.

P.—But nutrition can be carried on independently of capillary vessels, as you instanced in the case of bones.

DR.—Well remarked. These, with cartilage (designated *white tissues*), and the islets, in the midst of the capillary net-work everywhere, are the instances exceptional to this rule. In these cases, the nutrient materials conveyed by the blood, are absorbed by the cells, or other elementary parts of the tissue immediately adjoining the vessels, and are imparted by them (by endosmose) to others, which are further removed.

Here we shall stop for the present.

CONVERSATION XXV.—*Muscular and nervous tissue—The process of muscular contraction—Activity of waste and repair in muscle—Nervous tissue; central masses (ganglia), trunks, and branches—Nerve fibres and nucleated cells—Fat and phosphorous of nerve-substance—Rapidity and extent of its interstitial change.*

DR.—MUSCULAR AND NERVOUS TISSUES. Up to the point where we last left off at, the animal fabric is constructed upon the very same type as that of plants. The parts concerned in nutrition, secretion, respiration and reproduction, the vessels that convey the fluid equally with the solid por-

tions of the frame-work, *all have their origin in cells.* The tissues that now fall to be discussed, are quite dissimilar in their properties and purposes. *They concern a class of functions which have no analogue in plants.*

P.—I quite understand you. The one of these tissues is the agent of the palpable movements of the body. The other is the instrument of its sensations.

Dr.—Yes,—and the exponent of its volitions, its thoughts, its emotions, its instincts, &c. Herein, therefore, and hereby, a broad impassable line of distinction is drawn between the vegetable and animal kingdoms. Yet the ultimate structure of these tissues conforms exactly to the simple *cell-type.* The elementary fibre of muscle, is a tube formed by the coalescence of a linear series of extremely minute cells, with a peculiar interior deposit. So also the nervous *striæ*, whose bundles constitute the nerve-trunks, are tubes of the same cellular character.

P.—This interests me much. Please, describe to me, more particularly, the elementary structure of muscles.

Dr.—The primitive muscular fibres are arranged in *fasciculi*, or bundles, of larger or smaller size, by means of areolar tissue. These elementary particles, or primitive *fibrillæ*, are arranged in two directions, one set longitudinal, the other set transverse, and are bound together by a very delicate tubular sheath (myolemma), distinct from the areolar tissue.

P.—What does the process of muscular contraction consist in?

Dr.—An approximation of the transverse striæ, and a general shortening of the fibre. But all the fasciculi are not in contraction at once. The tension is effected by a continual change of parts, some relaxing, others contracting. The fibres of the muscles of organic life present no transverse striæ, and but very faint longitudinal ones. They consist of tubes arranged in parallel bands, or fascicula. These fasciculi are interwoven into a net-work, and have no fixed points of attachment, but contract against each other. This is the nature of the structure composing the walls of the gullet, stomach, intestinal canal, heart, bronchial tubes, bladder, uterus, gland-ducts, &c. The action of muscular tissue is beautifully exhibited in *the movements of the worm.*

P.—From the very nature of muscles, and the incessant, and often excessive, demands made upon them, as well as

from the development we see them assume by exercise, I infer that their facility of growth must be great?

DR.—Yes; the process of interstitial change,—the renovation of the component cells of muscles,—is rapid in proportion to the activity of their exercise, and the energy of the nutritive functions. But, notwithstanding this facility of development in muscular substance, its actual destruction (as of a part cut out or torn out) is never repaired. This loss of muscle is replaced only by areolar tissue, which is gradually condensed, but never becomes contractile.

P.—Muscle, also, I presume, is copiously supplied with blood, as the activity of its waste and regeneration demands?

DR.—It is. But its fibres are not penetrated by vessels—the capillaries being distributed in the minute interspaces between the fibres; and perhaps there is no fibre without its attendant capillary. This copious supply of blood is necessary, not simply for nutrition, but for the supply of oxygen—an essential condition of muscular irritability and activity. *Every contraction of a muscle takes place at the expense of the combination of oxygen with the elements of its structure.*

P.—That is the reason, then, of the demand for nutrition, and of the augmented respiration, occasioned by muscular exercise?

DR.—Precisely. *The high vital activity and importance of any structure, bears a direct relation to the amount of blood it receives*, and therefore to the readiness of its disintegrations and renewals.

P.—And, for the same reason, the less will it be able to endure deficiency of supplies.

DR.—Of course. Thus, the muscles of cold-blooded animals maintain their irritability for a much longer period when their supplies fail—when the conditions of their energy are cut off.

P.—The law, then, seems to be this—that in proportion as a structure is slow to decompose (as cartilage)—*i. e.*, in proportion as its vitality is low, so much the more tenacious is it,—so much the longer does it retain its power of acting, after the withdrawal of the conditions of action.

DR.—That is precisely its expression.—The muscles of ANIMAL LIFE, after the skin, are the most copiously supplied with nerves—chiefly *motor*, blended with a few *sensory*. Muscle, as to its chemical constitution, may be called solidified blood. There is no difference in their elements.

P.—The nervous tissue, as it is still more wonderful in endowments, must be still more extraordinary in structure, than the muscular?

Dr.—It is, as far as we know, creation's masterpiece! By its large endowments in us, we alone of all animals, are fitted to know, to scrutinize, to appreciate the Divine handiwork, and worship the Maker of our frames, the Father of the spirits of *all* flesh. Nervous tissue consists of central masses, or ganglia, and trunks, and branches, which transmit, in either direction, the influence of actions that take place at either extremity. Nervous matter is composed of two primary elements; 1st, nerve-fibres; 2nd, nucleated cells, or vesicles. In the nuclei of these cells are pigment granules; to this is owing the grey colour of the *corticle*, or *cineritious* structure of the brain and ganglia. The ultimate nerve-fibre is a cylindrical nervous sheath, enclosing the nervous matter, which is soft, pellucid, and homogeneous. This tube seems continuous from the nervous extremities to the nervous centres. It has no blood-vessels, and forms no anastomoses. Trunks are composed of these tubular nerve-fibres, bound up with blood-vessels, areolar and fibrous tissue. The first development of nerve-tubes is precisely analogous to that of capillary vessels, or muscular fibre—*i. e.*, a string of primary cells coalescing into a continuous tube.

P.—Are these nerve-tubes, when destroyed by injuries, &c., ever regenerated?

Dr.—They are; as is clearly proved by many pathological facts and surgical experiments. Whether for the conduction of motion, or sensation, the nerve-tube must be unbroken.

P.—What are the essential constituents of the central or *ganglionic* masses of the nervous system?

Dr.—They consist of nucleated cells, or vesicles embedded in a fine granular matter, and traversed by capillary blood-vessels. The nerve-tubes simply enter the ganglionic centres, wind their way among the cells, and then emerge from the mass. There is reason to believe that the arrangement of the nerve-fibres is alike at the nervous centres and at their extremities. The *motor nerves* have no proper terminations, their ultimate ramifications forming a series of loops, returning into themselves, or joining others. The arrangement of the *sensory fibres* is of the same sort.

P.—Is anything known of the alterations these ultimate

elements of nervous structure undergo in the actions connected with sensation?

Dr.—It seems to be a law of the nervous structure, that wherever a change has to be originated, we have a layer of nucleated globules, and a plexus of fibres (nerve-tubes) and capillary vessels. This arrangement is found at the origin of the sensory nerves, *i. e.*, on exterior surfaces, as on the retina, the olfactory and auditory nerves, probably in the papillæ of the skin and tongue.

P.—Is there anything remarkable in the chemical constitution of nervous matter?

Dr.—Much. The peculiar cell substance is *fat* and *phosphorous*. The amount of the latter is greatest at the age of greatest *thought!* In infancy it is scanty: so in old age and idiocy.

P.—For the same reason as in the case of muscles, I infer that the nervous system is copiously supplied with blood.

Dr.—It is, and necessarily so. The vesicular structure is embedded in a minute capillary net-work. In the fibrous trunks, the vessels run alongside, connected at intervals by transverse branches. *The supply of blood to the brain is beyond all proportion greater than to any other organ.*

P.—This is the surest index of the active function of the organ.

Dr.—Yes; and hence also of the rapidity and extent of its interstitial changes. Every vital operation, as I before showed, induces a change of structure. This is an essential condition to the manifestation of power, or the exercise of a function.

P.—You said that the oxygen introduced by the arterial blood united with the ultimate elements of structure.

Dr.—That being the case, the death and disintegration of a minute portion of mature cells so induced, make a corresponding repair necessary;—call up an effort of nutrition to replace that which has been removed. The products of decomposition found in the excretions, demonstrate this waste and reproduction of the nervous substance. From analogy, it may be presumed that the nerve-cells are reproduced in precisely the same manner as the epidermis-cells are carried forward to the surface, *i. e.*, are developed in successive layers, from the *pia mater* to the interior, where they are connected with the tubular portion of the nervous tissue.

CONVERSATION XXVI.—*Of the general functions of the nervous systems of man—The organic, the reflex, and the animal systems—Visceral ganglia—Spinal chord—Brain.*

P.—I AM particularly anxious to have a clear, connected, and concise view of the grand systems and functions of the nerves, as they are so often evoked by you, and evidently form so large an item in the explanation of the symptoms of disease. In modern times, if my reading informs me rightly, great discoveries have been made in this department of physiology. To judge from myself, a popular exposition of this subject must be a great desideratum with unprofessional readers.

DR.—The subject, truly, is one of equal importance and interest, but one too little understood. It is the basis at once of sound pathology and successful practice. Artificially to split the nervous system into separate individual organs, aids us in its clear comprehension. But it is only when such organs are viewed *as a whole*, united as they are by close anatomical dependencies and connexions, that the full significance of their wondrous plan comes out. They may be truly said to constitute the Divine masterpiece of animal mechanism! Considered simply as a fertile field of Natural Theology, the nervous system remarkably illustrates the high attributes of Deity. He who wishes to understand *well* the general economy of the human frame-work, the causation of disease, its symptoms and its sympathies, its modes of propagation throughout the various structures of the body, together with the philosophic principles and processes of its restoration to health, I should say, *study the nervous system* in all its departments or divisions.

P.—I shall patiently, and with much interest, hear your exposition.

DR.—For the purposes of the existence of plants, a simple circulating apparatus suffices. But the complex functions of animals necessitate mechanism of a higher order, to which nothing analogous is found in the vegetable kingdom, viz., a NERVOUS SYSTEM, or, more properly speaking, *a series of nervous systems*. Their office is threefold:—

1st. To be an actual and active *source of power* to the various animal structures and organs. (This is independent of the question "whether contractility be an inherent property of muscles," which I believe it to be, and as Haller long ago demonstrated.)

2nd. To be the *instruments of relation* with the external world.

3rd. To be a *bond of union* between the several contractile tissues of the animal, to harmonise and control their movements, and to act as an internuncio and interconductor between all parts of the organism; subjecting them to certain common influences for good or for evil, and pre-eminently making the complex parts of the mechanism into one grand whole.

The nervous centres are disposed into, or constituted of, what are termed *ganglionic masses*—agglomerations of vesicular nervous matter.

P.—I recollect. You explained the nervous structure before, under the head of the elementary tissues of the human body.

Dr.—Yes; these ganglionic masses are the sources and elaborators of all nervous power. Into these enter, from these proceed, the various *nerve-trunks*, whose *branches* penetrate and pervade every structure.

P.—What are these *nerve-trunks* composed of?

Dr.—Bundles of *nerve-fibres*, of various endowments and offices. The fibres are mere conductors of power or imitators of impressions. They are divided into two great classes, 1st. *afferent*, or *centripetal nerves*. 2nd. *Efferent*, or *centrifugal*. The former commence on the surfaces, and terminate in the vesicular matter of the nervous centres. The latter originate in the vesicular matter, and end in the muscles and skin, or mucous membranes.

The ganglionic masses are numerous, and each independent sources and centres of nervous power; yet all intimately allied, co-working and co-sympathising.

P.—Will you enumerate these ganglionic centres?

Dr.—1st. The visceral ganglia. These include not only the semilunar and cardiac ganglia, but also the chain of *cranial*, *cervical*, *thoracic*, *lumbar*, and *sacral* ganglia, that form a netting along the entire front of the vertebral column; to these may be added numerous minuter ganglia, as well as those at the posterior roots of the spinal nerves. The branches of the semilunar ganglia are distributed among the abdominal viscera. Those of the cardiac ganglia, from their name, go to supply the heart, and also the vessels proceeding from it. These nerves accompany the arterial trunks through their whole course, ramifying minutely upon their surface, and intimately influencing their

functions, especially the actions of nutrition and secretion. Taken altogether, these ganglionic centres and ramifications constitute the sympathetic or organic system of nerves. By referring to an anatomical plate you will understand it perfectly.

P.—You are coming to what interests me much, and of which I have hitherto had but a very vague conception.

Dr.—It may, perhaps, surprise you to learn, that the system of organic nerves is developed in animals, not in the ratio of the activity of their nutritive functions, but in the ratio of the purely animal, or more exalted functions.

P.—Organic innervation, then, does not bestow an active moving power on the viscera under its control?

Dr.—You are too fast. Such inference is not justified. I freely admit that one grand office of the organic nerves is to be a means of inter-communication between distant parts; to associate, control, and harmonise the organic movements; to render the grand visceral functions subject to certain influences from the higher or animal functions, and *vice versâ*:—in short, to bring them to mutually sympathise in the weal or woe of each other. But I cannot believe this to be all. The means are disproportionate to the end. It is contrary to all analogy, that the Creator should use a complex agency, like the organic and excito-motory nervous apparatus, for so simple an end as that of mere sympathetic connexion. I freely admit that muscular fibre *per se* can contract. But a *muscle* (a bundle of such fibres) executing a specific action, in association with other muscles, always has a supply of nerves, which clearly, in the higher animals, impart energy to the exercise of that muscle, and which constitute, to all intents and purposes, its active moving power. Of two men, or two horses, similar in build, bone, and muscular development, that one will perform the greater feats of strength which has the larger nervous development.

P.—That is well known. Hence, "*blood*, *bottom*, and *pluck*"—cant phrases for the elements of energy and endurance—refer more to amount of nerve than to amount of muscle.

Dr.—Undoubtedly so. Nevertheless, this sympathetic influence of the animal upon the organic functions, and *vice versâ*, is not a trifle. It is, on the contrary, a point of high moment practically to the medical practitioner; and wherever I can, I wish to turn abstract scientific truth to

practical account. The volitional movements of man—the excesses of his passions, appetites, and emotions, through the medium in question, all powerfully affect and derange this system, often laying the foundation of his gravest *chronic* maladies. In brutes, who obey their instincts, and who live in a state of nature, disease of these nervous centres, so fertile a source of misery to man, is not known.

P.—Please to tell me about the SPINAL MARROW, or CHORD.

DR.—This is a part and parcel of the mechanism of the organic nervous system; yet as a chain of ganglia it is distinct and independent. It is not, as long supposed and taught, a mere appendage to, or prolongation of, the brain. It is a nervous apparatus distinct and *sui generis*. It is, in consequence of its *afferent* and *efferent* fibres of nerves, pre-eminently the seat and instrument of what is called *reflex actions*, or *excito-motory movements*. The spinal chord forms, also, a sort of connecting link between the organic and animal nervous systems. For, through it volition and sensation are transmitted; and from it, as well as from the brain, is draughted off ganglionic power, when the organic functions are too severely tasked.

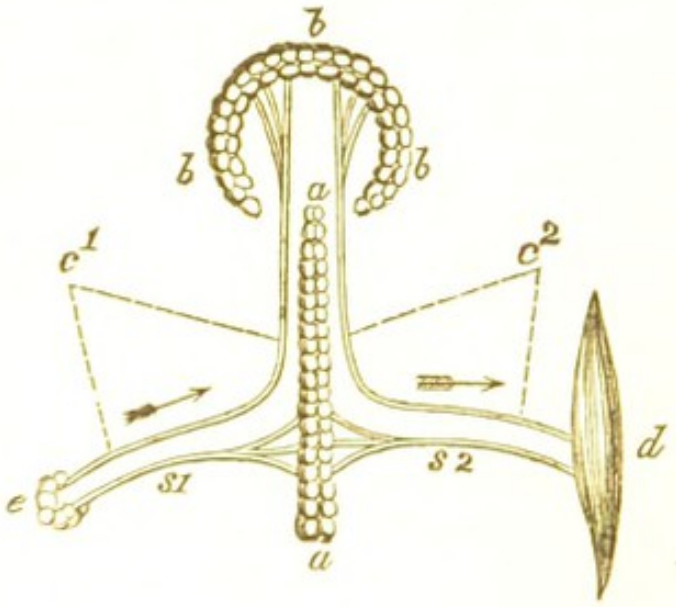


DIAGRAM OF THE ORIGINS AND TERMINATIONS OF THE DIFFERENT GROUPS OF NERVOUS FIBRES. *a*, *a*. Vesicular substance of the spinal chord. *b*, *b*. Vesicular substance of the brain. *e*. Vesicular substance at the commencement of the afferent nerve, which consists of *c* 1, the sensory nerve passing to the brain, and *s* 1, the spinal division, or excitor nerve, which terminates in the vesicular substance of the spinal chord. On the other side is the efferent or motor nerve, proceeding to the muscle *d*, likewise consisting of two divisions —*c* 2, the cerebral portion proceeding from the brain, and conveying the influence of the will or instinct; and *s* 2, the spinal division conveying the reflex power of the spinal chord.

P.—This REFLEX FUNCTION, you have so often mentioned, I wish particularly to be explained to me; for it is highly interesting, and wonderful in design.

DR.—*Reflex movements* are performed

independently of the will, without consciousness, and without sensation (in the healthy state), by the simple contact of the contents of the hollow viscera, as the gullet, stomach, bowels, heart, bladder, &c. The impression is propagated by *afferent* (*centripetal*) nerves to the spinal chord, or the medulla oblongata (its prolongation into the cranium), where a respondent motor impulse is excited, and whence it is transmitted by *efferent* (*centrifugal*) nerves. Reflex action depends on the completion of the nervous circle in the grey ganglionic mass, in each segment of the *chord*.

The spinal chord consists of two lateral halves. Each spinal nerve arises from two sets of roots, an *anterior* and a *posterior*. The *white fibrous tracts* of the spinal chord are continuous with those of the brain. The ganglionic portion is principally composed of grey matter. The quantity of grey matter in a ganglionic mass, bears always a direct relation to the amount of influence to be exerted. Into the grey matter, and returning thence, a portion of the roots of the spinal nerves may be traced. Others pass on continuously to the brain.

Each spinal nerve contains at least *four* sets of fibres, inclosed in their respective sheaths, or bundles.

1st. A sheath of *sensory chords*, passing continuously to the brain.

2nd. A bundle of *motor nerves*, conveying the influence of volition and emotion downwards from the brain.

3rd. A bundle of *excitor* or *afferent nerves*, terminating in the true spinal chord, or ganglion, and conveying impressions into it.

4th. A bundle of *motor* or *efferent nerves*, emerging from the same ganglionic centre, and conveying the motor energy emanating therefrom.

The posterior or afferent roots of the spinal nerves unite the first and third of these bundles. The anterior or efferent roots unite the second and fourth.

The great *excitor or motor nerve* in the acts of respiration, circulation, and digestion is the PAR VAGUM, which takes its origin in the medulla oblongata, and gives branches to the pharynx, larynx, heart, lungs, œsophagus, and stomach; uniting these important parts, in the most intimate sympathy and friendly association.

P.—Situated at the base of the brain, as you have described the medulla oblongata to be, Nature seems thus to have chosen, with curious and watchful care, to locate the

sources of the most vital actions in the best protected parts of the organism.

DR.—True; in these studies, we are incessantly called upon to venerate the abundant benevolence with which all design in the human body is carried out. The *inlets* by which the food and air find entrance, and the *outlets* by which the excretions find exit, are subject to the control of the excito-motory or spinal system of nerves. They are to a certain degree, also, under the influence of the will. Deglutition is, as a reflex act, the result of a stimulus applied to the fauces. We cannot always swallow at will, nor can we ever restrain the tendency once it is excited. By the same law, by means of the same mechanism, the contact of a noxious gas, or the collision of a hard substance with the glottis (the entrance to the windpipe) causes the latter spasmodically to close against it. The action of the sphincter muscles which guard the cardiac orifice of the stomach is *reflex*. It yields and opens to the pressure of the swallowed morsel, and it then closes so as to retain the food during the churning movements of the stomach. The latter, with the peristaltic (propulsive) movements of the bowels, are referrible to the direct stimulation of the simple contact of the food. The muscular coats of the rectum and bladder are, in like manner, excited to contraction, by the direct stimulation of their contents, aided by the combined contraction of the abdominal muscles; the sphincter of the cardia being closed, the force must act downwards upon the walls of the rectum and bladder. The action of the *expulsors* and *sphincters* are thus continually balancing each other. If the intrinsic or internal stimulus be deficient, the *will* must aid the expulsors.

The closure of the pupil of the eye against strong light, and of the eye-lids against external irritants, are *reflex acts*. The rapid vibrations of the wings of insects, and of birds, are not volitional movements, but reflex acts—albeit they begin and end, in obedience to the will. Hence the occasional long continuance of the latter, as in the flights of migratory birds, comparatively without fatigue. The grasping and perching on twigs, by the bent claws of birds, is a further instance of *reflex action*.

Locomotion of the lower extremities is, in a healthy subject, to a great extent a reflex action. So also is muscular tension and antagonism.

P.—I have observed this want of tone or tension in the paralysed side of a face.

Dr.—Right; there the features are drawn together towards the side where their tone is still retained by the muscles.

III. The third series of ganglia are those of *the nerves of the special senses.* Their locality is in the continuation of the medulla oblongata. They are the instruments of the *instinctive actions* of animals; also of human emotions, feelings, passions, and appetites. The organs, whose nerves proceed from these ganglia, are placed in immediate proximity with the entrance into the alimentary canal.

IV. *The cerebral hemispheres are the ganglia* (par excellence)—the seats and instruments of the will, and the intellectual faculties of man.

V. Lastly, the *cerebellum* is a vesicular nervous mass, and *source of power.* Its ganglia are for the co-ordination, adjustment, and combination of the locomotive actions.

The nutrition and well being of these last two divisions of ganglia, are under different laws from those that regulate the first three series of ganglia. Being the seats of voluntary efforts, and of the more exclusively *animal* functions and endowments, their exercise produces more or less speedy exhaustion. *Volition* is exhausting. Hence the amount of the exhaustion is in the measure of the force and continuance of the volitions. This is a grand law of the organism, not well understood in the theory of healing, and much neglected, if not wholly discarded, in the practice of healing. In proportion as an individual has wasted himself by voluntary exertion, *i. e.*, disintegrated his brain, and diminished the nervous energy, that should thence have flowed to the other nervous centres, in that proportion is a season of cerebral torpitude necessary, to stop the disintegrating process, and to repair the loss that has been sustained.

P.—What do you call that season of cerebral torpidity!

Dr.—Sleep. The other nervous centres know no exhaustion of this sort. The will there has no control, and therefore produces no disintegrating effects. The common processes of repair suffice to replenish the waste their exercise entails.

P.—By that showing of the matter, therefore, *the visceral and spinal nervous centres never sleep?*

DR.—No; they require it not. They know no intermission of action. They go on at their own speed, as appointed by their Creator. They may be surcharged with work, or with materials of work, but they will not easily work under *high pressure*, as the brain is so often forced to do, in the necessitous pursuits, or mad passions, of mankind. If so compelled, they sooner or later revenge themselves by bursting the boiler, or to carry out the metaphor, otherwise straining the machinery to its irremediable damage.

CONVERSATION XXVII.—*The animal and organic functions continued—The organic, involuntary, or vegetative functions—The animal nervous system the medium of the mind of man—Muscle and nerve instruments of thoughts—What is the influence of the organic nerves in nutrition?—Nervous system compared to a republic of confederated states.*

P.—IT is very clear from the tenor of your last conversation, that the distinction of the animal and organic functions of the human body is valid and vital. Will you please to enlarge upon this topic?

DR.—Most gladly. The movements implied in the performance of the vital functions necessitate the intervention of a nervous and muscular system. The intercommunications of the nervous system are a sort of corporeal telegraph wires, by which behests are transmitted from the sources of impression, to the agents of motion, and *vice versâ*. Through all grades of animals, above the very lowest, wherever muscular contractility is needed, or any peculiar operations by means thereof, there is always an associated nervous structure. The stimulus to muscular movement—whether voluntary or involuntary—always operates through *innervation*.* In the former case, that of voluntary movement, the stimulus is purely nervous, one of thought or will. In the latter case, the stimulus that provokes the activity of the muscles of ORGANIC LIFE, *i. e.*, the involuntary or automatic movements, is one of the *reflex* class, generally the simple stimulus of contact or distension. Muscular contractility is only called forth in obedience to appropriate stimuli. To send forward the impressions of that stimulus, and to arouse the

* This term is borrowed from the French, and now naturalised in our medical phraseology. It seems to embrace the functions of the nervous system generally.

contractile efforts the necessities of the case demand, are the sole uses and functions of the nervous distribution we find in the organs of vegetative life. Organic actions may go on without brain, *i. e.*, without perception, thought, or volition, but not without a spine, nerves, and visceral ganglia.

P.—This vegetative or nutritive system you allude to is the organic system of nerves?

Dr.—Yes; otherwise called the ganglionic system. It merely concerns individual or intrinsic life. It presides over the vital or involuntary functions—all motions that are performed spontaneously and unconsciously. The organic nerves are not conveyers of sensation in the usual acceptation of the term, and are withdrawn from the control of the will. They accompany every blood-vessel, and permeate every tissue. They pervade the animal nervous system, and subserve the nutrition of the brain and spinal chord. They lie at the foundation of the grand functions of digestion, assimilation, secretion, excretion, respiration, circulation, animal heat, &c. These nerves confer on the tissues what is termed their *irritability;* in other words, their organic vitality, their power of being acted on by their appropriate stimuli. On the organic nerves the first impression of disease is usually received, and through them it is transmitted. In short, the functions of the *organic* or *vegetative* system, and the parts under their dominion, have for their object to maintain the integrity of the structure, to repair its waste, to counteract its decay, to afford the conditions for the full play and development of the animal powers. The *organic ganglia* are partly the media of reflex movements. They are the excitors of power, in obedience to stimuli.

P.—Well; what is your account of the animal system of nerves?

Dr.—They are those by which the individual brings himself into relation with the world without. They constitute the cerebral system and its adjuncts. They furnish or regulate the instruments by which the animal takes cognisance of what occurs around him, by which he acts upon others, or is acted on in turn. They perceive the wants of the economy, and exercise themselves in the supply of the external materials necessary thereto. These comprise the conscious, voluntary, and sensible acts of the living being, —the expressions, movements, and feelings, which peculiarly and exclusively characterise the creatures constituting the animal kingdom.

P.—The animal nervous system, therefore, is the medium of the mind of man!

Dr.—Yes; muscle and nerve are the instruments of thought. In no other way can ideas emanate from one being to operate upon another. Language, literature, look, gesture, are the muscular and nervous moulds, as it were, in which mind is forced to throw itself in the present state of being. *The organs of sense* are instruments of particular mental faculties, and constitute the great highways of communication between the world within and the world without. On simple physical principles, the various special senses, as sight, hearing, smell, &c., are instruments exquisitely adapted to convey the particular impressions they take cognisance of. In man, the purely organic or vegetative life is subordinate to, and for the mere support of, the animal or psychical functions. On the due supply of the former, the activity of the latter depends.

P.—When you come to that, indeed, the most powerful stimulus to man's mental exertions, is the necessity of provision for his nutritive functions.

Dr.—True; his muscular and nervous systems, the prime agents of his animal functions, are his predominant characteristics, and would still constitute him man, if they could be preserved intact, and all the other parts destroyed.

When the fabric has attained its full development, the activity of the *organic* functions keeps pace with that of the *animal*—sometimes are prematurely worn out in order to do so.

P.—That is a startling and pregnant thought.

Dr.—It is a highly suggestive truth. But it is one which touches on considerations of pathology and practice to be taken up in their place. At present we cannot afford to diverge from our main route. The reason of the fact stated is this, that the exercise of the animal functions—of the brain, nerves, and voluntary muscles—produces great structural waste. Every effort of thought, every impulse of volition, every contraction of a muscle, requires, as its necessary condition, the disintegration of a certain portion of the structure, and the union of its elements with oxygen. The rapidity of the disintegration of the tissues is in proportion to their functional activity, and their renewal is correspondingly rapid. The excretions, therefore, *i. e.*, the products of the disintegrated tissues, augment with the activity of the animal functions, and diminish with the

degree of their disuse. This is most palpably seen under muscular exertion, that is, in the waste produced by bodily labour.

P.—Does the same law hold good in the case of *brain* labour, thought or care, grief or passion?

Dr.—It does. These *consume* the nervous structures as exercise consumes the muscular. The nervous centres in this case undergo increased disintegration, and proportionate is the demand for blood to the brain, that is, for the elements of reconstruction and of nutrition.

P.—You said that the animal and organic functions were mutually dependent on each other.

Dr.—Yes. For example. The organic functions are dependent on the animal so far as sensation, thought, volition, locomotion, are necessary to obtain possession of the food, and in man, to prepare and fit it for nourishment. Its ultimate appropriation is the concern of the organic functions. The animal functions, in turn, are intimately dependent on those of organic life. The nervous system can less than any other bear an interruption to its circulation, or vitiation of its nutrition. Morbid action of the ganglionic nerves, by its influence on the blood-vessels alone, will impair the nutrition of parts supplied by the affected vessels. Impairment of the functions of animal life, *i. e.*, disorders of the higher or encephalic nervous system, have their foundation in faulty performance (however induced) of the nutritive functions.

P.—Do you mean to say that sensation, volition, thought, emotion, &c., are quickened, diminished, or perverted by disease of distant parts, especially of the nutritive centres and apparatus?

Dr.—I do. The fact is unquestionable, and it is important to know it. This is the root of *hypochondriasis* and *insanity*. In ninety cases out of a hundred of these disorders the fountain of the evil is not in the brain, *but in painless abdominal disease.*

P.—Which, because painless, has so long escaped the cognisance of both patient and practitioner.

Dr.—Just so. Hence the injury and injustice done to such patients by treating their mental miseries as feigned or imaginary. I have seen very many suffering persons make believe, and anxious that they should be thought well, but cannot recall one who pretended to be ill, when he was really well.

P.—Such facts—the facts you state of the true, perhaps the unsuspected source of those miserable mental maladies, place in a striking point of view, the importance of avoiding the production of morbid sensations in the vital seats and centres, and of cultivating only general sensations there.

Dr.—Yes; but proper or healthy sensations there—those arising from the healthy satisfaction of normal wants, not the morbid satisfaction of abnormal cravings; as unwholesome tipples, irritant condiments, &c.

P.—What do you call tipple?

Dr.—That is anticipating. We shall leave that till we come to discuss the questions of diet, &c. To proceed. By the present showing, then, irregularities in the quality or distribution of the blood are one of the mainsprings of the mischief in disorders of the nervous system; the cure is mainly to be sought, and addressed, *through the blood—in means that improve its quality, and correct its distribution.*

P.—That is an argument for your WATER-CURE, that comes upon me forcibly. I had always heard that the boast—the justified, the unquestioned boast—of the Water-doctor, was the power of his system to *improve the quality*, and to *correct the distribution of the blood.* And from the new light you give me of the origin of nervous diseases, I can at once perceive the *rationale* of your success in their treatment. The same light suffices to show me clearly, how impossible it is to treat such diseases successfully by drugs alone, sanguineous depletions, or the starvation system; the one *impairing*, the other *impoverishing* the blood.

Dr.—You judge correctly. But allow me to correct an error you may be very likely to fall into here, from the undoubted reciprocal relations of the nervous and nutritive systems. The nutrition of animals, as of plants, is to a great extent the result of the vitality of the circulating fluid. In this way the primary tissues of the embryo are developed, and the processes of organic life are comparatively far advanced *before nervous matter is formed.* Afterwards, however, the organic nerves are found minutely to intertwine the coats of the blood-vessels.

P.—If, then, the organic nerves have no influence on nutrition, what meaneth this supply of them to the blood-vessels, as you now describe it? *Cui bono?* This is to me an anomaly on the theory that nutrition is independent of innervation.

DR.—I will give you my solution of the difficulty. One obvious reason for this nervous distribution to the blood-vessels, is the necessity of combining all the parts of the animal body *in sympathy, i. e.*, for the purpose of establishing a general connexion and dependence of one part with another, and of the whole with every part. But this, I conceive, is not the whole extent of the office of the organic nerves in the present case. That they have a more *vital* influence is shown by the fact that the tissues of the eye are disorganised and destroyed by severing its organic nerves. The action of the heart, the propulsion of the blood through its vessels, and the peristaltic movements of the bowels, are no more than the organic actions of the eye, independent of innervation. Plants have no need of a nervous system, neither sensitive nor organic. They have no sympathies of the kind of those of animals. Their circulating vessels suffice to bring all their several parts into mutual relation. Another reason, they are immovably fixed in one spot. Deriving their nutrition by means of roots, they *receive it in one continuous current*. There are no *interruptions of supply*, as with animals. They never fast. Therefore they need no stomach, no heart, no force-pump to propel the fluids through the vessels; the interchanges going on between the contents of the leaf and the atmosphere, promote their circulation as effectively. But it is precisely because animals fast—man and brute—because their blood-vessels are in the course of twenty-four hours in alternate states of distension and flaccidity—at least comparatively so—that they require a *regulating nervous system* to adapt the calibre of the vessels to the quantity of their contents. The blood-vessels undoubtedly contract upon their contents, and propel them forward, precisely in the same way as the heart does, as the alimentary canal does, as the bladder does, and in a great measure in consequence *of the same mechanism—reflex action*. As the *stimulus*, therefore, either of *distension*, or of *quantity*, in any of these cases cited diminishes, so does the contractile action called forth by that stimulus.

P.—The nervous system, it strikes me, taken as a union of complex parts, as consisting of a supreme governing centre, that of animal life, and the subordinate ganglionic centres of nervous power attaching to special organs; with every means, moreover, of inter-communication between associated parts, for the purposes of mutual help and sym-

pathy, may be compared to a republic of confederated states, each individually independent, but all mutually allied and co-operating for the general good.

DR.—Your simile is *apropos* and accurate; and you have only to carry out the metaphor to see how it fares with the governed in such a government. In a time of profound calm and prosperity of these associated states (general health of the organs), each is only concerned with its own functions, and is competent to their discharge; having no special call upon its confederates for aid or sympathy. In such cases, the supreme council of the republic (the great centre of animal life) only takes cognizance of the general condition of each state (*i. e.*, organ) in particular, and of the wants of the collective body in general. But let an enemy from without (disease) find entrance; or let *intestine* tumult within threaten the dismemberment of the body political (corporeal) then their mutual sympathies and interests unite to spread the common alarm; as all share the common danger, and reap the common weal. At the same time, the presiding local centres of intelligence and power (visceral ganglia) take their measures of prevention or remedy. The energies of neighbouring parts are roused, their help evoked. By a consentaneous action of the allied powers, a vigorous effort is made to expel the foe, or to quell the revolt. In the case of the enemy gaining the upper hand, or the rebellion flourishing (disease unsubdued), then the break up of the social (corporeal) policy and frame-work is the result. Or if, through innate strength, the *constitution* holds together, and the forms and functions of government are retained, nevertheless, violence, dissension and heartburnings long prevail at the centres of power, and anarchy and weakness at the extremities (chronic maladies supervene, through the neglect, or exasperation of acute diseases). The *subordinate* parts, untrained to office, unfit for power, often usurp the seats of *principals*, and with the usual result; viz., that abuses grow more rank, and confusion gets worse confounded. (Morbid irritability of the organs, pains, spasms, convulsions, delirium, &c., evince the perversion of the functions of the vital centres.) But this is neither the height nor the whole of the evil. It is the nature of all extraordinary efforts of bodies (corporeal or political), to weaken, to waste, to exhaust, their material resources. The general muster of the available strength of a commonwealth (putting to the test the *vis medicatrix*) can only take place

at the expense of disturbing or suspending, for the time being, the various trades and professions of its members (the functions of the organs). But this interruption to individual callings, must only be of very temporary duration, and of very unfrequent recurrence. Because, if the industrial arts, tillage, and commerce, are long neglected, the state must necessarily fall into decay. Private ruin, general poverty, famine, and in the train of all these, wide-spread DISEASE will follow. The cup of calamity is at length full; and the sense of suffering now impels to the search for remedy. But the extremity of affairs is not always favourable to coolness of reflection. At first, any expedients are caught at, on the principle of drowning men grasping at straws. This is the season for the patronage of quackery political (and professional). Changes of ministry (of doctors) are the order of the day; and all sorts of political (drug) dosings and neck-or-naught remedies (mercurial courses, iodine, strychnine, arsenic, &c.) are called for, to purge off constitutional obstructions, to operate a diversion, or to give vent to pent-up ill-humours. But all to no effect. Every new experiment of an unfitting remedy only leaves the state (the patient) in a worse plight than it found it (him). Exhausted by vain efforts, and sick of social (physical) turmoil, aches and pains and disabilities of every sort, reason at length gains the ascendancy. Passion and prejudice are trampled under foot—a "man of the people" is raised up (a "peasant-philosopher" it may be)—to teach the community that help (health) is not to be found in agents extrinsic and alien to themselves. The nation that will be saved, *must save itself*. Its help is from within. By living at peace among themselves (diet and regimen), and by the steady development of their own rich internal resources (the constitutional powers given free play, the *vis medicatrix naturæ* untrammelled) all former extravagances and abuses may be to a great extent redeemed, counteracted, or remedied; and the body political (and corporeal) by degrees reinstated in its pristine condition of health and vigour.

CONVERSATION XXVIII.—*The relations, sympathetic connexions, and reciprocal influences of the nervous systems—Influence of irritated ganglionic centres in the production of morbid mental phenomena—The body conscience—How it is perverted or seared*—Intrusion *into the organic domain, and its results—Animal and organic sensibility—*

The index of being "used up"—Consequences of sound and unsound organic centres—The stomach the centre of sympathies—The consciousness of unconscious parts—"Fast" living—Reciprocal disturbances of brain and stomach.

DR.—THE general sketch of the organic and animal nervous systems, given in our last conversation, will prepare us now to discuss the subject more in detail, and with more special reference to its *practical bearings*. The topic is one equally replete with interest to practitioner and to patient. In the profound study of the relations, and reciprocal influences, of these admirable nervous structures, the practitioner, especially, will find the surest elements of sound judgment and practical acumen in the consulting-room and at the bed-side.

P.—The organic functions of the individual, you said, are withdrawn from the influence of the will, are performed without consciousness, and yield no sensation, so that a wonderful machinery is at work day and night, in our head, spine, chest, and abdomen—without our knowledge or without our being reminded of it.

DR.—Yes; but this is only so long as the primitive constitution of the animal is maintained, and its laws obeyed—*i. e.*, in the state of health. Under disease, when morbid sensation is aroused in this system, by the violation of its natural sensibilities, and the Creator's ordinances imposed to guard them, the existence and actions of the stomach or heart become painfully conscious; and besides, an element of *general* misery and *malaise* is superadded, that more than aught unmans the sufferer, prostrating alike the physical and mental energies. This lesion, this *strain* of the organic nerves, lies at the foundation of hypochondriasis in every case; and is the root of insanity in probably the majority of cases. The influence of irritated ganglionic centres in the production of morbid mental phenomena, is hardly yet investigated, hardly credited, by the profession.

Although the various nervous centres are insulated masses in one sense—distinct and independent systems—yet are they all intimately associated, by indirect connexions at least. The spinal ganglions in front of the vertebræ occupy a sort of middle territory, between the nerves of *animal* and those of *organic* life, and are a medium of communication

between each. First, they join filaments with the nerves going to the brain to convey sensations, or proceeding from the spine to supply the muscles of voluntary motion; notably those of respiration. Secondly, these spinal knots and nettings are connected by numerous radiating branches, with the great ganglionic centres, supplying the heart, lungs, stomach, bowels, kidneys, womb, &c.

These sympathetic connexions will sufficiently explain why disease of the viscera deranges the brain; and why cerebral irritation, in its turn, disorders the viscera.

P.—Can you determine or define precisely what nervous power is?

Dr.—The task is difficult, I must confess. Attempts have been made to identify it with electricity. There is, beyond all question, an electrical battery in the structures of man, and a current of electricity perpetually pervading these structures.

P.—But is there not something more?

Dr.—Undoubtedly. The whole subject, however, of vital properties is very recondite.

P.—I suppose change in the quantity or quality of the nervous influence will modify its functions?

Dr.—Yes; how this may be with the nerves of *organic life* we may infer by analogy, from what takes place in the seats of the nerves of *animal life*. Lowered mental tone, for example, the want of excitement, or disagreeable excitement of brain, lowers the voluntary functions, the nervous and the muscular energy; and then, by the sympathetic connexions, depresses visceral energy. This is seen in the readiness of soldiers, during a retreat, when the spirits are generally depressed, to take typhus fever, and other low forms of disease. It is also witnessed in the withering bodily effects of *despair;* and in the sudden rallying of the organic energies by the excitement of *hope*. The stimulus of innervation may be so lowered, on the instant, as to produce total prostration of power, or paralysis of function.

P.—You would illustrate this by the *shock* of sudden bad news.

Dr.—Precisely. On the other hand it may be so intensified as to produce involuntary and convulsive action, suspension of consciousness, and death. The *kind* of nervous influence depends upon the condition of the brain. A sound and vigorous brain, exercised in conformity with the laws of

man's mental and moral constitution, yields the most salutary influence in its own department and in that of the organic nerves.

P.—By the same rule, nervous power used contrariwise—*i. e.*, the lower feelings predominating over the higher, the natural order of things is inverted, and diminished mental and corporeal power will result.

Dr.—You are quite right. In any way—but most of all in a bad way—over-exercise of the mental energies robs the physical, and over-exercise of the physical robs the mental powers. Our power to pervert, exalt, or depress the functions of the animal nervous system, according as it is exercised in a manner at variance, or in harmony, with the conditions of its healthy action established by the Creator, is perceived and received by everyone as indisputable truth. But the analogous truth with regard to the good or bad influence we are daily exerting over the organic nervous system, is perceived and received by few. Hence, virtual suicide is daily, universally, practised in society; and men know it not, feel it not, heed it not.

P.—Do you mean to say that all habits of action, all modes of living, all diets, and all drinks, that are not in conformity with the organic laws of man's constitution, are *pro tanto* voluntary infringements of the first law of life, self-preservation?

Dr.—I do—and this is a startling truth to bring home to men's minds. The only difference is, that the intentional suicide does his work at once; the unintentional does it by piecemeal.

P.—You make it now clear. This enunciation of a solemn truth, for the first time, seriously arrests my attention—flashes a sort of electric light into my conscience, if I may be permitted such a figure of speech.

Dr.—I believe it will do so with every good man to whom it comes home. It should stir up profound reflections in the moralist.

P.—I am quite aware, as you have already so satisfactorily proved, that the tendencies of true philosophy, and the revelations of true science, harmonise with those of true religion.

Dr.—Here is another proof of it. Men speak of *conscience* only in reference to moral sentiments, instincts, and well-being. But there is a *corporeal conscience*, as prompt to warn of deviations from the laws of corporeal well-being.

And the same analogy holds as to the hardening effect, or searing process, produced by the *habitual* violation of the sane dictates of either.

P.—I perceive it clearly. The light you have shed into the recesses of my inner man grows stronger and more searching. You have struck out a topic which it is peculiarly the physician's vocation to preach on.

Dr.—Truly said. It has long been the subject of my daily conversations. Ninety-nine in a hundred patients we see *entail their own diseases* by the systematic, albeit, oft unwitting, violation of the *sound instincts* of their body. With some unfortunates, a healthy body-conscience has never existed; because the process of perversion, of searing it, has commenced in their cradle, and has been continued all through. By countless multitudes thus *sophisticated*, corporeal evil is called good, and corporeal good, evil.

P.—It certainly behoves medical men to expose and oppose, with all their influence, a giant bane of this sort, which unconsciously affects the core of society, and poisons the springs of life at the fountain-head. And I believe all those will do so who value the influence of their calling more than its gain; and who deem the *prevention* of disease, though less lucrative, yet more honourable than *cure*.

Dr.—A hard-judging world won't give us credit for so much disinterestedness. But let that pass. To our own master we stand or fall. The connexions and sympathies of the organic nervous system may become man's greatest bane or blessing, the greatest bane when the organism is abused, the greatest blessing when its laws are strictly maintained. In the natural and healthy state of the system, if any substance unfriendly to life be introduced within its boundaries, its deleterious properties soon make themselves evident.

P.—What results particularly in such a case?

Dr.—This. The organic sensibility is done violence to, more or less, and the nervous extremities convey to the nervous centres the intelligence of an ungenial and unwelcome intruder into the organism. Measures of prevention, or remedy, are taken on the instant, as a result of the consent between the extremities and the centres of power. A copious secretion is poured out to wash away, absorb, or drown the noxious irritant, and at the same time to shield the delicate tunics it is brought in contact with.

P.—What, if these be insufficient, and still more violent

measures of vital protection are called for, by the interests of the economy—what then?

Dr.—In exact proportion to the unfitness of the disturbing agent for vital purposes, is the discomfort it creates to the presiding central powers, and the measure of resistance it meets with. The sympathies of neighbouring and allied parts are roused; and an united effort is made against the intruder. He is either expelled the forbidden ground, by a consentaneous action upward of the muscles of the stomach, diaphragm, chest, and abdomen (vomiting); or, if gone too far to return, a summary exit is enforced per descensum.

P.—That, I suppose, you would say was the view nature takes of aperient pills and purgative draughts, and other delicate compounds of the same character.

Dr.—Yes; of all drugs in any dose to be sensibly felt. In the unperverted organism, these conservative actions have all the unerring certainty of instinct, and all the method and precision of reason. But these disturbers, although dangerous weapons in clumsy hands, are often necessary, and cut short the progress of diseased action, when judiciously used.

P.—You would say that an unsophisticated palate abhors alcohol, opium, tobacco, as much as poisonous drugs, and for the same reason, because innately poisonous?

Dr.—Certainly. By such a palate a genial substance, as bread, fruit, &c., is highly relished; and the more natural it is, the more highly relished; plain cooked meat, for example, is more piquant than ragouts, devilled and sauced dishes, &c.; the bread of unbolted wheat than that of finely-sifted flour.

P.—What distinction do you draw between *animal* and *organic sensibility*?

Dr.—*Animal sensibility* is needed in reference to the corporeal wants. It is represented by, or summed up in, the five senses. These constitute the faculties of external relationship, *i. e.*, they intimate to the regulating animal centre, the qualities of external objects, their size, temperature, roughness, or smoothness, softness or hardness, dryness or moisture, nearness or distance, taste or smell, position, &c., &c. They are established to guard the body from sources of injury that lie without, or lurk in the things taken within.

P.—Have the *nerves of organic life* any sensibility of this sort?

Dr.—No! not in the state of health. But they have the

precise co relative and equivalents. Each organ under their control possesses an organic sensibility of its own, as faithful, true, and delicate *in its sphere*, in testing the qualities of the things it is constituted to take cognizance of, as is the ear to sounds, the eye to colours, the nose to odours. This organic sensibility constitutes the *conscience* of each organ, we have spoken of above. This is its *special sense*.

P.—It is in consequence of this special sense, you make it appear, that the nerves of organic life transmit to their centres, the impressions made upon them by the substances contained in the organs to which they are distributed.

Dr.—Just so: that is sound doctrine. This sensibility varies in kind and intensity, according to the nature and action of each organ, as any given organ has been used or abused, and according to the unfitness or the vital wants of the object that elicits its action. The lungs, for example, are constituted, quick to perceive the qualities of air; the stomach those of food; the bowels those of chyme; the biliary organs those of bile; the bladder to perceive the qualities, irritant or otherwise, of urine; the heart and blood-vessels the qualities of the circulating fluid, &c.

P.—I may put this down, then, as an ultimate *fact* or *law* in physiology, viz., the adaptation of the special nerves of special organs to discern the properties of that which concerns their functions.

Dr.—A very clear law, the *final cause* of which is sufficiently clear: but into the efficient cause of which it would be as vain to inquire, as into that of gravitation. The only answer is, So the fiat of the Creator made it. This law of their nature is the sentinel of each structure and organ, their safeguard against whatever is inappropriate or injurious.

P.—Against all violence and offence to the organs they supply, these nerves recoil and protest, as one might say.

Dr.—As you may say, truly, although metaphorically. Nor is their protest unheeded and unregistered at the organic head-quarters. By the same law that implanted this conservative instinct, it is appointed, *that all injury*—wilful or unwitting, it matters not—*is followed by irritation and derangement of function, in the precise measure of the offence.*

P.—Would you say that incorrigible offence is followed by irremediable disease?

Dr.—I do maintain it by abundant and unmistakable proofs. What leads to these deplorable results is this, that

as the *moral sensibilities* of the individual—the conscience proper—may be perverted, even deadened, so may be the *organic conscience,—the physical sensibilities set to guard special functions*—be perverted or destroyed. Only conceive this state of matters, the man given up a willing victim to self-destruction, knowing it not, perhaps intending it not; but, worst of all, usually heeding it not, as we see exemplified in the case of the inveterate drunkard or opium-eater, —quite indifferent to it. It is a singular fact, also, that the two deteriorating processes generally go together—the one inducing the other.

P.—It appears, then, by your clear showing of your case, that as the most hopeless state of the man moral, is that in which the moral sensibility is quenched; so the most deplorable state of the man physical, is that in which his natural organic sensibilities are falsified or obtunded.

Dr.—Precisely. The state of the organic nerves, accompanying chronic disease, is to the observant physician a sure index, in a multitude of cases, of the sort of life the patient has led; how far he is "used-up;" what hope there remains for him; the precise cast of his future days, and the probable time of their termination.

In the department of *organic life* the sympathetic relations are intimate, intense, universal. It is the reverse in the province of animal life, so far as mere animal functions are concerned. A limb may be cut off, an eye destroyed, without impairing the integrity of the other eye, or other limbs, or affecting the health, if the vital organic centres and viscera be *sound*. Not if otherwise. From sound organic centres, a healthful influence is transmitted to every part of the organism, and this greatly through the route of the organic nerves, ramified on the blood-vessels.

P.—What if the vital centres be unsound, irritated, or debilitated?

Dr.—Then the morbid influence extends wherever an organic nerve goes, that is, throughout the entire economy. In such case, all injuries of the circumference or extremities of the body sympathise intimately with the unhealthy state of the centre; and all acute diseases, not intense enough to extinguish life, become *chronic, persistent in character though subdued in tone.* Under this morbid influence of the organic centres, a broken bone will not unite; or what would be in a healthy man a simple inflammation from a wound, becomes erysipelatous, phagedenic, ending

in mortification, or producing a fatal fever. In this unhealthy condition of the body, a simple inflammation of the eye, or of the gums, will run on to ulceration.

P.—I suppose that the degree of sympathetic influence which each organ has on the others, is always in proportion to the rank that organ holds in the system.

Dr.—Yes, according to its functional pre-eminence. The stomach *stands first in this sympathetic scale;* and justifiably so on every ground. Connected as this primary organ is, on the one hand, with the great centres of *organic life*, associated by plexuses (nervous nettings) with all the other nutritive viscera, heart, lungs, liver, kidneys, &c.; on the other hand inter-communicating, as it does, with the grand *animal* centres, by means of the par vagum, or pneumogastric nerve, and ever irritated in man's artificial state by his ever recurring wants, the sympathies of the stomach must necessarily be, and *are*, of all others the most profound, direct, and universal. *The suffering of every other organ is reverberated back upon it, and its sufferings in turn are reflected back on every other organ.*

P.—This explains the well known fact that an unexpected blow on the stomach will more speedily destroy life than a knock on the head.

Dr.—It does. In boxing, for this reason, it is not permitted to hit below the waist. A sudden and acute irritation of the organic nerves of the stomach, as from inflammation, spasm, or even a simple flow of bile into its cavity, will often produce entire prostration of the muscular powers, with deadly pallor, and all the feelings of dying. The stomach *in its rage*, when highly offended, oppressed, and irritated beyond endurance, will cause the brain to beat till real fury or phrensy is produced, sometimes till the structure is torn, and the man falls like a felled ox. Few thoroughly appreciate this pathological condition.

P.—From all this I should infer that the complete functional integrity of the organic viscera depends on the healthy condition of the nerves supplying them.

Dr.—Undoubtedly. The organic sensibility of health is exquisite. By corporeal abuses, by the repetition of disturbing causes, the natural organic sensibility of the part becomes denaturalised and depraved. Morbid irritability is kindled up; morbid sensibility accompanies it. The irritating cause is reiterated, and morbid irritability and sensibility are permanently established. The result is, that

from this starting point diseased sympathies are propagated throughout the economy. Hence all the functions of organic life are necessarily impaired, and impaired just in proportion to the amount of the morbid irritation.

P.—That stands to reason. One compartment of a complex mechanism cannot go wrong, without the play of every associated part being correspondingly deranged.

Dr.—In the human organism, for example, by a primary point of irritation established in the stomach, lungs, heart, or brain, every function becomes gradually to be more or less impaired. Digestion languishes. The chyle is badly elaborated. The blood deteriorates. Respiration is imperfect. The circulation is partial, irregular, unequable. The vital operations from being an easy, *unconscious labour*, become a painful struggle. Increasing inflammation or congestion in the centres of organic life, developes increasing local and general malaise, in which the animal centres sympathise. Patients get to fancy they feel the operations of their own stomachs, and the movements of the blood through the heart and great vessels; with often a painful consciousness of the existence of a brain.

P.—This consciousness in unconscious parts is a deplorable state of the man physical.

Dr.—And you might add—which no strength of the man, spiritual or intellectual, can long contend against. Such a state constitutes the acmé of mortal misery, and is often witnessed in the great, the good, the gifted, who have made *haste* to be eminent,—and who have achieved their elevation by the culture of intellect, pursued in *violation of the laws of health*. The names of such victims in the annals of literature, science, and art, are *legion*.

P.—Is this abnormal sensitiveness, or morbid sensibility, of the nerves of organic life, confined to the great and the gifted?

Dr.—By no means. Two other classes partake of it;—first, those who have been slowly poisoned by courses of medicine; and second, the degraded and the sensual, who have systematically poisoned themselves by alcoholic drinks; and who, under their excitement, draw upon the corporeal energies of a month, to sustain the debaucheries of a day.

P.—In the state of *perfect* health, I suppose, there is no consciousness of any internal organs,—nothing but a general feeling of physical *bien être*.

Dr.—With corporeal harmony, and that the natural re-

sult of the perfect play of the machine, there is a certain feeling of psychical happiness always associated—mental ease, calm, and joy, to a great extent, whatever may be the external state or troubles of the individual. "I am *still* happy in my mind," said a *healthy* friend to me, who had suffered losses, and experienced vexations and troubles enough to have killed any ordinary person.

P.—I may lay this down, then, as a sure principle, that, in the perfect state of health, there are no corporeal sensations, save those of the body's natural wants; as those of food, drink, and air.

Dr.—We must include also those of the voluntary excretions.

In probably ninety in a hundred cases of *chronic disease*, the diversity of *aches and pains* belonging thereto, may be traced to and found to be, neuralgic sympathies with some morbid part of the alimentary canal: as the organ with most sympathies, and the most sinned against by the reasoning animal *par excellence!* Dietetic offences are the more heavily visited, inasmuch as they are most frequently committed, under corporeal condition the least of all calculated to permit or sustain them, that is, under the *over-excited* or aching heads and hearts, produced in every class by the competitions and collisions of modern society.

P.—So dearly do we pay for a high state of civilisation!

Dr.—Pardon. You are mistaken. *A truly* high state of civilisation would correct all these evils. We are refined in manners and the *conventionalities* of society. We are great in commerce, great in arts, great in arms, and great in science theoretically, and so far as regards its money-making applications; but in that knowledge that truly exalteth a people, and ennobleth human nature—that brings man in conformity with the moral and material laws of Deity; and which crowns his existence with that health, wealth, happiness, and length of days, permitted to be man's portion or privilege on earth; in such knowledge, in such true civilisation and refinement, we are yet far far behind.

P.—Certainly something must be materially wrong in that alleged refinement of an age, when the vast body of the people can only obtain the *means* of subsistence by sacrificing the *end* of existence. But is not this verging upon politics?

Dr.—By no means. We are propounding no political theories; but are merely stating undeniable facts, in order

to show their bearings professionally. For example; it much concerns mankind to know how that stomach diseases, and then, next in frequency to them, brain or nervous diseases prevail, as the result of a high state of false social refinement—of that false refinement whose prominent characteristics are, 1st, discontent with position: 2nd, the exaggerated estimate of the happiness derivable from wealth and station, and the helter-skelter race to attain them. The *brain* and *stomach* are here the battledores that make the body the shuttlecock of mortal miseries—*irritation* being banded about from one to the other, in proportion as now the one, now the other, is vexed and maltreated. With many, there is little intermission of actual or sympathetic disturbance in either organ; *and life is one long disturbance and disease.* In these reciprocal disturbances of brain and stomach, we have all degrees of suffering—from low spirits to ill temper—from convulsions to insane ravings—from hypochondriasis to idiotcy—from palsy to epilepsy—from the tedious softening of the brain, to the sudden apoplectic fit.

P.—I must say, you have opened to me a field of great physiological and pathological interest; one whose cultivation by the community at large would yield the most precious fruits.

Dr.—A volume might easily be written on the influence of the nerves of organic life on the animal functions; *i. e.*, on the manifestations of mind, thought, temper, passion, disposition, character, &c. Here we can strike out only the most salient points.

In the perfect health of the organic nervous system, when the instinctive wants of the organism are satisfied, when the viscera receive none but their appropriate *stimuli*—proper air, food, chyle, blood, &c.—the whole machine works smoothly, harmoniously, joyously. A general feeling of *bien être* pervades the frame, with an entire absence of any special *local* sensations, or interior organic consciousness. The mind feels a cheering exhilaration, but does not know its source—at least, heeds it not. The thoughts flow easily; the fancy warms; and the highest aspirations of the man kindle.

P.—That is a proof that no law of our constitution has been materially violated.

Dr.—It is. This serenity of mind and physical joyance

would be man's habitual state, if all the laws of his constitution, mental, moral, and material, were systematically observed.

P.—The reverse, alas! is the common picture of human nature and of human life.

Dr.—That is man's fault or misfortune. The Creator has made all provision for human happiness. Wherever there is suffering of any sort, be sure that there has been a departure from the established laws of man's constitution in some point or other. The first step to the remedy of an evil *is the ascertainment of its source.* This corrected, warning taken, relapse avoided, health may be preserved and life prolonged, and the gates of happiness opened to all mankind. Moral causes may give temporary pain, grief will inflict its sting, and sorrow cloud the brow—vexations, crosses, and losses must be expected long to be mortals' lot; but their impression on the perfect organisation of the *healthy* man, will be as the ruffle of the summer breeze on the placid lake. "Weeping may endure for a night; but joy cometh in the morning."

Irritability in children or adults, is a sure proof that the organic nervous centres have been irritated in some shape or other; yet the mind is unconscious that it sympathises with the body. The brain is irritated by stomach-irritation as a result of its nervous connexions; and it irritates the stomach in its turn, when irritated in itself by the undue exercise of its own functions. The emotions and passions too long and too frequently indulged—grief and fear, jealousy and anger, love and pleasure—disturb the functions, and injure the structure, of both the organic and animal nervous centres. Hence the functions of the *stomach* are most impaired by profound mental emotions and exercises.

P.—Does it not occur, also, that the action of the heart is sometimes almost, and occasionally altogether, suspended by vehement moods of mind or thrilling sensations?

Dr.—Yes; sudden death often follows sudden joy, or excessive anger. The effect of over straining, or over exciting, any function is to exhaust its nervous endowments faster than they flow into it, or are created. Impairment of structure necessarily follows all undue exertion or demands on function. In this way, morbid action in an organ is *fixed*, its operation impeded, and its sensibilities perverted. From

such a starting point, morbid irritation is propagated throughout the economy, and a universal morbid sympathy is set up.

P.—It appears, then, as the conclusion of this whole matter, that the STOMACH and the BRAIN, as being the centres of nervous power—in consequence of their connexions, deeply reciprocating and resenting each other's trials, injuries, and complaints, and being, moreover, the organs that are constantly over-worked and over-excited by the habits of society—on these grounds, I say, it appears that *the stomach and the brain* are the inlets of all the woe that our world presents.

DR.—A melancholy fact in natural history. Yet a radiant gleam of hope shoots out around the thick darkness. *Knowledge* in due time will correct these evils. It is something to unfold their source. Whoever shall comprehend thoroughly the morbid states of the stomach apparatus and brain, and shall trace accurately the steps that led to their disordered action, shall have in his hands the two keys that will unlock the secret chambers of *chronic disease*, and will possess a clue whereby to unravel the intricate windings of its symptoms.

CONVERSATION XXIX.—*The generalities of the function of nutrition or assimilation—Cells absorb the organic compounds floating in the blood, and metamorphose them into structure—Changes of nutrition and its products lie at the foundation of all diseases—Natural and morbid affinities of the structure—The humoral pathology—Morbid products or deposits in the blood—The functional activity of a part the measure of its nutrition—Hypertrophy and Atrophy—Their causes.*

P.—WHAT do you call assimilation?

DR.—That function or process by which dead alimentary matters are converted into living organised structures (literally *made like* them).

P.—What is the essence or essential of the nutritive act?

DR.—*The growth of the individual cells* comprising the fabric. This commences while the inert nutritive materials are in their fluid condition, while they are circulating in the vessels. These cells draw their nourishment from the organic compounds floating in the blood.

DR.—In the same way, I suppose, as plants derive their

materials of growth from inorganic matters diffused in the air or in the water they absorb?

DR.—Precisely so. These materials are selected in such ways, and combined in such proportions, as to produce all the diversified forms and characteristic properties of organised structure, vegetable and animal. Each separate tissue of the body has its own peculiar and distinctive affinity for those constituents of the blood that are fit to be appropriated to its own uses, and converted into its own substance. Thus are matters previously inert and without life transformed into living fabric.

P.—I suppose this property of *cells* to convert matter into its own structure is an ultimate *fact* or *law* of physiology?

DR.—Yes; like that of chemical affinity, gravitation, &c., not to be explained. It has been already shown how cells grow from germs, mature, decay, or give up their contents, leaving behind them germs to go through, in their turn, the same round of reproduction and decay. This property of a cell, or structure, constitutes its *vitality*, a name to designate it as something entirely diverse from a *physical* or *chemical* property. As far as we know, it is beyond the power of inorganic matter to constitute a cell. The simplest cell must have a previously existing cell to furnish the germ.

P.—The definition of a cell, according to this, is, nature's *vitalising, organising* apparatus, by which it draws from the blood the materials required for the development of the structure it appertains to.

DR.—Just so. From this it will be apparent how substances abnormally present in the blood, must necessarily deteriorate the condition and development of the cells, and the solid tissues they originate. The tendency of all foreign or unnatural substances, of poisonous drugs, of effete or inert elements in the blood, is to produce a state of irritation in some or another solid tissue of the body; to disorder its nutrition, and to make it, in fact, a focus or starting-point of diseased action.

P.—Do I then clearly understand you to say that changes in the activity of the nutritive processes, and in the character of their products—changes either affecting individual parts or the entire organism—lie at the foundation of all diseases?

DR.—That is precisely the doctrine I inculcate; further, every tissue has its own morbid, as well as natural affinities,

and tendency to draw to itself and to retain or let off, certain elements of disease or foreign unassimilable substances, in preference to others. Drugs are among the foreign substances the system is too often gratuitously taxed to dispose of. They remarkably call forth cell affinities. Thus we find one tissue or organ has an affinity for *arsenic;* another for *lead;* a third for iodine; a fourth for *mercury;* a fifth for *aloes;* a sixth for foxglove; a seventh for ergot; an eighth for colchicum, and so on.

P.—The *humoral pathology*, then, holds an important place, and is not to be so thoroughly discarded as some would suppose?

Dr.—Discarded, no. The whole tendencies of microscopic physiology, and of animal chemistry, point in that direction; in fact, place the humoral pathology on a firmer basis than ever, though not so vague and exclusive as of old. The primary alteration of the secretions effected by disease, their excess, defect, or perversion, of course alters the constitution of the circulating fluids, either through the non-elimination of effete matters, or by the formation of morbid products. Hence abnormal elements or deposits in the blood are the precursors and attendants of every functional or structural change that can occur, and constitute, in fact, the material palpable causes or conditions of the persistence of diseased action. This can be *demonstrated* in a great many cases.

P.—You have just referred to the chief sources of abnormal elements or deposits in the blood; sum these up, if you please.

Dr.—They are *three*, perhaps. 1st Disordered conditions of digestion and assimilation; the unhealthy elaboration of healthy materials; in other words, the making of bad blood. 2nd. Extraneous or abnormal matters introduced from without, as alcohol, drug-poisons, &c. 3rd. Arrested, excessive, or perverted secretions. The non-elimination of the wasted fabrics of the body, being the means of accumulating in the system the largest amount of the most deadly elements of disease.

P.—All these active causes of abnormal elements or morbid products in the blood, must still further vitiate the nutritive processes?

Dr.—Clearly; by presenting to the cells unfit, injurious, or extraneous materials, *out of which to build anew the constantly decaying tissues.* Hence will result two grand evils:

1st. An acceleration or retardation of the normal nutritive processes. 2nd. A deterioration of the character of their products. From these will result, more or less, malaise and debility.

P.—I see clearly your doctrine. We cannot have disease affecting any individual parts, or the entire organism, without these essential elements and concomitants. I see from this, the successful defence you are able to set up for the pretensions of the Water-Cure; inasmuch as Hydropathy is confessed to be the best opener of the excretory outlets of the body; ejecting out of the corporeal channels, and reservoirs, all morbid *débris* that offend and poison the life-springs.

Dr.—Also by giving tone and power to the nervous centres, and healthy condition to the solids; but we shall come to that on another occasion. I believe that never before had a system such *scientific* buttresses and bulwarks, as the Water-Cure has. But that does not concern us at present. I was going to remark that the functional activity of a part, or of the organism generally, is the measure of the amount and rapidity of its nutrition. Health consists in, or is maintained by, the due proportion being observed between the activity of the *nutritive processes*, and the amount or rapidity of *waste*, according to the demands of the body under the varying conditions of infancy, youth, maturity, decline, decay, labour, and rest, &c.

Hypertrophy and *Atrophy* indicate relative degrees of nutrition, its excess or its defect; the former is nutrition exceeding waste, the latter waste exceeding nutrition, in the whole, or in a part of the body.

P.—Does increased nutrition necessarily follow increased ingestion, or excessive supply of food?

Dr.—No, emphatically. This surplus, indeed, if digested, may render the blood richer in nutritive materials; *but it does not induce augmented plastic activity in the tissues, by which these nutritive materials are made part and parcel of the living fabric.* These materials, therefore, being in excess in the system, over and above its wants, or its power of appropriation, impose a gratuitous burden on the excretories—necessitating the extra exertions of the latter, to rid the system of the undue accumulation of the former. But the excretories as often fail of their activity, as the plastic processes, or, at all events, break down under the abnormal efforts thus demanded of them.

P.—I see, then, there is no help for it, but that these unassimilated, unexcreted materials, become a pregnant *source of disease*, become, to all intents and purposes, foreign, unconformable, uncongenial elements, a true *materies morbi*, as you designate it.

Dr.—I perceive you properly apprehend the foundations of the Humoral Pathology. If even the excretories do succeed in eliminating this excess of materials, which they will do for a time in unimpaired constitutions, yet this extra strain of their powers eventually exhausts their energy, impairs their functions, and finally degenerates their structure.

P.—But is not *fat* a provision of nature for stowing away this excess of nutritive materials?

Dr.—You are quite right. Adipose or fatty tissue is an expedient of nature to remove from the circulating current an excess of nutritive materials, beyond what the system has been able to appropriate to the actual wants of structure. The undue nutrition of this tissue is the least injurious form of hypertrophy.

P.—How is hypertrophy or excessive nutrition of a part usually induced?

Dr.—This is anticipating our pathological conversations. But I will briefly satisfy your inquiries as they are *apropos* to the subject of nutrition.

1st. The excessive use of a muscular part (whether it be an organ of voluntary or involuntary motion), will induce therein hypertrophy or undue development. This is witnessed in the heart in cases of pulmonary obstructions, from the excessive efforts to clear that obstruction; in the bladder in cases of diseased prostate, from similar efforts for similar ends; in the brain, occasionally, from precocious talents unwisely goaded on. In this case the soft parts grow faster than the bony covering.

2nd. By local congestions, *i.e.*, by the gorging of the distensible veins of a part.

3rd. By the oozing out of plastic elements (as fibrine), which consolidate, and become interstitial or areolar tissue. The causes of atrophy, on the other hand, are more various. Atrophy may arise 1st, from insufficient supply of nutriment —*i.e.*, from deficient vital-sustaining power in the fibrine and plastic elements of the blood; or from a new growth absorbing the nutritive materials.

2nd. *From disordered digestion.*

3rd. From defective assimilation of proper plastic ele-

ments; in other words, from inactivity of the formation processes, from slowness of vital elaboration in the cells.

4th. From the suspension of the functional activity of a part; as in the uterus after child-birth; in the mammæ after lactation.

5th. From abnormal rapidity of disintegration; as in marasmus (wasting); diabetes; diarrhœa; cholera; starvation; fevers; and all diseases of exhaustion; from trouble, grief, care, anxiety, want of rest, excessive toil, &c.

6th. From mechanical causes, *e.g.*, obstructed circulation; from ossification; from inflammatory deposits obliterating the arterial tubes.

P.—I draw several conclusions from the foregoing observations. It seems *every vital act of the economy involves an act of nutrition.*

Dr.—It does. The vital properties of a part depend on its nutrition. The nutrition of a part, in its turn, depends on the due exercise of its vital properties.

The process of repair in a destroyed structure is nothing new or abnormal. It is simply the carrying out of the peculiar cell-formation, or nutritive processes belonging to that part. But let me add two other inferences for you, which I have, perhaps, scarcely afforded you the data for drawing.

Abnormal growths, as tubercle, cancer, &c., are instances of disordered nutrition, perverted cell-development.

Death is the final cessation of nutritive effort—the arrest of all cell mutations. This, however, is anticipating our Pathology, in which department we will discuss at length the important bearings of these and their allied topics.

OF THE CIRCULATION OF THE BLOOD; AND OF THE MOVING POWERS CONCERNED THEREIN.

CONVERSATION XXX.—DR.—TO-DAY, following the due course of our scientific colloquies, I should, by rights, enter on the functions of DIGESTION, ABSORPTION, and SANGUIFICATION. But this topic is so comprehensive, so intimately bears on our hygienic practice, and is, moreover, so full of interesting details, that I reserve it for a special series of conversations, which shall include the subjects of DIET and REGIMEN.

P.—Well, you could not discuss anything more interesting than the circulation of the blood. For I know enough of physiology to know that on the equable, uniform and continuous movement of the nutritive fluid through the blood-vessel system, the healthy action of all parts of the vital economy depends.

DR.—True. There are two distinct and entirely separate circles described by the circulation. 1st, that through the lungs; 2nd, that through the general system. The heart is placed at the junction of these and is a double organ,—two hearts joined together as it were—each circulating system having its own heart, its own arteries, and its own veins, intrinsically or anatomically independent; but, in fact and in function, intimately blending with each other in their common centre, and at their common extremities.

P.—I suppose the heart has the action of a great force-pump?

DR.—Something of that sort. The onward movement of the blood—*i.e.*, through the arterial trunks and capillaries—hair-like tubes, the ultimate branches of the circulation—is performed principally by the propulsive action of the heart, and partly by the contractility or elasticity of the smaller vessels. The larger vessels have in their structure a preponderance of *elastic tissue*, a great purpose of which is to make the *intermitting* waves of the blood, sent by the pulsations of the heart, into one continuous unbroken current.

P.—Have the capillaries any muscular tissue in their coats?

DR.—No. But there are supplementary local forces, which regulate the flow of the blood in the capillaries, independently of any central impulsion, or contractile action in

their own coats. Seen through the microscope, the capillaries present no obvious movement. The stream from the arteries passes through them, as through elastic tubes. *They do not afford any mechanical assistance to the movements of the blood.* Their coats are indeed contractile, but this is merely to regulate their calibre, and not for the purpose of peristaltic movement—the movement alone that would aid circulation. The great agent in the flow of blood through the capillaries is the chemico-vital reaction that takes place between the fluids they hold, and the tissues they nourish.

P.—The maintenance, therefore, of the proper chemical constitution of the blood, I infer, is the grand condition of the healthy capillary circulation.

DR.—It is subject, however, to the influence of the nervous system. Hence imperfectly arterialised blood, or blood containing morbid elements induced by faults of nutrition or secretion, or introduced by direct poisons taken into the stomach, or by miasmata through the lungs,—blood altered in any of these ways in its due chemical condition and affinities, will disturb the capillary circulation—will favour visceral congestion.

P.—Your doctrine then goes to prove, or to make it highly probable, that interior congestions are an essential element, or an inseparable condition, of all chronic and acute diseases?

DR.—That to me is very clear. You may truly say that congestion, in some degree or other, in some quarter or other, is the *material* cause or condition of all diseases; for whether it be an effect itself of a primary mischief, an irritant applied, a poison imbibed, or a miasm inhaled, it soon establishes itself as virtually the *efficient* or *perpetuating* cause of the malady.

Hence lay it down as an irrefragable axiom, *that the removal of congestions, or the promotion of a perfect capillary circulation in vital or other organs, where it has been languid or arrested—and thereupon the liberation of the secretions and the regulation of nutrition, the restoration of the mechanical constitution of the blood—and with it the integrity of the solids—are the grand practical indications, aims, and accomplished results of* CURE.

P.—Have not these been in essence and effect the object of all medicinal systems in all past times?

DR.—In *theory* they may be said to have been the aims of some of the really reflecting practitioners of all times and

of all sects. But *practically* they often hardly knew what they aimed at—at least the *means* they often used were the most irrational and unlikely for their *ends*. The best system of medical treatment—by whatever name it may be called—is that which will best accomplish these great ends. What claims to this beau ideal of curative art, the agencies comprised in THE WATER-CURE may establish, will afterwards be inquired into.

P.—Will you proceed then with the main subject, for these last remarks are a digression somewhat from the business in hand?

DR.—In the great, or systematic circulation, the affinities of arterial blood for the tissues is greater than that of venous blood.

Every distinct organ attracts to itself the peculiar substances which it requires as the materials of its nutrition. In each individual case the affinities differ. The tissue of each gland, for example, possesses a peculiar affinity for those materials which it is intended to separate from the blood. As the blood, therefore, in its course gives up its elements, its affinities diminish, and it is propelled by the force of the fresh current from behind, which has not yet parted with its elements, whose affinities are not satisfied.

P.—These ingredients, therefore, hasten towards the tissues for which they have attraction, because charged with certain constituents necessary to them?

DR.—Just so; and thus the nutrient elements of the blood are gradually yielded up, in performing the rounds of the arterial circulation. The exhausted nutritive fluids then return, charged with the effete, or used up elements, they have received in exchange for what they parted with (the venous circulation).

P.—From the analogy of the action of the leaf (the lung and skin of plants) in promoting the circulation, I imagine that pulmonary and cutaneous transpiration cannot be omitted as great subsidiary agents in effecting the circulation of the blood?

DR.—Your analogical argument is valid; its conclusion just. The exhalation or dissipation of fluids from the surface occasions a demand from below, a molimen or determination of fluids from the interior outwards. In this way circulation is solicited and propagated from the innermost recesses of the organism. With the checking of exhalation, either in plants or animals, this influx of fluids from

the centre to the surface is checked, circulation is retarded, or is suspended.

P.—Thus, by the very necessities of waste and supply, and by the wondrous apparatus adapted by nature with consummate skill to these ends, is the circulation of the blood incessantly maintained.

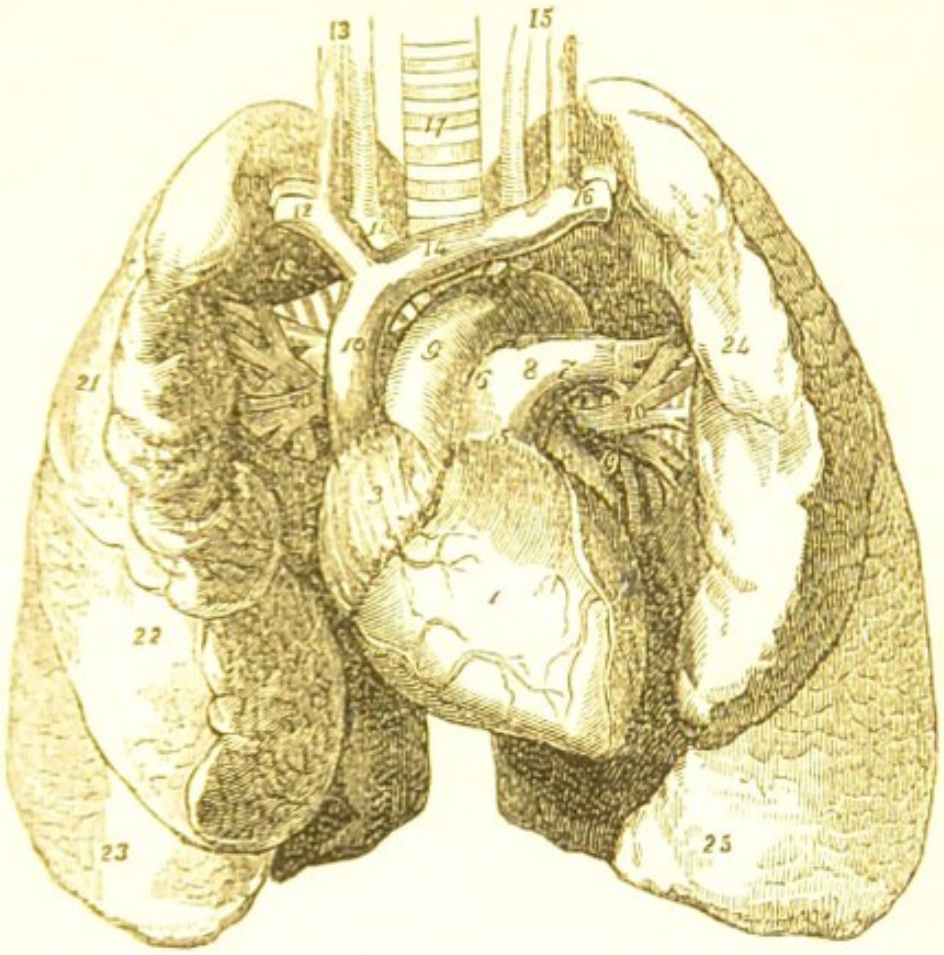
Dr.—It is just so. In the little, or pulmonary circulation, the same principle holds good, but acts in a reverse direction. Here the venous blood, having the greater affinity for the oxygen of the air, drives on the arterial blood before it.

P.—Pray, what is the office of the capillary or hair-like vessels, of which so much mention is made? Are they mere conduit-pipes?

Dr.—They are much more. You may call them nature's laboratory, if you like, the sanctuary of her secret mystic processes, wherein and whereby are determined the vital laws and actions, the composition and form of the various structures of the body. Every soft animal structure may be analysed into a congeries of cells, capillaries, and nerves, bound together with areolar tissue. By means of this exquisite mechanism are performed repair and waste, secretion and excretion, the preparation and putting down of the new materials of the corporeal fabric, and the removal of the old. Of these changes, the blood is at once the *medium* and *stimulus*, and the organic nervous system, at least *a regulating power*. So much at all events is certain, that the diameter of the vessels is directly under the control of the organic nerves.

P.—It would be indeed very strange to common sense, if the curious net-work of organic nerves, which you state encircles the capillaries, was placed there by all-creative wisdom for any trivial ends.

Dr.—It cannot be supposed. But to conclude this conversation, and to sum up the various and combined agencies effecting the *incoming* circulation of the blood, and its return through the veins to the heart: 1st, in part the suction-power of the heart; 2nd, the vacancy created in the chest by the respiratory movements; 3rd, the action of the muscles upon the venous trunks; 4th, the transpiration ever taking place through the pulmonary and cutaneous surfaces; lastly, the attractions subsisting between the nutritive fluids and the walls of the vessels. The veins contain two or three times as much blood as the arteries; consequently the circulation in them is slow in the inverse ratio.



1. The right ventricle; the vessels to the left of the number are the middle coronary artery and veins; and those to its right the anterior coronary artery and veins. 2. The left ventricle. 3. The right auricle. 4. The left auricle. 5. The pulmonary artery. 6. The right pulmonary artery. 7. The left pulmonary artery. 8. The remains of the ductus arteriosus. 9. The arch of the aorta. 10. The superior vena cava. 11. The arteria innominata, and in front of it the right vena innominata. 12. The right subclavian vein, and, behind it, its corresponding artery. 13. The right common carotid artery and vein. 14. The left vena innominata. 15. The left carotid artery and vein. 16. The left subclavian vein and artery. 17. The trachea. 18. The right bronchus. 19. The left bronchus. 20, 20. The pulmonary veins; 18, 20, form the root of the right lung; and 7, 19, 20, the root of the left. 21. The superior lobe of the right lung. 22. Its middle lobe. 23. Its inferior lobe. 24. The superior lobe of the left lung. 25. Its inferior lobe.

OF THE FUNCTIONS OF RESPIRATION.

Conversation XXXI.—Dr.—In the rounds of the circulation, as we showed in our last conversation, the nutritive

fluid yields to the tissues its most important elements, to supply the demands of growth or waste; and receives into its current for removal those materials that have served their purpose in the economy. It is the office of the excretory organs to separate these worn-out particles, and as this *debris* of the system is great in quantity, and deleterious in quality, a high degree of importance necessarily attaches to the functions set apart to this work of separation.

P.—I can conceive that readily, from what you formerly stated regarding the perpetual rusting or wearing away of organic as well as inorganic matter—that every vital movement of our bodies was an act of disintegration of structure, a displacement, and new combination of its atoms.

Dr.—So it is. Of this structural metamorphosis the chief product is *carbonic acid*, the carbon of the tissues being united with the oxygen of the atmosphere conveyed in the blood. After death decomposition is more rapid both in plants and animals. In all diseases, wherever decay is faster than renovation, the dark blood indicates the excess of this poisonous substance in the system. In the state of health, it is of all excretory products, at once the most copious and the most baneful. The softness of the animal tissues, their abundance of fluid constituents, the high temperature of the warm-blooded species, with the frequent and prolonged calls upon their muscular and nervous systems, are all circumstances which favour this kind of decomposition.

P.—I suppose, then, you will find the provision made for the elimination of carbonic acid to be commensurate with the need for it?

Dr.—We do. The apparatus appropriated to this end is at once the largest and most simple of any belonging to the higher animals. All that is requisite is the exposure of the blood to the influence of the atmospheric air, through the medium of a membrane that shall admit the diffusion of gases. By this simple contrivance, the exit of the most deadly material in the body and the entrance of its most vital elements, are accomplished at one and the same time by one and the same means. In these two conjoint processes lie the great purifying and vitalising functions of the lungs. In these respects, it will be seen that the skin is a true aërating or respiratory organ, supplementary to that of the lungs. The atmosphere will redden livid blood in the cutaneous capillaries.

P.—I presume, then, that in the case of obstruction to

the due action of the lungs, the exhalation through the skin will increase?

DR.—It does, and this strictly according to the analogy of the vicarious action of other excretory organs. This is the explanation of the great advantages usually derived in *pulmonary diseases* from a *judicious* application of the water-cure treatment; powerfully promoting, as it does, the activity of the cutaneous functions, the subduing of feverish symptoms, the improvement of digestion in all its stages, and the making of healthy blood.

P.—Is not the function of calorification dependent on that of respiration?

DR.—It is. With admirable economy of material and mechanism, nature has made this purifying process subservient to another of equal importance, the maintenance of *animal heat*, that is, when the direct conversion of the carbon of the food, contained in the unassimilated blood, fails to supply the heat necessary. On the other hand, when the waste of tissues is great, the latter course may suffice for the maintenance of the required temperature, without recourse to the combustion of the materials of the food. The interchange, also, of the gases, between the air and the blood, through the skin, keeps up the temperature in the human body.

P.—You said, when speaking of the skin and mucous membranes, that the lining of the lungs, like that of the bowels, was a prolongation of the external coverings?

DR.—It is identical in structure, but fitted by its soft, thin, porous, vascular nature, *to bring the blood into close relation with the surrounding medium*. The blood is distributed in a minute capillary net-work spread in the walls of the pulmonary vesicles, or cells; chambers so minute that nearly 18,000 are grouped around the extremity of each air-tube, making, in all some 600 millions. The smaller air-tubes possess a degree of muscular contractility which is readily excitable through morbid action of their nerves. *Spasm* is an instance of this morbid muscular irritability of the air-tube as illustrated in one form of ASTHMA (spasmodic). In the *trachea* and larger *bronchi*, the cartilaginous rings prevent diminution of their calibre. This contractility is diminished by vegetable narcotics, as stramonium and belladonna.

P.—Are the lungs active or passive in the movements of respiration?

Dr.—Passive; the vacuum produced by the dilatation of the thorax, causing the rush of air down the tubes and through the lungs. This dilatation of the chest during inspiration is chiefly effected by the contractions of the diaphragm; from the previous high arch it becomes a plane. Expiration is brought about by the contraction of the abdominal muscles, which force up the diaphragm by their pressure on the viscera, and depress the ribs. These movements are aided by certain muscles attached to the spine, as you will easily perceive when observing a person under laborious breathing. The average numerical relation of the respiratory movements to the pulsations of the heart, and the average amount of air at each respiration, is about one to five or four and a half. When this standard is departed from, there is either nervous or chest disease. Twenty cubic inches is the average amount of air inhaled at each inspiration. The quantity of oxygen absorbed exceeds that given off (in carbonic acid) by 174 parts in every 1,000.

P.—Is the whole of this oxygen taken up to make carbonic acid?

Dr.—No. A part equal to one-sixth of the quantity so consumed remains for other purposes; part of it to combine with hydrogen to form water, part to oxydise the sulphur and phosphorus received with the food, and which are excreted by the kidneys as sulphuric and phosphoric acids. The average quantity of carbon daily thrown off from the lungs of an adult is about 160 grains per hour, or 3,840= eight ounces, *per diem*. The amount, however, varies much with the temperature, age, sex, constitution, health, disease, labour, rest, sleep, wakefulness, digestion, &c.

P.—Is the change which the venous blood undergoes physical or vital?

Dr.—It is explained on simply chemical laws, the same as take place in air out of the body, through a bladder. In this latter instance, the change affects only the surface. By the exquisite arrangement of the minute capillaries and cells of the lungs, the blood is spread out into currents so small, as only to expose *one layer* of blood corpuscles at a time to the action of the air. Hence the change that is instantaneously operated in it.

The changes effected by respiration relate to the proportions of the different gaseous ingredients of the blood. The blood has a remarkable power of absorbing carbonic acid gas; as much as one and a half times its bulk. There is

about ten per cent. of oxygen in arterial blood. In becoming venous it loses five per cent. The carbonic acid of arterial blood is about twenty per cent. of its volume; of venous blood twenty-five per cent. Through the medium of the lungs the blood absorbs water and volatile matters from the atmosphere to the extent of sixteen or twenty ounces in the twenty-four hours. This is not liable to be varied by those influences which modify the cutaneous transpiration.

P.—But does not the blood also rid itself, by the same means, of its superfluous water in the shape of vapour?

Dr.—Unquestionably. The *halitus* of the breath carries off a great deal. Much waste fluid is also *reclaimed* from the system by the action of the lymphatics. Their function is, no doubt, the gathering up of certain crude fluids that have exuded from the capillaries into the meshes of the areolar tissue; fluids hitherto unassimilated, or that have been deprived of their nutrient elements, but are still convertible into living structure. These fluids, being thus rescued and returned into the circulation by the lymphatics very probably undergo elaboration, or a new vitalising process in the thickly strewn glands of that system, through which they have to pass previous to their re-introduction into the blood by the thoracic duct. When no longer serviceable for the purposes of the economy, it is likely that these fluids find exit partly by the lungs, and partly by the skin, or kidneys. The union of oxygen and hydrogen in the circulation may generate part of this water.

P.—Are the pulmonary excretions much disordered by disorders of the digestive apparatus?

Dr.—Greatly and often. In such case they are heavy, mal-odorous, loaded, no doubt, with unassimilated materials.

P.—But may not carious teeth, ulcerated throat and passages, &c., produce the foul breath you speak of?

Dr.—Undoubtedly they do. That referred to, however, is independent of such influence.

P.—Is it not generally alleged that miasmata, noxious gases, and other morbific agents in the atmosphere, are more readily introduced by the pulmonary surface than by any other?

Dr.—The allegation has every basis of truth. Analogous in action to these is venous blood, which has a depressing influence on the functions of the brain, and the nervous

and muscular systems. The result of arrested respiration, that is, the retention of carbonic acid in the blood, is its stagnation in the capillaries (asphyxia, suspended animation). Hence its accumulation in the venous system, and the emptying of the arteries. In such cases, the heart ceases to contract, —1st, from the over-distension of the walls of the right ventricle, in consequence of the accumulation of blood in the venous system; 2nd, from deficiency of blood in the left, or arterial side. The contractility of the muscles of the heart is not *finally lost*, as soon as their movements cease. The withdrawal of a portion of blood, as by the jugular vein, will re-excite their action, by relieving the distension of the right auricle. So also are the movements of the heart recommenced by artificial respiration; oxygen being thus sent to replace the carbonic acid in the pulmonary capillaries. It has already been shown that the performance of the reciprocal actions taking place between the blood and the atmosphere, is the cause of the movement through the extreme vessels of the lungs.

OF THE FUNCTION OF CALORIFICATION, OR ANIMAL HEAT.

Conversation XXXII.—Dr.—The vital processes of warm-blooded animals require a constant and uniform amount of heat as the first condition of their performance. The provisions of the living economy for the generation of *heat*, and for the regulation of its amount, display the same consummate designs; the same admirable adaptation of simple means to complex ends; the same economy of agents, and the same luxuriance of products, that I have had, and shall have, so often occasion to illustrate in explaining to you, and in developing the exquisite organism and functions of man.

P.—I believe the temperature of the human body keeps up to the same point in every climate, the coldest as the hottest.

DR.—It does so, nearly. Under any circumstances of temperature, disease, health age, sex, individual peculiarities, &c., it varies but a very few degrees. A range of *eight* or *ten* degrees will comprise their utmost deviation either way from the standard of 98°. The average of such deviation is hardly *four* degrees.

P.—Is there any general or specific relation between the temperature of the body, and the rapidity of the circulation and respiration?

DR.—There is. In pulmonary diseases, for example, whether acute or chronic, in consequence of the active respiratory efforts superinduced, the temperature is unusually high, sometimes the skin is even painfully hot, and this in spite of great disablement or deficiency of lung. In cases of a contrary kind, where the circulation through the lungs, or the entrance of air, is impeded, as in cholera, asthma, narcotism, asphyxia from any cause, fainting, &c., the temperature of the body falls to the minimum, often to a deathly coldness.

P.—It seems, then, that notwithstanding the limited variation the corporeal heat admits of, yet man can exist, and exist in comfort and health, under the greatest extremes of external temperature, from a range in the torrid zone of 110°—120°, to 60°—80° below zero in the frigid zone! This is very extraordinary.

DR.—Yes; *so* extraordinary is the compensating and regulating power implanted in the human mechanism. In right of this, a man can go into ovens and furnaces heated even from 350° to 600°, and remain sometimes with impunity. The degree of *tolerance* of great heat, however, depends on the dryness of the atmosphere which facilitates the process of evaporation. Evaporation takes place from the body's surface, as from a moist dead membrane. Warmth and dryness are the favouring atmospheric conditions of evaporations.

P.—It is very conceivable how such a state of the air most readily receives, dissolves, and dissipates the watery halitus of the skin.

DR.—Besides this simple exhalation from the surface, excessive heat occasions the copious secretion of fluid by the cutaneous glands. The water in passing off in the form of vapour abstracts and conceals a great proportion of free caloric; in other words, makes it *latent*, thereby reducing

the temperature of the body. Under a hot *dry* wind exhalation and evaporation are very rapid In a hot *moist* atmosphere, evaporation is checked.

P.—The large amount of caloric that becomes latent in the process of evaporation, being, it seems, the grand provision for *keeping down* the temperature of the body, what are the provisions for *keeping up* the temperature

Dr.—These I shall now explain. It is a law of living organisms, whether plants or animals, *that, wherever vital processes are in active operation, there heat is proportionably evolved.* This is exhibited in the flowering of plants, and in the germination of seeds. The evolution of heat in living structures, is in this way proved to be *a purely physical operation*, the product of the *organic functions.* The same causes that develope heat in the vegetable, are the agents of its production in the animal kingdom. In both cases an absorption of oxygen from the air, and an extrication of carbonic acid, are constantly taking place. *The liberation of heat is dependent on this change.* This effected through the leaves (their lungs), is to all intents and purposes *the respiratory process* of plants. These changes are also very active, at the periods of the germination of the seed, when the evolution of heat is also very remarkable. So in animals, there is an exact relationship between the degree of heat evolved, of oxygen consumed, and of carbon given off.

P.—The production of animal heat, in fine, according to this statement, is due to the various chemical changes incessantly taking place in the living economy, to those decompositions and recompositions of which living structure is the constant scene and seat. I suppose it is on the same principle that exercise augments the temperature?

Dr.—Precisely. Exercise increases the temperature, not simply by accelerating the circulation, but by *promoting disintegration of the tissues*, increasing the activity of those molecular changes that are the source of all power in the organism, the *primum mobile* of every function, the test of the existence of vital properties. These changes, as has been shown, constitute the essence of *nutrition* and *secretion.* The *nervous system* has plainly nothing to do with these molecular changes as a *cause*, although it powerfully *controls* them. Nervous elevation or depression, therefore,

by elevating or depressing organic actions, will elevate or depress temperature.

P.—The dependence of animal heat on the cutaneous and pulmonary transpiration, you have already adverted to. But as this is the fitting place for those details, I should like to hear them more fully discussed.

Dr.—Rabbits coated completely with an impervious paste, declined in temperature and soon died. It was supposed that the pores being stopped, *i.e.*, evaporation being prevented, the temperature of the tissues would be sensibly increased, that, in short, the animal *would be parched up*, and die of a high fever! How unphysiological this expectation was, I think *you* will not require to be informed. You are prepared to expect the result of such an arrest of the circulating powers.

P.—The animals, it is clear, were asphyxiated, died from sheer want of circulation, from want of decarbonisation of the blood, from want of liberation of heat, therefore, from want of molecular change, from the absence, in short, of the elements of vital movement.

Dr.—You have stated the true *rationale* of their death. The younger an animal is, the less is its power of generating animal heat. The calorifying power increases as the bodily structure developes itself, or as the constitution acquires vigour. It decreases with the advance of life. It varies also with the season of the year. A cold day is ill tolerated in summer.

P.—Why?

Dr.—Because the system not having been at that season accustomed, or called on, to produce much heat, is ill prepared for an unexpected demand, *i.e.*, the organism has been accustomed to eliminate its superfluous carbon otherwise than by combustion. For the same reason, persons long resident in hot climates generally feel cold disagreeably. In diseases of exhaustion, and in cases of starvation, death occurs by the cooling of the body consequent upon the loss of calorifying power, and the sheer absence of the materials of heat.

P.—Are there any supplementary sources of animal heat?

Dr.—Yes; I stated that the surplus of oxygen taken into the body, above that given out in the form of carbonic acid, amounts to 15 per cent. of the whole. Part of this unites with hydrogen to form water; part unites with the phos-

phorus and sulphur of the ingesta, to be excreted as phosphates and sulphates. These and other chemical changes are supplementary sources of animal heat.

P.—How is the oxygen we inhale combined with the carbon set free by the decomposition of the living body?

DR.—This is a physiological problem that still remains to be solved. After pondering considerably of late years over the great Liebig's works, and of other worthies too numerous to mention, the conjecture I hazard is as follows; only take it for what it is worth; I shall gladly abandon it for a better; in the meantime it is, perhaps, as feasible as anything current.

Electricity, as you know, is the most potent agent of all chemical decompositions and recompositions. The IRON of the blood globule takes with it from the lungs, besides OXYGEN, a *charge of electricity* into the innermost recesses of the organism, wherever living tissue needs repair, and wherever dead tissue requires abstraction. The difference in the products of nutrition in the several parts of living economy does not depend on a corresponding alteration in the character of the fluid or the vessel, wherefrom the operation takes place. No. The fluid and the vessel are common, the one identical in composition, the other identical in structure, in every part that receives the tribute of the common pabulum. In the same way, a GLAND, a nearly analogous structure everywhere, by the original constitution and law given to it, elaborates from the same common and universal current, products the most diversified. The difference depends on the peculiar vital affinities of each structure, for specific elements in the common nutritive fluid, whereby is brought about the deposit of the precise material wanted for the repair of that structure, and no other. This is the *law* which determines that the *common nutrient principle*, the blood-globule, shall here become brain, there bone; here muscle, there mucus; here membrane, there ligament; here tendon, there tooth; here nerve, there vessel. *The results are most diversified and unlike: the elements affording them few; the plastic all-forming mother fluid, in its living state in the vessels, is one and homogeneous.* It is highly probable, then, that wherever the wasted particles of structure call for new vital deposit to replace them, that there the intrinsic and congenial affinities of that structure, determine the instant coalescence and amalgamation with them, of the

requisite materials in the blood-globule. This is effected by the discharge of its electricity, in the same way as water is formed by the electrical explosion uniting its elements. Heat is evolved; the globules lose their tunics, set free their ingredients, and so leave it to the affinities of the part to incorporate what materials it requires.

P.—Thus you make it out, that by the all-wise arrangement, every structure receives and appropriates to itself its own materials of repair, just in the measure, and in the time, its necessities demand.

Dr.—Yes; the crown and complement of the theory is this, viz., that in this electrical union of the blood-globule with the tissue, the oxygen unites with the liberated carbon and hydrogen of the decomposed structure, forming carbonic acid and water. In this way, in the minute capillary circulation, wherein these vital processes take place, the *scarlet* peroxide of the blood becomes the *purple* protoxide, having parted with its vital elements, and received in exchange the poisonous refuse and *débris* of the system. The water formed from the decomposed elements is partly given off in its course by way of exhalation, secretion, &c. The carbonic acid is set free, partly by the skin, but principally by the lungs, in company with the remnant of water, and other animal particles.

OF SECRETION AND EXCRETION IN GENERAL.

Conversation XXXIII.—P.—You laid stress on the fact that the secreting process was an act of cell-development. The processes of nutrition and secretion, by that showing, must be nearly allied, if not identical.

Dr.—They are. The whole body may be called a great secreting apparatus. Growth is secretion. Repair is secretion. Waste is secretion. The character of secretion has no connexion with, or dependence upon, any structural peculiarities. The secernent functions are, to a certain degree, vicarious, the secretion of one organ, when checked, being compensated by the extra activity of another.

P.—So anxiously careful, it seems, has nature been not to permit the accumulation in the blood of injurious materials.

Dr.—Very true. The materials of the secretions exist in the blood, and perhaps nearly in the state in which they are thrown off by the excreting organs. The meaning of the term *secretion* and the *fact* of the function exactly coincide. It is literally a *separation* of the elements of the blood for specific purposes in the economy.

P.—Will you specify these purposes?

Dr.—First; for the preparation of the nutritive materials.

2nd; for the formation of solid textures or fluid deposits; as lime in bones, fibrine in muscles, gelatine in cartilages, the horny matter in the epithelial cells constituting the hair, nails, &c., synovial fluid in joints, serous fluid in the areolar interspaces and in the shut sacs, fat in adipose cells, albumen in the humours of the eye, &c.

3rd; for the elimination from the system of all substances whose retention would be injurious, all wasted, extraneous or superfluous matters. These constitute the *excretions proper*. By this, the human *waste-pipe apparatus*, the materials of repair are prevented from exceeding the amount of "wear and tear." The excreted products of the body are equal in amount to that of the solids and fluids ingested. Their chief source is the decomposition of the various structures: their *débris* are received directly into the returning current of the blood, and are thence carried to the various outlets for elimination.

P.—The sum of which is, that in the *outgoing* (arterial) circuit of the blood, it parts with its best elements; in the *incoming* (venous) circuit it gets charged with its most poisonous properties.

Dr.—Moreover, those plastic elements which in the *out circuit* it has been deprived of, which it has yielded up to the growth or repair of the several structures, are restored at the end of the *in-circuit* by the tribute of the thoracic duct, whose fresh supplies are poured in near the heart.

P.—Another conclusion I draw from your observations is this, that the truly *vital* actions of the animal, the acts of nutrition, secretion, &c., consist of the reactions between the nutritious fluids and the tissues, or the solids they nourish. When their channels—the supply-pipes and the waste-pipes of the system—are obstructed, the incessant reactions and reformative processes taking place in every healthy part are marred or prevented in the diseased.

Dr.—You are quite right. But this *local* derangement

soon diffuses its baneful influence, and we have what is called "*constitutional* disturbance."

P.—I hope, then, I am not wrong in this idea, that I do not attribute a low or unworthy *mechanical* function to a *blood-vessel*, when I define it as a channel of supply, and a conduit of waste for the building materials of the body?

Dr.—Your notions are quite just. In the wondrous fabric of animals, the purely mechanical parts have equal honour and equal utility with the purely *chemical*, or the purely *vital* functions. For the fundamental idea of a breathing, moving, self-repairing structure *is a circulating apparatus*. If any one function of living beings be more important, more indispensable, more characteristic than another, it is assuredly the circulation. The first want of animated existence is the *distribution* of nutriment; the next its *elaboration*. In the great circulating centres, the reduced plastic elements of the blood are replaced, and its exhausted vital qualities renewed.

P.—This function of the lungs, ridding the blood of its deadly carbonic acid, and receiving in exchange the vivifying oxygen and electricity of the atmosphere, seems to me a beautiful instance of the fertility of nature's resources, as well as of the economy of her expedients. With what admirable wisdom, with what exquisite contrivance, is taken advantage of the simple properties of inert matter, to subserve the complex functions of living structure! But what is the actual seat, or active scene, of operations in glandular bodies?

Dr.—The CELLS which cover the membranous surface, and which line the follicles and tubes. Adipose tissue is an instance of a simple secreting cell. It separates fatty matter or oil from the blood; but its contents are not poured forth by bursting. The nature of the secreting cells of glands is, that they are so disposed on the surface of a membrane, that when they give way their contents are poured into the cavity lined by that membrane. The mucus which coats the surface of the mucous membrane is elaborated by the epithelium cells. These cells are continually cast off, and renewed from the germs supplied by the subjacent membrane. The *cells* of the intestinal VILLI select, and separate from the contents of the alimentary canal, the nutritious matters to be introduced into the absorbents. In like manner, the cells, of the secreting tubes, follicles, or passages of

a gland, the *liver*, for example, separate from the blood certain effete matters they are constituted to elaborate and discharge.

P.—True secretion, then, is a vital act, not a mere physical *endosmose* or *exosmose*. In other words, it is not simple imbibition and transudation.

Dr.—Exactly. Here I should gladly discuss the details of the various secretions, as the tears, saliva, milk, &c. These are replete with interest in themselves. But they are irrelevant to the great *practical* objects I have in view, viz., to unfold so much of the mechanism and functions of man, as is necessary to make clear to your mind a rational *theory* of the water-cure, to illustrate the true *modus operandi* of its processes, and entire curative agency. These will be found philosophical inductions, from the physiological premises I have laid down in this department of our conversations. The excernent functions, especially, are intimately, and on all occasions, brought into question in explaining both the *principles* and the *practice* of the water-cure. These, therefore, deserve a very particular attention. I have insisted on the prominent part the lungs take as eliminating or excreting organs. The SKIN will by and bye come in for a brief review. There remain *three* other grand outlets of the superfluous, wasted, or noxious matters of the body, the liver, the kidneys, and the bowels. The latter will best find its place in treating of DIGESTION and DIET. At our next conversation, then, we shall take up the biliary secretion.

OF THE FUNCTION OF THE LIVER.

Conversation XXXIV.—Dr.—The liver may be truly regarded as a *supplementary organ* to the lungs and skin, ridding the system of its superfluous hydrocarbon, whether directly emanating from the food, or whether introduced into the blood as the result of the body's decay—the product of its wasted tissues. Yet it differs, in this respect, from the other two, in that the non-azotised substances which it eliminates, are previously turned to account, are economically rendered subservient to the purposes of digestion. The bile serves to reduce the *oily* matter of the food into a kind of soap, a state in which it may easily be taken up by the ab-

orbent vessels. It also transforms sugar into fatty matter.

P.—But I suppose, this subsidiary function apart, the bile must be considered as chiefly an excrementitious fluid?

Dr.—Precisely. The colouring and other matters of the bile pass off by the bowels. The fatty or soapy portion is absorbed, and ultimately eliminated by the respiratory process. The placing thus of a great decarbonising organ on the confines, as it were, of the digestive and circulating systems, shows the same admirable foresight in anticipating every want of the economy; and the same consummate contrivance in providing every security for the proper discharge of its functions. On reflection, it will be perceived, that this organ is the more wanted, because, on the one hand, the carbon brought into the circulation from the decay or disintegration of the tissues, usually gives sufficient work to the skin and for the lungs to extricate it; and on the other hand, the circulating channels would be overflowed, and the areolar tissue unduly impacted by oily matter, were the liver not placed where it is as a *check* upon its introduction. Much carbon is absorbed, at first hand, by the mesenteric veins from the alimentary canal.

P.—You have made it appear that the great function of the VEINS everywhere is to abstract and carry carbon.

Dr.—And truly. The processes of chymification and chylification largely develope carbon and hydrogen. A large portion of this is got rid of summarily, by the chyle going in the first place to the heart and lungs.

P.—This I understand clearly, recollecting that the thoracic duct, which is the great reservoir of *the lacteal system*, terminates in a venous trunk near the heart.

Dr.—Understand, then, that to relieve the lungs especially of the duty that would thus be imposed upon them, in the case (which often happens) of much oily food being taken, without a low temperature of the atmosphere to burn it off, as so much fuel to sustain the animal heat,—in such case, the liver comes in to play a prominent part as a great decarbonising organ. The immense quantity of blood it receives from the walls of the intestines, and which it decarbonises, places in a strong light the relief afforded to the lungs and skin, by the due performance of the functions of the liver.

P.—I suppose that, in the failure of the latter (the *liver*), the former (the *lungs* and *skin*), must do double duty?

DR.—Yes, if they can. If they cannot, then disease will be the consequence. The prevalence of liver diseases in tropical climates, among those who live after the fashion of the frigid zone, will not now be difficult to explain. In the first place, their food abounds in carbonaceous products; the error being not less in quantity than in quality. In the next place, the amount of stimulating liquors taken to propel along their heavy ill-digested meals, aggravates the intestinal irritation, by recalling and *fixing* an undue amount of blood in the digestive mucous membrane.

P.—In that case the surface must be robbed of blood to supply the extra demand of the interior?

DR.—Quite so. And it is precisely in this that the error of the mode of living in question lies. The cutaneous functions, for their active duties in hot climates or weather, require all the aid they can get, instead of their power being diminished by diversions of the blood to the interior, a loss of equilibrium everywhere and in all circumstances mischievous, but an evil of tenfold magnitude in burning climes. Moreover, the great heat of the tropical atmosphere reduces to the very minimum the quantity of carbon extricated by the lungs. Lastly, the want of active exercise, and usually indolent, luxurious habits, fill up the measure of the mischief; and this it does, by preventing that proper and due waste of the body which justifies full diet, and that activity of the excernent functions which passes off its superfluity. In the case of hot climates, the reverse order of things occurs, from that which takes place in cold climates. In the latter, the lungs and skin, in consequence of the active habits necessary to resist cold, effectually relieve the liver of any surplusage of duty, by the large outlet they afford for the carbon of the system, and by the large demand, in fact, created for it at these outlets, to keep up animal heat. Hence, the comparative immunity from bilious disorders, especially in cold weather, of persons of temperate and active habits. In hot climates and seasons, on the other hand, the consumption of carbon as *corporeal fuel* being null, or being reduced to the minimum, the labour of its extrication chiefly falls on the liver. Hence this organ is overstrained or overworked, except in those who live a life, and adopt a diet, in all respects conformable to the organic laws and to the climate.

P.—This throws a great light to me on the prevalent diseases of Europeans in hot climates. I suppose, also, the

same will serve to explain the great popularity of medicines (as calomel) that stimulate the function of the liver?

DR.—It does; such intestinal irritants afford the needed relief; but it is only temporary. It is equivalent to borrowing cash at ruinous interest, cent. per cent. if you like; enabling the spendthrift debtor to go on for a time blindly squandering, but "pulling him up" so effectually in the long run, that he can neither borrow nor squander. He is corporeally insolvent, ruined, literally and truly. Medicinal stimulants, like other noxious "tipples," leave behind the necessity for their repetition in increased dose. This *tells* most destructively in the end, as must tell always, the frequent introduction into the system of any materials other than the elements of its structure; which alone it was intended to receive, and which alone it is fitted to appropriate. Aught else received within it is a profanation of nature's sanctuary, which she visits, if too often repeated, with the direst penalty.

P.—Well, from your metaphors and from your reasoning, I infer that these continued over-stimulations of the liver, at length end in permanently disordering its functions and altering its *structure*.

DR.—They do. Long-enduring nature will endure no longer; will stand no more tampering with. Further forbearance would be to forfeit her penalty, to give immunity to the transgressor of her laws. The day of reckoning comes; the retribution is exacted. Now appear the usual results of *over*-working; and *over*-exciting to get over the over-work; the organ, overstrained, disordered, gives up the unequal contest, sinks often, like an over-driven brute, to rise no more. With the break-up of a prime organ of life, profound disorder is gradually superinduced in the system, and the whole fabric totters to its fall. At the best, the best days of the individual are over, and this often in the very spring-tide of existence. For the remainder of such a life, the sun may rise as usual, but its cheering rays are no more for him—life is for ever shadowed, clouds and darkness veil its prospects, and death is too often invoked as too tardy in its course for the impatient sufferer.

P.—I do not then wonder at the attacks of diarrhœa, dysentery, and yellow fever, the biliary plagues of hot climates, and which I now perceive to be the explosion of pent-up materials of disease; materials which it would seem

patients voluntarily, perseveringly, and as if, of set purpose, accumulate! Would that men would look upon diseases in the light wherein you now represent them, viz., as efforts of nature to rid the system of substances undrawn off by the outlets appointed to eliminate whatever is superfluous or injurious; mischiefs entailed too, as you show, by indulgencies of the appetite, by dietetic excesses and other irregularities.

Dr.—It will also be readily conceived how in such a state of body, charged and ready for a morbid explosion, with vital structures highly irritated, and all but inflamed; how infected air, extreme heat, cold, or hardships, mental depression, profound agitation and disquietude, or the poisoned chalice of the false "comforter," will usher in general rebellion and anarchy in the living system; putrid fever (typhoid) perhaps, or rapid dissolution, or how the same causes will more slowly sap the system by insidious lingering disease.

P.—You mentioned before, a grand expedient resorted to by nature to rid the system of any excess of carbonaceous matters which the proper excretions have not been able to eliminate. This is to stow it away in the deposition of fat?

Dr.—Yes; in the shape of adipose tissue fat is virtually, *pro tem.*, removed out of the system; for it is out of the current of the circulation, and provided it be not engendered in excess, it is not an abnormal product. It answers as, or is convertible into, a granary for the support of the system, in cases where disease may cut off the supplies. In hybernating animals fat is stored up as a fund to draw upon, when all the voluntary powers of the animal are in profound abeyance.

P.—While upon the subject of the bile, will you give me an anatomical *aperçu* of the liver?

Dr.—It is a large glandular mass, occupying the right side, partly under the false ribs, partly under the soft parts. In one point of view it may be represented as a great reservoir, situated midway between the apparatus of supply and the organ of distribution of the nutrient fluid, and evidently for the purpose of preventing the sudden influx on the heart, lungs, and brain, of blood as yet saturated with impurities.

Structurally, the liver may be regarded as a congeries of

cells clustered round the ramifications of the hepatic duct, the portal vein, the hepatic artery, and the hepatic vein. These are all as so many supporting twigs, of the *trame*, mesh, or ground-work of the structure. The cells are like so many berries clustering around every twig, and filling up every interstice. The liver also, has its lymphatics and nerves. The former are distributed on the walls of the vessels and nerves. All these are connected by fibrous tissue, the capsule of Glisson. The secretion of the liver is entirely effected from venous blood: the blood supplied by the hepatic artery being merely for the nutrition of the organ.

P.—You said that the proximate principles of the secretions existed in the blood; what comes of the retention of bile, for example?

Dr.—The materials of bile accumulate in the blood when its secretion is suspended, or what is the same in effect, when its outlets are stopped up, then jaundice supervenes. When this occurrence is sudden, the nervous system experiences all the shock of a narcotic poison, and death may occur rapidly. In cases where the jaundice ensues slowly and gradually, then the system has time to accommodate itself to the poisoning, and a surprising degree of tolerance of the constitution is manifested. But if the malady be unrelieved, if the biliary arrest be permanent, death is inevitable.

P.—I do not wonder, then, at *digestion* and *biliary derangements* so profoundly affecting the minds and spirits as they are known to do, considering the nice functions of the brain, the omnipresence of the nervous system, and the amount of *materies morbi*, retained excretions, sent floating through their delicate structures in particular, and through the system in general.

Dr.—You state correctly both the fact and its *rationale*.

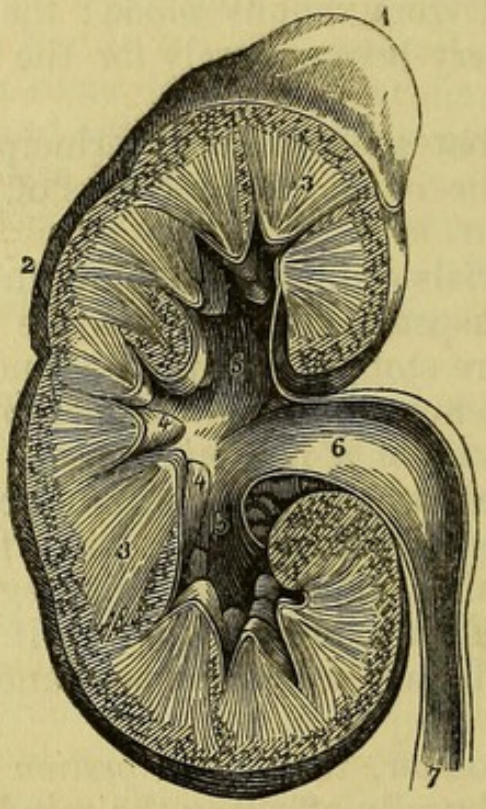
P.—What is the use of the gall-bladder?

Dr.—It is not an essential part of the biliary system. It is only necessary to animals who eat at intervals, and is a simple provision for holding the bile till required for the purposes of digestion. In animals who are almost always ingesting aliment, there is no gall-bladder, the bile being poured into the intestine as fast as it is formed.

P.—What are the purposes the bile serves in the digestive processes?

Dr.—With your permission we shall leave that till we come to discuss systematically, and at length, the important questions of Digestion and Diet.

OF THE FUNCTION OF THE KIDNEYS—THE URINARY SECRETION.



A SECTION OF THE KIDNEY, SURMOUNTED BY THE SUPRA-RENAL CAPSULE; THE SWELLINGS UPON THE SURFACE MARK THE ORIGINAL CONSTITUTION OF THE ORGAN, AS MADE UP OF DISTINCT LOBES. 1. *The supra-renal capsule.* 2. *The vascular portion of the kidney.* 3, 3. *Its tubular portion, consisting of cones.* 4, 4. *Two of the papillæ projecting into their corresponding calices.* 5, 5, 5. *The three infundibula; the middle* 5 *is situated in the mouth of a calyx.* 6. *The pelvis.* 7. *The ureter.*

Conversation XXXV.—Dr.—The structure of the kidneys is complex, and to be well understood requires the aid of microscope, scalpel, and two or three kidneys from the butcher's. I will demonstrate one, and then you will understand the engraving. Its minute arrangements are of marvellous beauty, and of exquisite adaptation to the ends to be accomplished—the ridding the system, on the one hand,

of superfluous fluid, water more than the skin and lungs can exhale; and, on the other, opening a channel of exit for the effete azotised substances received into the blood, or elaborated therein.

P.—This makes good its title to your phrase and *idea* for the excretories, viz., a *safety-valve*—a means in the present case of keeping at a uniform standard the quantity of water in the system.

Dr.—But this is not all. By so doing it regulates the amount of pressure on the vessels. Such a function is the more necessary, inasmuch as the waste of water by the cutaneous and pulmonary exhalation varies greatly with the temperature and hygrometric state of the atmosphere.

P.—The quantity of mere water, therefore, strained off by the kidneys, I infer, is regulated by the amount got rid of through the skin?

Dr.—Precisely so; the former being greatest when the latter is least, and *vice versa*. The quantity of *solid* matter separated by the kidneys depends on the amount of waste in the system, and the surplusage of *azotised food*. The kidneys have a twofold apparatus for accomplishing this twofold purpose. 1st. *Cells*, the TUBULI URINIFERI which elaborate the solid secretion. 2nd. The CORPORA MAPHIGIANA—bundles of capillary vessels which lie bare in the channels and outlets. These allow the transudation of simple fluid through their naked walls.

P.—From what you state of the nature and purposes of the urinary secretion, I conceive peculiar interest attaches to its alterations in disease.

Dr.—Fortunately this is a subject now well understood, at least better understood than analogous derangements of the liver, and, perhaps, even of the excernent function of the lungs and skin; for the reason that urine is readily obtained, and easily subjected to chemical tests. Of its solid matters *nitrogen* constitutes a large portion. The intense disturbance of the economy produced by even a partial suspension of the urinary secretion, shows its importance.

P.—I suppose the phenomena of disordered renal secretion, like those of the biliary, show directly the poisonous effect of the retention of its elements in the blood?

Dr.—Yes; disorders of the nervous centres, coma, and even death may take place, the same as from narcotic poisons. The presence of urea unduly in the blood is some-

times the unsuspected material cause of what are called diseases of the nervous centres. So the *sudden* stoppage of bile in its ducts, and its *rapid* absorption into the system, thereby producing *acute* jaundice, is, unless promptly relieved, as certain in its effects as other poisons. Now I should like you to give me some of your tabular data. The quantity of urine varies with the amount of fluid ingested, and with the temperature of the air. In winter, the skin, acting less freely, a larger proportion is carried off by the kidneys. The following is Berzelius's analysis of the solid urinary matter in 100 parts :—

Urea . . .	(constituted)	45·10
Uric acid . . .	. .	1·50
Extractive matter, ammonia, salts, and chloride of sodium		36·30
Alkaline sulphates .	. . .	10·30
Alkaline phosphates	. . .	6·88
Phosphates of lime and magnesia	. .	1·50

The nature of the food, and the degree of exercise, will vary these proportions ; the urea may be separated from the urine in the shape of transparent, colourless crystals.

P.—Pray what is the average amount of urea excreted in twenty-four hours?

Dr.—I believe I shall sufficiently answer your question, if I quote the following table from Lecanu (Journal de Pharmacie, tom. xxv.) which gives the mean of the results of one hundred and twenty experiments made to determine that point :—

By men	433·13 grains.
By women	295·15 ,,
By old men (84—86) . .	125·22 ,,
By children of 8 years . .	207·99 ,,
By children of 4 years . .	69·55 ,,

The quantities in this table, the amount of urea excreted, may be taken as a fair measure of the rapidity of interstitial change, at the different periods of life ; in other words, of the measure of the vital activity of the tissues, especially of the muscular tissue. By violent exercise the proportion of urea in the urine is nearly doubled compared with the state of rest. This increased waste of tissues explains the increased demand for food produced by exercise.

P.—Will you give me some account of that much talked-of matter, *lithic acid?*

DR.—Called also indiscriminately *uric acid*. This is an important ingredient in the renal secretion. If in undue quantity, it is precipitated on the cooling of the urine. Uncombined it does not exist in healthy blood. But combined with soda, it constitutes the gouty concretions, or chalk-stones that are found in the neighbourhood of joints. Urine evidently contains a considerable amount of saline matter; and the elimination of this is a chief duty of the kidneys. These ingredients are ever being introduced by the food.

P.—Their undue accumulation is thus prevented.

DR.—Of course. Common salt is decomposed into muriatic acid and soda. The former exists uncombined in gastric juice; the latter in bile. These again are recombined by the mixture of the bile with the chyme. The salt thus new formed is received into the circulation.

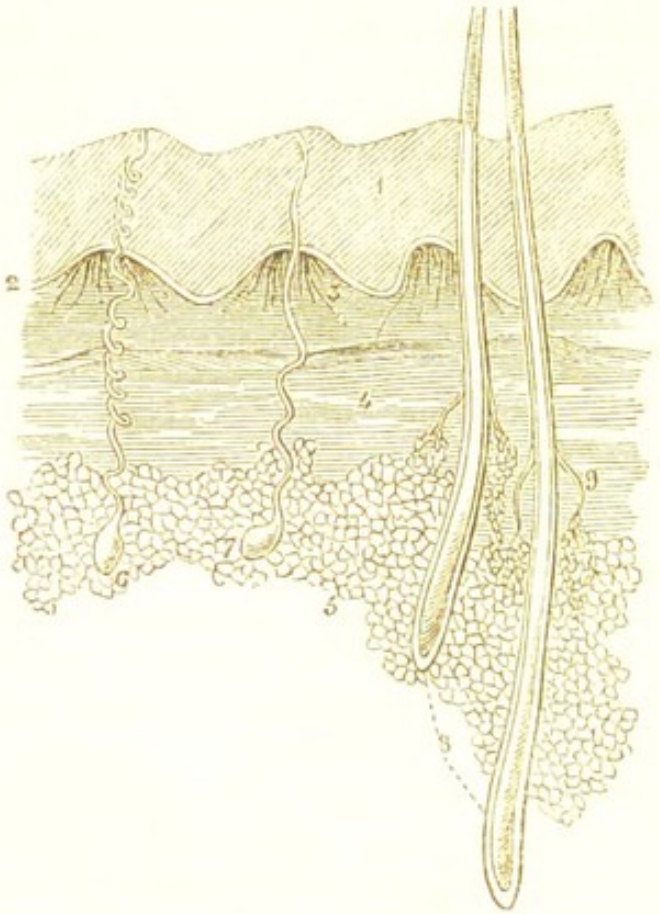
P.—How do you account for the *sulphates* found in urine?

DR.—Not so easily. Sulphur is introduced in combination with the azotised principles of the food. This is oxidised within the system, and unites with any free base it meets with.

The *phosphates* are formed in like manner, from the free phosphorous which certain alimentary matters contain. Phosphorous is a necessary constituent of nervous matter, the waste of which sets it free again. To be eliminated, it must be converted into phosphoric acid, and united with an alkaline base.

P.—In that case, mental or bodily labour, which, of course, induces much nervous waste, will necessarily be attended with an evident increase in the amount of alkaline phosphates in the urine?

DR.—A just inference. The amount of azotised matter in the urine depends on the nature of the food. A part of it is derived from unassimilated materials in the blood. An over-supply of nitrogenous diet is more injurious than that of simply carbonaceous food. It does not produce either fibrous or gelatinous tissues, and the excess cannot be disposed of, or stowed away, like that of carbon in the system. It must be eliminated by the kidneys.



ANATOMY OF THE SKIN.—1. The epiderma. 2. Its deep layer, the rete mucosum. 3. Two of the quadrangular papillary clumps, composed of minute conical papillæ, such as are seen in the palm of the hand or sole of the foot. 4. Deep layer of the derma, the corium, 5. Adipose cells. 6. A sudoriparous gland with its spiral duct, as are seen in the palm of the hand and sole of the foot. 7. Another sudoriparous gland with a straighter duct, such as is seen in the scalp. 8. Two hairs from the scalp, enclosed in their follicles; their relative depth in the skin is preserved. 9. A pair of sebiparous glands, opening by short ducts into the follicle of the hair.

CONVERSATION XXXVI.—THE *skin* includes, in its largest sense, not only the external coverings of the body, but also the lining of the cavities and passages which communicate with the exterior, that is, the mucous membranes. Both tissues taken together constitute a wall of circumvallation, as it were, around those grand central organs, on which depends the continued existence of the individual and the

race. It is not, however, a "dead-wall," but one *alive, active, and sensitive at every point.* These membranous ramparts of the vital domain are guarded everywhere by sentinels (exquisite nerves), at once quick to perceive danger, and prompt to give alarm. It is, nevertheless, a limited view of this wonderful tissue to regard it merely as a fence or skin, a simple felt or hide, a covering or shield, to protect the delicate surfaces and deep-seated structures, from the rude contact of things without, from the effects of weather, chemical or mechanical irritants, &c. It is much more. It is a sentient, sensuous, breathing, absorbing, exhaling, living surface; an organ as comprehensive in function as admirable in structure, of exquisite beauty, of prime vitality, and of incessant activity; one, in short, essentially important to the vigour, and comfort, and duration of life.

P.—All this, I suppose, is admitted and understood by *well educated* professional men?

Dr.—Of course it is. They are familiar with a thousand facts, besides the occurences of daily practice, which prove how great an emunctory the skin is, how intimate are its sympathies with interior suffering; how safe and efficient a field it is for *remedial operations;* how active are its powers of absorption; how keenly sensitive it is to atmospheric vicissitudes; how the interruption of its functions disturbs the harmony of the whole machinery; how their spontaneous excess (*sweating*) carries off acute diseases; how speedy and decisive are the effects of *leeches* or *blisters* (superficial irritants and revulsives) to *deep-seated* pain and inflammation; how in small-pox, measles, scarlatina, syphilis, it is a great derivative or safety-valve; nature thereby saving the pith of the tree at the expense of the bark; transferring interior irritation to the exterior; establishing *spontaneously* that *revulsion* which the physician seeks to effect *artificially;* how soothing is the application of hot fomentations, poultices, and water-dressings, to internal as well as to external diseases: how the wrinkles and dirty sickly hues of the skin indicate what the individual has gone through, either in the way of moral or physical suffering; all these, I say, are facts of daily observation to the physiological practitioner.

P.—But I ask what practical applications have been made of the knowledge of these facts by ordinary allopathic practitioners?

Dr.—You may well ask, what fruit has it borne? to

what account has it been turned? If we except the debilitating warm-bath, we find this great sentient surface, the skin, seldom or never invoked in the regular routine of practice. The skin, viewed simply in its excreting or eliminating function, is of more consequence than even the secretions from the bowels.

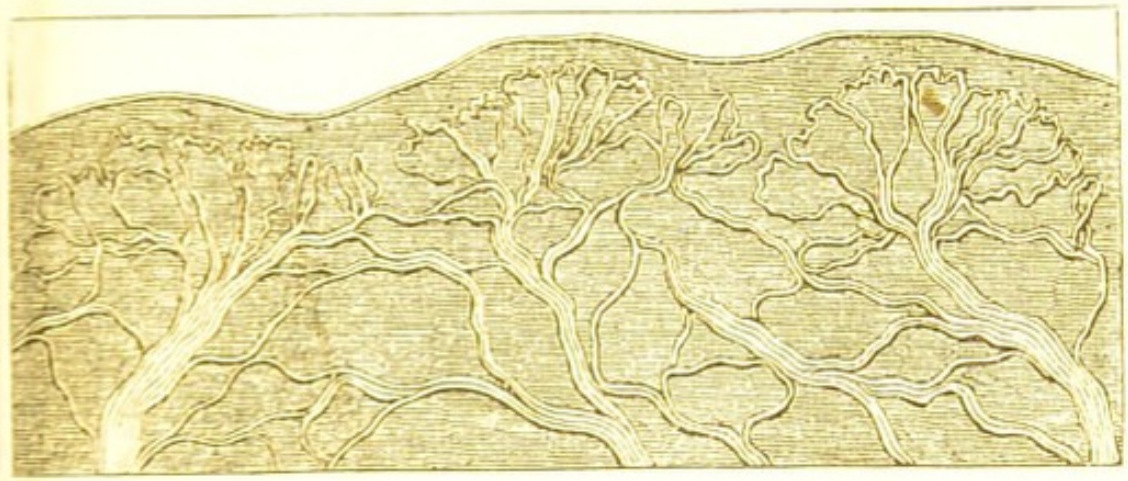
P.—Is, then, this incessant source of daily anxiety to thousands exaggerated or gratuitous?

Dr.—It is relatively so. Of the function of the bowels we shall have much to say presently. A much greater amount of actual matter is carried out of the system by the skin every day than by the bowels. It may be safely affirmed, that in obstructed function of the inner and outer linings of the body, originate, on the one hand, the largest amount of acute diseases, and on the other, the most inveterate forms of *chronic* suffering. Their thickly-studded pores are so many waste-pipes, drains, and safety-valves, through which issue every moment, everything that is noxious, effete, or superfluous in the fluids or solids of the body, and all substances that, unremoved, would constitute a *materies morbi*, and mar the play of the vital mechanism. By the route of these structures must pass everything that enters into the living territory.

P.—They are, therefore, the broad highways of communication with the world without, and the microcosm of man's body within.

Dr.—Precisely. Through these outer and inner integuments, the new materials of corporeal construction are carried in, and the old carried out; by their means is the blood purified, temperature regulated, and drooping vitality renovated. By the same channels carbonic acid, nitrogen, alkalies, acids, earths, metals, salts, and animal *débris*, are thrown out. In exchange for these—besides the directer nutrient fluids, water, vapour, the vivifying gases, and the electricity of the atmosphere, are taken in. As in the substances, of which the skin and mucous membranes rid the system, they precisely resemble each other; so, in fact, their offices are convertible, reciprocal, substitutionary, vicarious; the suppression of one outlet augmenting or deteriorating the activity of another. These two membranous systems, however, differ in their means of communication with their visceral centres. Those of the interior skin are nerves of *organic life*, and are connected with their special organic centres of perception and action—the ganglia. The sensi-

tive nerves of the skin, on the other hand, belong to the system of *animal life*, and communicate with the *cerebro-spinal centres*.



Distribution of the tactile nerves at the extremities of the human thumb, as seen in a thin perpendicular section of the skin.

P.—I suppose the nutrition of the skin is accomplished, in part at least, through the agency of the nerves of organic life, of which you said a twig was sent to every blood-vessel?

Dr.—True. In certain parts of the interior skin, *as at the entrances and exits of canals*, the nerves of animals, as well as of organic life, are distributed. This is because these parts are the seats of superadded sensibilities, and are subject to the control of the will.

P.—These nervous connexions, then, clearly explain the exquisite morbid and healthy sensibilities of the skin and mucous membranes, as well as their intimate sympathies with each other, and with the vital centres. Will you give me some account of the structure of the skin?

Dr.—The skin is composed of two principal layers—1st, the *epidermis* or *scarf-skin*; and 2nd, the *dermis*, or proper sensitive skin. The former is a simple exudation membrane, poured out by the vessels of the latter. It may not inaptly be deemed and designated a sort of protection varnish. Like all other structures of the body it is of true cell-formation. The gradual development of these from minute granules, takes place in the deepest layer of the scarf-skin. Possessed of independent inherent power of life and growth, each cell draws to itself the fluid residuum of the colourless part of the blood, and secretes a horny matter. These cells lie layer upon layer, constituting a sort of mosaic flooring. As the deep layers are gradually pushed onward and become

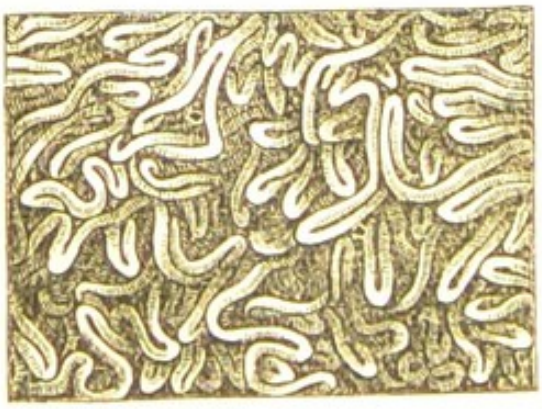
superficial, their fluid portion evaporates, and they are converted into dry, flat, extremely thin, and dense scales. The abnormal accumulation of these scales is seen in many cutaneous diseases; notably in the *scurf* of the head.

P.—What is the chemical constitution of the scarf-skin?

Dr.—Principally dried *albumen*. This is soluble in the alkalies. Hence, the utility of *soap*—a compound of alkali and oil—as a detergent for the skin. The excess of the alkali in the soap combines with the oily exudation of the skin, and forms an emulsion. With the removal of the accumulated dirt, the superficial stratum of the scarf-skin is removed.

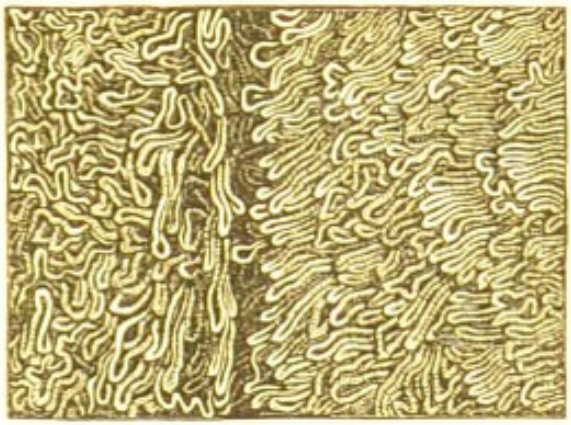
The *scarf-skin* is the seat of colour. The pigment granules lie in the deeper, softer, newly-formed layers. This used to be called the *rete mucosum;* and was considered a separate structure. The intense colour of the skin is the index of the energy of its action. Exposure to the glare of the sun, is one grand condition of its exalted energy. Hence, the tanning of the skin, and all its various hues, from the pale northern to the swarthy inhabitant of tropical climes.

The *dermis*, or true skin is divided by anatomists into the *papillary layer* and *corium*. The latter is the part that is convertible into leather. It is a porous web of excessively minute fibres, collected into strands, and interwoven with each other, constituting a firm elastic net-work of great strength. The open meshes of these strands are filled with little bags of fat, a provision for elasticity; soft compressible cushions, fitting the skin to bear with impunity the unavoidable pressure and contusions it is daily exposed to. In the sole of the foot, and the palm of the hand, this is beautifully exemplified, and is an evidence of exquisite design.



Capillary network at margin of lips.

The sensitive layer of the skin is thin, soft, uneven; pinkish in colour, and is a complete web of blood-vessels and nerves. This vasculo-nervous web is everywhere heaved up into little conical prominences, termed *papillæ*. They may be compared to the *pile on plush*. Every papilla or tuft is composed of a minute



Distribution of Capillaries at the surface of the skin of the finger.

vessel and nerve, each bending upon itself, *i. e., ending in a loop*, and returning whence it came. In this way, there are four little cylinders, with their investing membranes in each papilla. The linear ridges and markings on the palms of the hand, and soles of the feet, are subdivided by cross lines into little square allotments, each made up of a tuft of papillæ, from ten to twenty in number. These minute vessels and nerves are so thickly set over the entire cutaneous surface, that the finest needle cannot be inserted into any point without wounding both a nerve and a vessel. To keep this exquisite structure moist, and to protect it from the rough collision of exterior substances, it is covered by the scarf-skin. The adaptedness of the innermost layer of the latter to this purpose is sufficiently declared in its old name, the *retu mucosum* (moist net-work).

P.—What is the colour and condition of the skin dependent on?

Dr.—On the quantity, quality, and velocity of the blood in its superficial vessels. Its circulation is very much under the influence of the nervous system. The capillaries of the head, face, and neck may be *instantly* gorged by mental emotions, as shame or anger; and as instantly disgorged by fear. In the latter case, the blood retires from the skin to the central organs.

P.—How sympathetic an organ the skin is—how mobile, sensitive, and vascular, is now very apparent.

Dr.—The retardation of the blood in these papillæ, is the condition of cutaneous inflammation. The same cause, over-distension of the papillæ with blood, gives rise to the mottled or livid appearance of the skin, when unduly chilled by exposure. The vigour of the nervous system is lowered by *undue* cold; *i. e.*, by the abstraction of heat *prolonged beyond reaction*. In this case much of the cutaneous blood is repelled inwardly, and accumulates abnormally in the centre viscera, obstructing their functions and obtunding sensa-

tion. The blood which remains in the cutaneous capillaries moves languidly along, or stands still altogether.

P.—There is great difference in the acuteness of the sensibility of the skins of different individuals. How do you explain this?

Dr.—This difference is referable, in many cases, to original differences of constitution and endowment. It depends, in other cases, on the state of health, or sex, age, temperament, and acquired tendencies. It is more acute in the young than in the adult; in the female than in the male; in the sanguine and nervous, than in the phlegmatic temperament; in the weakly and diseased, than in the robust and healthy; in the intellectual than in the stupid.

P.—The *pores* of the skin are talked of by everybody. Will you describe them?

Dr.—Numberless minute tubes traverse the various layers of the skin, and reach the surface by a spiral course. These are about a quarter of an inch long, and constitute the perspiratory glands, oil glands, and hairs. The gland itself is no more than a coil of this tube. The lining of these tubes consists of three layers; derived, respectively, 1st, from the scarf-skin (which is their epithelium); 2nd, from the sensitive skin whereon their vessels and nerves are distributed; and 3rd, from the *corium*, whose strong fibres and interlacements constitute the basis and framework of the whole cylinder. On the lines of the palms of the hands, and the pulps of the fingers, the perspiratory pores are distinctly visible at equal distances. Of these above 3,000 are contained in a square inch. This, at one quarter of an inch long each tube, will give *above* 70 *feet of waste pipe on every square inch of the body!* The extent of the body's surface is about 15 feet square. In all, the perspiratory pores of the body, if joined end to end, would *form a tube more than* 20 *miles long*.

P.—The results of checked perspiration are now very conceivable. No comment is wanted to this fact, to demonstrate the derangement of health likely to arise from the obstruction of even a *few miles* of this tubing.

Dr.—I think not. Yet in many diseases, both acute and chronic, the skin is almost useless as an excretory, its functions are all but suspended. It is either dry, parched, and burning—pungently so, as in pneumonia (inflamation of the lungs); or it is pale, flabby, lifeless, as in many chronic gastric diseases.

Substances contained in the perspiration, and whose removal is essential to health, are thus retained, circulated with the blood, to seek or force their exit by other and unwonted outlets. The effort of the extrication of these retained matters, falls on the liver, the lungs, or the kidneys, on one or all.

P.—These you well described as the grand eliminators of the system; the *safety-valves* that prevent the explosions that would otherwise be so frequent; as well from the excess of *fuel* used, and of steam generated, as from the collisions that daily happen in the eager contests of life.

But what do you say when the safety-valves refuse the supernumerary work thus given them—when the organs thus forced to do double duty, break down under their extra labour—when neither their own nor their vicarious function is performed?

DR.—A deplorable case, and one of too frequent occurrence; the equilibrium, the proportionate play, of all the organs is then disturbed almost beyond remedy. Diseases of greater or less severity are engendered, according to the quantity and quality of the retained excretions. Drugs alone are rarely competent to effect any permanent relief. Any hope that remains is in the resuscitation of the organic energies. *This can only be effected by the best hygienic agencies.* The water-cure, as a *formula* of these, is equalled by no substitute yet propounded.

P.—In any case, this *goal* of fast living reads us a lesson not to overtask genial nature—not to go on heaping abuse on abuse, with the hope that your *vis medicatrix*, gently coaxed, will put all right again.

DR.—But there is a limit to nature's endurance. Pass once that limit, and great is her resentment and retaliation for abuses. On the side of the skin, nature, however, is certainly most placable, easiest to be coaxed, provided we only know the right way to set about it. When all the organs else seem rebellious, and all direct means of their pacification wanting, the great battle-field of the skin remains to us on which to quell the revolt. On this bodily restoration is often achieved, and generally will be the result, by good tactics on the part of the general.

P.—The whole *primâ facie* grounds of the case, make very clear and strong the pretensions of that system of medical treatment by whatever name called, by whomsoever practised, that can thoroughly excite the functions of the

skin, without overtasking its powers, and without overstraining its structure.

DR.—Such a system the enlightened and experienced "water-doctor" claims the credit of administering.

P.—I shall sift one day, I hope, to the bottom the *rationale* of your hydropathic operations and pretensions. Meantime, to proceed with the skin, I think the calculation is that about two pounds of perspiration take place in the adult in twenty-four hours.

DR.—From 2 to $2\frac{1}{4}$ lbs. is the average. This is incessantly going on: but the fluid is carried off in vapour, insensible perspiration, as fast as it is formed. Under exertion it is seen oozing from the pores in clear drops, as sensible perspiration.

The exhalation from the skin is much influenced by the varying states of the vascular and nervous systems. Excessive fear will suspend it altogether, or induce it profusely.

P.—How far is suppression of perspiration in fever cause or effect?

DR.—This will more properly be discussed hereafter.

The oil-glands and tubes of the skin resemble the perspiratory, both in structure and course. They are absent in the palms and soles: they are abundant on the shoulders; on the face and nose; at the roots of the hairs of the scalp; in the ear-passages, and along the ridge of the eye-lids.

P.—I suppose the unctuous secretion, according to the analogy of the other secretions, takes place from cells.

DR.—Yes; these when fully formed burst. The collapsed cells are cast off in minute scales, and expelled from the tubes in company with the oily product. In disease, these actions become irregular from torpor of the skin on the one hand, or from inflammation on the other. The contents of these cells become unnaturally solid and dense; or are only partially emptied; or get impacted in the tubes, which become inflamed, constituting the disease called *acne* (popularly called "grog-blossoms"). From smoke, dirt, or dust the projecting point of the tube gets blackened. This unctuous matter contains an animalcule resembling a caterpillar or wood-louse.

P.—What are the uses of this oily matter?

DR.—Various. To lubricate the scarf-skin; to prevent its peeling off; to defend it from the contact of acrid substances; to repel moisture; to prevent its too easy escape from the skin; to confine the tears and moisture of the eye

within the lids; to defend the conjunctiva from the irritation of fluids or minute solids, and to guard against their adhesion. In the ears, it moistens the passages; and with the hairs offers an obstacle to the intrusion of insects.

P.—You have already adverted to the important influence of the cutaneous transpiration in the vital processes. I am inclined to believe, from what you said in reference to the forces concerned in the circulation of the blood, that the greatest function of the skin, at least one of paramount importance to its excreting office, is its subserviency to the motion and distribution of the fluids of the body.

Dr.—This is perhaps the latest great discovery of science, and we owe it to the analytic genius of Leibig, who has made it very apparent in his work "On the Motion of the Fluids." I have stated one-half of the *modus operandi* of this influence. The other half now remains to be explained. This is a subject deserving much attention. For though the fact be familiar, its explanation is almost unknown; at least its practical bearings are neither recognised nor acted on. You must understand that the force or influence which promotes or produces the ascent of the sap in plants, viz., the exhalation from the leaves, is one identical physical principle with that which determines the motion of the fluids of the body towards the exterior, that is, the transpiration from the skin and lungs.

All liquids in connexion with an evaporating membrane acquire motion towards that membrane. The amount of the motion is directly proportional to the rapidity of the evaporation, *i. e.*, stands in a fixed ratio to the temperature and hygrometric state of the atmosphere. Capillary attraction fills the vessels; but it does not cause the fluids to rise. The motion of the fluids belongs to or is derivable from the evaporating surface. The evaporation constantly taking place, in the state of health, from the large exhalant surfaces of the skin and lungs, produces a virtual vacuum within the tubes, whence the fluid oozes out, and is evaporated. By the external pressure of the atmosphere, and by the vacuum created in the lungs at each expiration, the fluids are forced, or rather drawn, into the superficial capillaries. The fluids, therefore, in this way, acquire a motion to the surface, which is accelerated by the other powers concerned in the circulation of the blood. The suppression of transpiration (as by improper exposure to chills and draughts when freely perspiring, or by states of the atmosphere in which

heat and moisture coincide, and, therefore, the conditions of evaporation fail) is followed, of course, by a check to those outward motions of the fluids. A primary condition of life is thus interfered with. If the powers of vital resistance be not strong, or if, at the same time, the body be otherwise diseased and weakened, interior congestions, stagnations, or sanguineous accumulations in vital structures, especially in the mucous membranes, arise. Hence we find the entire obstruction of the skin (as from putting an impervious coat of pitch on a rabbit), by preventing exhalation, and therefore the circulation and oxygenation of the blood, rapidly diminishes the animal heat, in fact, asphyxiates. The rabbit so treated dies in a shivering fit. In *epidemic cholera*, the function of the skin, and probably the lungs, is from the first interfered with. Exhalation from the surface failing, and the more fluid portion of the blood being drained away, by the immense surface of the bowels, the circulation is soon brought to a stand. Hence the deathly *coldness* characterising the disease, and the *blueness* from the entirely venous character of the blood. In this state of matters that the vitality of the blood should be reduced to the lowest ebb is to be expected; is, in fact, unavoidable. Hence the chemical affinities of the blood's constituents gain the ascendant over the vital. The serum separates from the fibrine, and the channel of its outlet once being opened from the congested intestinal membrane (where the blood has retreated and accumulated on being driven from the surface) there is nothing in the unaided powers to stop the drain of vitality. The salt of the serum, indeed, operates as a cathartic on the exhalant vessels: the drain goes on so long as there is any serum to drain away, and the system sinks, "dead-beat" in the unequal contest. Yet even in these cases, genial nature occasionally will rally. The blood-vessels will contract down upon their diminished contents, fresh serum will be absorbed from every soft tissue, and the *salutary* thirst that exists will soon supply its lack, and the patient will in no long time be resurrected from apparent death to life.

LIFE AND ORGANISATION.

CONVERSATION XXXVII.—*Life and organisation—Life, like matter, only known by its properties—Our ignorance of the intimate nature and essence of things—The business of Philosophy to investigate the conditions of the action of things—Life the sum of the phenomena of organised beings—How life is a* forced *state—War of vital structures with the elements—Fallacy of the theory which makes life an entity.*

P.—IT will now afford me great pleasure to hear you explain the interesting questions belonging to the mysterious domain of life and organisation.

DR.—I will gladly impart the opinions I have formed, after many years devoted, more or less, to such investigations. On these perplexed subjects very erroneous views are popularly held. However, you shall judge for yourself. As we know of matter only by its *properties*, its modes of being or acting, so we know of life only by its properties, *i. e.*, the phenomena it manifests when acted on by certain stimuli. The effects of chemical action are not more dissimilar from those of mechanical action, than are those of vital action from either of the former. Of the immediate or intimate nature of chemical or mechanical action, we know as little as we do of that of vital action.

P.—This begins already to melt away a little of the difficulty connected with the subject of life. You argue that we know things only by their properties; the substratum or connecting-bond that holds those properties together we do not know. What do I know of the *pen* that I take up from this table, but its colour, shape, size, weight, elasticity, hardness, or density, the roundness of its barrel, the sharpness of its point, the arrangement of its feathers. Take these *properties* away, and what do I know of its *nature* or *essence*. What care I?

DR.—The *properties* of things, then, are all that the human senses can discern in this world. What do we know of these wondrous breathing-frames of ours, but that they possess, in addition to the common *physical* properties of matter, certain *vital* properties—a new class entirely—a class exclusively appertaining to animated beings, having no analogues in inorganic nature. All we can ascertain,

all that it behoves the philosopher and the physician to investigate, are the conditions under which the several phenomena in question show themselves. The vital susceptibility, or endowment of organised structures, only shows itself when these structures are exposed to the agency of peculiar powers (stimuli). In that case, *the phenomena of life*, are called forth. An organised body, then, is that which possesses a property, in consequence of which, appropriate stimuli excite that series of actions, to which the term vital has been given. For example: atmospheric air is one of the essential stimuli of life; withdraw that for but a few minutes from man, and all phenomena of life will soon cease to show themselves.

P.—How would you define life, then?

Dr.—To define life is to recapitulate that whole series of actions produced in living beings by a system of organs acting to determinate ends. We can have no idea of life apart from the working of living organs or apparatus. Life must not be confounded with the Spirit or the Soul, which begins its independent existence when organic life has ceased.

P.—Life, then, consists in, or is indicated by, the active phenomena of organised beings. In this view life is not a cause of vital action, but is one and identical with it—is that action itself?

Dr.—Yes; but it is something more than mutual actions and reactions of one part of the body upon another; otherwise a going watch, or steam-engine, or water-wheel, might be said to have life. Life, in strict philosophy, is a mere abstract term used to denote the sum or series of the vital phenomena, or characteristic actions, of organised beings.

P.—These actions ceasing, the moving-power being destroyed, the mechanism shattered, *life*, in legal phrase, *non est inventus*, is nowhere. In the same way, derange the structure of your Æolian harp, and the wind blows through it without eliciting its music, its life, to speak metaphorically, is gone; that life, that music, lay in a certain arrangement of parts acted on by the vibrations of the breeze. The *sonoriety* of the wood and cords of the instrument was its *property*, which required the concurrence of two causes to elicit it, viz., a specific disposition of their parts, and the contact of an external agent, the wind.

Dr.—Your illustration is apposite; and makes it clear by that very analogy, that the cause of vital action lies in the concurrence and co-operation of certain properties attached

to certain forms of matter, with certain stimuli, which acting upon them, evoke those properties. The vital properties of an organised structure or organism, infinitely transcend the mere physical or chemical properties belonging to inert matter. The latter are therefore, resisted, overpowered, suspended, during the continuance of life. *Life* has in this view been aptly termed *a forced state*, because it is the continued successful opposition of organised bodies to the decomposing tendencies of inorganic affinities, chemical agents, and the physical laws of Nature in general. Hence the ceaseless expenditure of vital power in this struggle, the inroads made on the vital organism by the wear and tear of the prolonged conflict, and ultimately its subjugation by those affinities, agents, and laws. With this is involved the destruction of organic arrangements; the total and intimate disintegration and disseverment of its particles; their return to the primitive forms of inert (inorganic) matter.

P.—This eternal fight, then, of structure with element, is the reason why organised bodies are less durable, even the longest lived of them, than inorganic bodies, the oak and the rock?

Dr.—Undoubtedly. You see, then, from the above, how gratuitous, how fallacious is the theory which makes LIFE an assumed entity, a substantial principle, a controlling power, or cause, entering into, and presiding over, material forms, regulating the processes by which the structure of organised beings is developed and sustained, an entity working the movements of the organic puppets, and by a species of wizard art, dazzling us with phenomena—*the functions of structure*—to all appearances utterly incommensurate with the feeble agency used thereto. *Life*, in such a sense, is untenable, is a fiction. *Life* is not matter, nor an immaterial substance attached to matter, no more than music is matter, than words are matter, or immaterial substances attached to matter. We have no evidence of the existence of such an entity. There is no likelihood of its existence; analogy is all against it; such a tenet is alike contrary to sound sense, sound science, and sound philosophy. Neither does Scripture say aught contradictory to this view. Life is a simple condition of being; a wonderful property attached by the Creator to certain specific forms of matter, or organised bodies; and in consequence of which they perpetually repair their waste, or reproduce the constituent particles of their mass in whole, or in part.

P.—The imaginary vital principle or entity of some writers, then, is a mere mental abstraction personified?

Dr.—Yes; this substantive idea of life is a simple metaphysical conception, which, banished from the domain of astronomy and physics, now only lingers among the mysteries of chemistry and physiology. If an entity or substantive principle be necessary to account for one set of phenomena, why not for all? If for vital, why not for chemical and mechanical phenomena? To ascribe the phenomena in question to a chemical or mechanical principle does not bring us one whit nearer their true nature; wax is plastic, wood is combustible, the magnet is attractive, gunpowder is explosive, &c. But if we ventured to attribute these properties of bodies to a plastic, combustible, attractive, or explosive principle or entity, we should rightly subject ourselves to ridicule. So it is with vital properties.

P.—All that can be said, then, is this, that the phenomena exhibited by organised bodies, under certain conditions, show that they are endowed with those properties to which the term vital has been given. There the matter ends. You have now convinced me that to invoke a vital principle, to explain vital phenomena, and yet to repudiate a chemical principle to explain chemical phenomena, or a physical principle to explain physical phenomena, are anomalies in philosophy, and in fact inversions of common sense, contradictions that show how little still the schoolmaster is abroad.

Dr.—The ancients had no idea of the essentially different properties,—resulting from differences in the elementary particles, arrangement, and structure of different forms of matter. They held all matter to be essentially *inert;* and, of course, all spontaneous or automatic movements in matter, *i. e.*, the peculiar chain of actions distinguishing organised from unorganised substances—were naturally attributed to a *substantial* moving cause, or entity, operating within them.

Vital action, like chemical action and mechanical action, is one of those *secondary causes*,—which the Great First Cause of all things works out his designs; adapting, with consummate skill, specific means to determined ends. To subserve the innumerable purposes desired by the actions called *vital*—to carry on certain chemical and mechanical processes, and to resist others—to lay down new matter, and to convey away old—to select, prepare, mould, and

fashion the food to innumerable corporeal forms — to repair injuries, and to counteract diseases — to keep the heart, lungs, blood-vessels, brain, senses, nerves, glands, and bowels in perpetual activity, is not the office of an Archeus, or presiding genius of the economy. No! These complex ends imply the existence, and necessitate the operations of a host of textures, and forces, and organs—all irrational, all unconscious in themselves, but each undeviatingly obeying the laws, and blindly fulfilling the purposes imposed upon them in the beginning. Thus every part of the living organism works by itself, and all the parts work harmoniously in combination, to effect the ends they were intended and fitted to accomplish.

This much we will concede, that the operations of the vital properties of organised beings resemble, in many points, those of reason, for they work according to a definite rational plan; creating individual parts, having relations of fitness and harmony with the design of the whole—bringing it about that each separate part, each pulley, wheel, and lever of a complex vital mechanism keeps in its place, exactly fits in its place, and does the work of its place; at the same time consenting in its action with the whole, and answering to the ends of the whole. And so close is this alliance and dependence of parts, that if any jar or disturbance, how slight soever, occurs in any part of the organized structure, the whole sympathises more or less with it, or is affected proportionably.

P.—The sum of your observations, then, is to this effect, viz., that the active operations of organised structures, although in accordance with design, obey the undeviating laws of adaptation and action, and all without consciousness.

Dr.—Yes; and it is in consequence of these undeviating laws of operation, that the plastic matter from without is modified, and appropriated to organised tissues, that the animal body is preserved, its daily wasting structure repaired, its daily exhausting endowments replenished, and its diseases cured. Instinct may be quoted as an illustration of vital properties acting in accordance with design, but without consciousness. Cuvier said very beautifully, that animals acting from instinct were possessed, as it were, with an innate idea, or by a *dream*. They act blindly and unconsciously, but according to laws of adaptation.

P.—What distinction do you draw between life and vitality?

Dr.—The latter is the quiescent or passive state, and is illustrated in the seeds of plants before germination, and in the impregnated germ of the egg before incubation. Life is the property of a being in action; vitality is the condition of the structure fitting it to evince that property in the application of the requisite stimuli—the concurrence of the requisite conditions, as warmth, air, nutriment, and water. A seed may lie for a thousand years buried deep in the soil, or with a man's ashes in his tomb. All this time it has retained its *vitality*, or capability of living, but it has not given evidence of life, living action. It has been dormant. It has retained the power only of being acted upon. If the structure of the seed had been crushed vitality would have been destroyed with it; no stimulus would have roused vital phenomena. The first condition of vital action, then, is the maintenance of a specific organic constitution. This is vitality. The seed only awaits the concurrence of the second condition of vital action, viz., *appropriate stimuli*, to rouse its latent vitality. It only needs to be exposed to the genial influences of heat, moisture, soil and atmosphere, to grow into a plant—to bud, flower, and fructify.

These stimuli, or sustainers of vitality, afford both the impulse to change, and the materials of change, in the particles of the living body. By their continual influx and replenishment they maintain that essential elementary combination of the fluids and solids, which is the necessary condition of those organic changes in which the actions of life consist. This interchange of matter, this extruding of the old or worn out components of animal bodies, to make room for the deposit of the new, is great and rapid, in proportion to the activity of their locomotive and voluntary powers.

P.—I have heard life compared to the phenomena of combustion and flame!

Dr.—And not inaptly. The atmospheric oxygen unites with the burning body. Heat is developed by the combination and decomposition thereby taking place. The phenomena of fire continue, so long as oxygen and combustible materials are supplied. This is not life, but the nearest likeness to it. The vital stimuli represent the oxygen and combustible matter. The body is the furnace. You now perceive the bearings of the all-important practical questions

connected with these vivifying stimuli, food, air water, and warmth.

P.—What is the relation of *organisation* to *life?*

Dr.—Life is an effect of organisation. You see this in the primordial CELL, the type of vital action. It retains the power of infinitely reproducing itself, putting forth the elements of endless forms of structure, each charged with *life*. Destroy the peculiar organisation of the living cell—crush it—and its life ceases. So that life is referable to organisation.

P.—If so, what is the *cause* of organisation?

Dr.—No mere chemical or mechanical forces, simply or combined, are competent to bring into existence a determinate organic structure. The peculiar combinations, arrangements, and affinities by which inorganic are transformed into organic elements, can only be effected by the vital forces of living organs. So, to originate the organised being, requires different laws, processes, and properties, from those which regulate the formation of inorganic matter. In short, organised beings can only be formed by such as are already organised. The embryo pre-supposes the parent. The organisation of an embryo, endowed with the properties of the parent—and thereby the constant renewal of the fabric in new moulds, the young—is the result of a process of secretion. The function of secretion consists in the depositing, or throwing off, of vital cells. The same law, and almost the same forces, which capacitate organised beings to renew their tissues incessantly, according as they are wasted (removed by absorption), fit them to deposit new products, to develope new growths—the germs or rudiments of new beings. It is the property of this *germ*, to be able to commence and continue a series of vital actions, which only demand the co-operation of certain natural stimuli, to result in structure in all points like the parents. For convenience, this process is called the *vis formativa*, or plastic force. From the germinal membrane, bit by bit grow in a definite series, or progression, the various tissues and organs of the body;—the first germs being the product of mature and perfect beings of their kind.

P.—But in tracing back the origin of the several kinds of organised beings, the question again returns upon us—what is the cause of organisation? How was the first parent of every species formed?

Dr.—We cannot speculate upon the origin of living

beings, any more than on the nature of organic forces, or living properties. These things, no philosophy, no physiology, no analogy, can teach us. All we can say is, that the various tribes of organised existences were called into being *at the beginning* by the FIAT of SUPREME WISDOM and ALL-CREATIVE POWER. From this starting-point, each was constituted to reproduce its kind. Hence their constant succession downwards in the course of time, till the same fiat shall recall the power, or annul the law.

PART III.

A POPULAR EXPOSITION OF SOME OF THE SCIENTIFIC DETAILS OF NUTRITION, DIGESTION, REGIMEN, AND DIET.

CONVERSATION XXXVII.—*Spontaneous decomposition a law of inorganic nature—Its operation on living beings renders alimentary organs necessary—Complex processes of nutrition—Law of progressive development, from primary types—General laws of Physiology—Cells the essential instruments of vital structure—Supremacy in man of the animal over the organic system of nerves.*

P.—MUCH as I anticipated the profit and satisfaction to be derived from an explanation of the machinery and functions of the human body, I certainly did not expect that the most important points I required to know, would prove so easy of comprehension. These physiological inquiries, have impressed me more and more with the beautiful simplicity and high *rationality* of the water-cure remedies, and now I understand more clearly, how admirably they are adapted to regulate the functions, and to restore the healthy condition, of the deranged organs of the human body.

DR.—The simplicity and rationality which strike you so forcibly, may be reckoned *first* amongst the causes that have retarded the progress of the water-cure. Mankind are unwilling to believe that great effects can proceed from simple causes. A curative system so divested of secret remedies and mysterious prescriptions, as the water-cure,—so wanting in the conventional paraphernalia that impose on the majority of the community—must of necessity offend the pre-

judices of the uninformed and credulous, who, from long usage, have regarded them as the indispensable accompaniments, that give warranty to the remedies, used in orthodox as well as heterodox practice.

P.—What a premium there is offered for delusions, and how often we find the most glaring of them, protected with as much jealous care, as could be evinced in the defence of a prescriptive right, or any pernicious custom. However, the twin potentates, Time and Truth, more absolute in their decisions than colleges or communities, will settle these and other debatable matters. I am now more anxious to hear you on the interesting subjects of nutrition, digestion, regimen, and diet.

Dr.—Willingly, as far as comports with our brief conversations. I trust they will induce you to peruse some of the excellent works exclusively devoted to these subjects. The most recent of them (though *not* intended), will appear to you an elucidation, that will add if possible to your favourable opinion of hydropathic theory and practice, as well as, I hope, to the care you intend to take, not to injure the delicate structures of your inner man, by dietetic or drug abuses.

In our former conversations I have already called your attention to a great law of *inorganic nature*—the law of spontaneous decomposition, or perpetual molecular change. I have also insisted on the fact, that the matter composing living organised structures forms no exception to this law; you observe its very evident and active operation in both animal and vegetable substances.

P.—It is then, I see, a primary law of the physical world in general. How would you define or designate it?

Dr.—In strict terms, "*the tendency of compounded bodies to return to their primitive elements*;" *i. e.*, to be decomposed by those chemical affinities, or mutual actions and reactions among the particles of matter that are ceaselessly at work in the world around us.

P.—The operation of that *law*, then, you would lay down as the first source of the decay of living organisms?

Dr.—Certainly; and, therefore, I was called upon to adduce it among the reasons that rendered necessary an apparatus counteractive to it, viz., ALIMENTARY ORGANS—the prime requisite, and the essential condition, of the existence of both plants and animals. The office of this apparatus is the conversion of materials supplied by the external world into the organised structures of the individual, whereby

their vital properties are maintained, their functional powers replenished, their waste repaired, and their growth provided for. This in general terms is called the act of NUTRITION. It includes a series of complex processes, by which the crude pabulum of organised structures is gradually elaborated and perfected, circulated and assimilated. Here, as elsewhere, nature shows herself true to her law of *progressive* development, *i. e.*, a gradual advancement from primary types, as regards structure, and a gradual perfecting of her operations as regards function.

P.—I think a survey of creation, especially of the animate world, makes it very clear that nature in her works never rises *at a bound*, or makes a great leap. There is a measured ascent from the low and preparatory to the high and perfect.

DR.—A sound principle, undoubtedly. We shall proceed now to deduce those great GENERAL LAWS OF PHYSIOLOGY, as a result of which living organisms resist the decomposing agencies to which all things else yield: and by which it is brought about, that during a certain definite period their internal structure and external lineaments, remain identical in composition, and unaltered in conformation.

P.—What, then, would you say was the *first* general law of the economy of animated nature?

DR.—This, that vitality counteracts the simply physical or chemical laws; in some cases suspending their operation; but always by neutralising their effects. This last object is accomplished *by renewing structure as fast as it is disintegrated, and by simultaneously removing the products of decay.*

P.—You mean to say, that as fast as the vitality of the *old* matter is exhausted, and its constituents used up, decomposed, and carried out of the system, *new* matter is, *pari passu*, assimilated and incorporated?

DR.—Precisely; secretion is perpetually putting down fresh structure; absorption, at the same rate, taking away the wasted structure. Thus it is brought about that every tissue, every organ of the body, is enabled to retain its primitive properties and constitution, to grow and mature, to preserve its heat, to throw off its waste, to repair its decays, and to exercise its functions, so long as it is supplied with the requisite materials.

This unfolds, in the clearest manner, the broad foundation for the necessity for food, the source of the demand for nutriment to all living beings, viz., that it affords the con-

ditions, 1st, for extending or building up the organism; 2nd, for supplying its wear and tear; 3rd, for maintaining its heat.

We thus reach the SECOND general law of physiology, viz., *that the maintenance of the vital properties, and the normal structure of organised bodies, is made to depend on the due reception of elementary matters from without, their conversion into a homogeneous mass, whence are drawn the materials that supply the growth, or renovate the waste of the system, and the excretion or throwing out of the refuse and worn out particles.*

P.—You might set forth this law in briefer terms, thus, *the perfection of organised structure is necessary to the perfect performance of vital function, and the grand pre-requisites for perfect structure, are the constant entrance of new matter, and the uninterrupted exit of old materials.*

DR.—Perhaps a clearer enunciation of the law. To meet its requirements we have the three characteristic and fundamental provisions of the structure of all living beings. 1st, a nutritive apparatus; 2nd, the contact of food with it; 3rd, organs for excreting waste, or eliminating excrementitious particles.

But I hasten on in my enumeration of the great laws of general physiology:—

3rd. *In disease, or mechanical injury of the body, the ordinary preservative processes become the extraordinary reparative agency.*

4th. *In proportion to the activity of the vital action of living beings, is the expenditure of vital power and waste of organised substance.*

P.—It stands, therefore, to reason, that the more intense the action of individual parts, the more limited must be the duration of the life of these parts?

DR.—True. The same also is predicated of the whole organism as of its parts. CELLS, you will remember, are the essential instruments of vital functions, and elements of vital structure. These go through a certain series of changes—grow, mature, and decay. There is no break or gap in the succession, no delay in the evolution, so long as life lasts, or health continues. The place and functions of the old cells are instantly taken up by the new. Their death and renewal are rapid, in the ratio of the energy of the tissues, and operations they subserve. The *animal* functions, for example, exhaust and reduce the nervous and muscular

structures. The demand created for the reparation of these fabrics increases the activity of the *organic* processes thereto appointed. In man especially, the incessant activity of his nervous and muscular systems occasions great disintegration of their substance—great *waste*, and creates a corresponding demand for materials of *repair*.

P.—I recollect you mentioned that each effort made by a tissue or organ, every functional operation, every movement of a muscle, every thrill of a nerve, every act of volition, even every uprising of a *thought*, destroys the actual and normal composition of the parts concerned in their production.

Dr.—True. The supposition is based on good grounds, that a portion of the structure *virtually*, if not really, dies, as the result of effort, is thrown off from its place, and is eventually thrown out of the system. The preparation, and replacement of the materials so made room for, will fall, according to the views you have propounded, on the organic, vegetative, or nutritive functions. This leads to the establishment of another law of physiology, viz.:—

5th. *The activity of the animal functions is the measure of the healthy activity of the nutritive functions, and constitutes the standard whereby the natural demand and disposal of food are regulated.* This is the foundation of a very important principle in dietetics, which will be discussed in its place.

6th. A law of general physiology is this: *that the materials of the nutrition of living organised structures can be introduced into their systems only in a fluid state.* Liquids or gaseous substances are the sole matters absorbable by either plants or animals.

P.—Is not the ingestion of solid aliments, or organised structures, as bread, cheese, fruit, oysters, hard eggs, &c., all masses more or less coherent, a contravention of this law?

Dr.—No, not at all. But to meet the necessity created in this case, the necessity, that is, for *reduction* and *solution*, another general physiological law is established, viz.:—

7th. *The alimentary matters of animals, before they can become part and parcel of their fabrics, must undergo various preparatory changes in apparatus expressly constructed for the purpose.* We shall not stop, at present, to detail the various steps and processes by which the changes in question are brought about. The series of these constitute the

natural heads or divisions of the subject, and will come in for full discussion afterwards.

An 8th general physiological law is this: *that a superior function requires a superior organisation.*

P.—That is very supposable; with the degree of elaboration necessary to reduce crude materials into the nutrient elements of the body, the digestive apparatus will become more complex and refined.

Dr.—It does. New organs are successively superadded, and one part of the apparatus becomes more and more insulated from the rest. Hence—

A 9th physiological law, viz., *that a superior function necessitates and superinduces a corresponding elevation of structure in all its co-related functions.* 1st. In the *organic*, in order that all the vegetative processes may proceed with complete effect, and work in perfect harmony. 2nd. In the *animal functions*, in order that the individual may be better capacitated for his increasing relations with the world without, from which he has to derive his means of subsistence. With more elaborate digestion, the muscular and nervous systems, and the movements and instincts of the animal become both more diversified and more definite. To match with this more complex organism, and at the same time, as the result of it, we have, with the gradual rise in the scale of being, an increasing power of forecasting future events, of forethought, and providence, a perception of the relations of cause and effect, till we arrive at the highest psychical endowments of the noblest animal—man.

The 10th great law of general physiology is this: *that the structure of living beings is modified to meet the various conditions of their existence.*

The 11th: *that the character and provisions of the digestive apparatus bear a direct and intimate relation to the nature of the materials to be acted on, i. e., to the kind of aliment on which the animal is constituted to subsist.*

The 12th and last law of general physiology, it is necessary here to deduce and adduce is this: *that the digestive apparatus in its turn, necessarily determines the peculiar construction and capabilities of the rest of the organism.* This is true of all animals save man. It is his high prerogative, his enviable distinction, to be exempt from this law, to be rendered superior to it. In *brutes*, their structure and psychical endowments have an exclusive reference to their alimentary organs, or reproductive functions. In them the

instruments ministering to the faculties of *will, thought, purpose, effort*, are all subservient to their kind. In them the apparatus of *animal* life is the mere tool and slave of the *organic*. The development and exercise of their nervous and muscular systems are for the simple and sole advantage of their nutritive organs. But in man, on the other hand, it is widely different from all this. He is exalted and privileged above all. As "a being of large discourse, looking before and after," his apparatus of organic life is, or *ought to be*, the mere instrument and servant of his animal functions. His nutritive powers are, therefore, almost altogether for the exercise of his nervous and muscular systems. Would that he *always* rightly appreciated and worthily used his godlike endowments! There is a cheering prospect that the time may come when he will.

CONVERSATION XXXVIII.—*Plants and animals—The one simply vegetative—The locomotion of the other, making the possession of a receptacle necessary to carry the nutrient soil—Convertibility of the outer and inner surfaces—Progressive development of digestive organs—The alimentary passage virtually exterior to the actual seat of vital operations—Digestion how far vital and chemical—Chemical constituents of the food and blood the same.*

DR.—THE economy of the nutrition of plants differs as widely from that of animals, as the different conditions of their existence and modes of being. Plants have no sentient life, no voluntary power, no locomotive organs, no digestive cavity, nor its associated apparatus of reduction and solution. They need none of these things; their food is water, with the inorganic constituents dissolved in it (alkalies, earths, and mineral ingredients), and the gases of the atmosphere disengaged from decomposing organised substances. Their food being liquid and unorganised, there is no necessity for its being delayed in a digestive canal for the purpose of undergoing changes preparatory to absorption. They are, moreover, immovably fixed to the soil, always in contact with their food; all they require, therefore, is *an absorbent apparatus*—roots, stems, and leaves. Hence, in them, digestion and a digestive cavity are superseded.

P.—You would say, then, that the purport, end, and destiny of the plant were simply *vegetative*?

DR.—Clearly; to convert inorganic elements into organised substances fit for the nutrition of a higher order of beings. *Animals*, then, as a result of their nutrition alone, differ widely from plants in all the great characteristics of their being. Their food is not conveyed to them mechanically, without will, without consciousness, and without effort; on the contrary, it requires to be sought for by the exercise of the voluntary powers. Animals are endowed, therefore, with the faculty of locomotion, and need, of course, to carry their food with them, in all their changes of place. Hence the distinctive mark, the pre-eminent characteristic of animals, even of those lowest in the scale, is *the possession of a stomach;* a special alimentary cavity, or canal, appropriated to the reception and preparation of their food; moreover, the food of animals being vegetable and animal substances, organised masses, therefore, more or less solid, it requires a superadded apparatus for its *division*, *solution*, and *dilution*, to separate its impurities, to elaborate its crude materials, or to modify its prepared elements, to correct the tainted, and to neutralise the acid or the alkali; to fit, in short, the nutrient principles to be taken up into the living system.

The alimentary canal of animals is virtually *exterior to the body*. It is a simple inversion of the outer corporeal covering, as we find in the lowest class of animals—*polypes*.

P.—These little creatures are, I believe, *all stomach?*

DR.—They are a sentient self-moving digestive sac, formed by the mere reflexion of the external integument, which is closed up, all save a small passage, which serves at once as the inlet of the food, and the outlet of the excrement. In the walls of this common cavity, both gastric and biliary fluids are secreted. It is otherwise destitute of any instruments for divisions and comminution. The orifice of its stomach is surrounded with vibratile *cilia*, which determine currents of water towards it. In these currents the nutriment of these simple beings is floated, namely, animalculæ, insects, &c. Their external surface is easily convertible into internal.

P.—Do you mean to say that they may be turned outside in without deranging their functions?

DR.—Such is the interesting fact. This identity of structure and convertibility of function of the outer and inner surfaces or linings of the body prevail, to a certain extent, throughout the entire grades of the animal kingdom up to man.

P.—This anatomical and physiological fact I should deem to be of most significant application to pathology and practice.

Dr.—It is. Let it ever be remembered, as well by the invalid as by the practitioner, that the difference between the skin and mucous membranes is more in situation than in structure. They are composed of one continuous vasculo-nervous web, formed by the interlacing of the minute extremities of arteries, veins, nerves, and absorbents proper. Taken together, these *two grand sentient surfaces* constitute one universal unbroken inner and outer surface of absorption and elimination, of secretion and excretion; and each endowed with its own sensibilities, totally different in kind, but equally exquisite in their sphere; they are all, the mucous, the cutaneous, and the serous, *ex officio and per se, secreting and absorbing surfaces.* In beings a step higher than polypes in the scale, the digestive cavity is provided with *a second orifice*, and a regular *intestinal tube* leading to it, through which the little pellets of excrement are rejected. *Gastric juice* and *bile* are secreted in the stomach, and the food before entering is subjected to a *true grinding instrument*, a gizzard, a substitute for teeth.

P.—I suppose that the complex and multiform intestinal organs of the higher grades of animals, are only extended developments of these simple types?

Dr.—Just so. Bit by bit, as we ascend in the scale, the stomach becomes more and more a distinct compartment of the alimentary canal. The biliary follicles are collected into glandular masses, like currants on a stalk, and are also removed from the walls of the stomach. The stalk represents the duct by which these glands empty the tribute of their secretions into the digestive tube, at a little distance from the stomach. The gastric juice is secreted in minute sacs, imbedded in the substance and lining membrane of the stomach. Accessory glands, as the *pancreas*, are added. This we find so low down in the scale as the *cephalopoda* (cuttle-fish, nautilus, &c.). By and by, well-defined and separate salivary follicles make their appearance. But on the subject of the comparative anatomy of the digestive apparatus, the objects and limits of our conversations prevent us from enlarging. Only let me make this remark, that, in ascending to the more perfect animals, the vertebrated classes, remarkable modifications are made, accord-

ing to the requirements of the food. As an illustration of these we may cite the provisions of structure, adapted to reduce respectively vegetable and animal nutriment to the condition necessary for its absorption.

The alimentary canal being a passage through and through the body, its linings necessarily enclose, and is, therefore, to all intents and purposes *outside*, the vital viscera. Matters in that interior tube, are for the same reason *exterior* to the true and actual seats of vital operations—the great organising, transmuting, or assimilating apparatus—as much so, as if they were laid simply in contact with the skin.

P.—It is plain, therefore, that food in that cavity cannot be subjected to any vitalising process.

Dr.—A correct inference. The change effected is simply *chemical*, not *vital*. It consists in soaking or maceration of the food in certain juices, its reduction to a soft, pultaceous, homogeneous mass, and the precipitation of its coarser, undissolved, or feculent portion. Digestion, in short, is a mere solution and separation of nutritive materials. It can only be called a *vital* process, inasmuch, and in so far, as the nervous agency and the muscular movements that thereto contribute, are vital operations, depending on the vital properties of the tissues; and the solvent fluids, the salivary, gastric, and pancreatic juices, with the bile, are products of the living structure. If not of all these fluids, we can affirm at least of the chief, the gastric juice, that it acts on alimentary matters in a manner exactly conformable to the *laws of chemical solution*, viz., to the extent to which it can saturate. This saturation is aided—first, by minute division of the matter to be dissolved; 2nd, by thorough contact of the solvent fluid with its particles; lastly, by elevation of temperature; all which conditions are wonderfully secured by the apparatus nature has provided in her living laboratory. With infinite wisdom, and provident care, a fixed relation is established between the nutrient principles in the diet, and the living fluids of the animal. The chemical constituents of blood and of food are the same. Whatever be the varieties of food, however heterogeneous in appearance, or different in source, they all reduce themselves, on ultimate analysis, into the same nutritive principles, albumen, fibrine, caseine, &c. The homogeneous chyme of the stomach are these principles in a simply reduced and diluted form, mixed with certain excrementitious portions.

Blood is a fluid containing all the heterogeneous substances of which the body is built up. The act of nutrition or assimilation consists in the separation and deposition of these constituents of the blood, at the parts of the fabric where they are needed. Each tissue possesses specific vital affinities for those ingredients of the blood which its composition and constitution require.

P.—That is to say, according to the cell-doctrine—that the *rudiments of structure*, the vital globules or organised and organising cells of each particular tissue, have their own exclusive and unchanging affinities, each tissue for those materials in the common pabulum, or circulating fluid, necessary to the formation of that tissue. I conclude, then, that the variety of animal structures depends, not so much on the variety of building materials, as on the diversified arrangement of the same materials. In the same way as in other buildings we have a few staple materials, stone, brick, wood, iron, mortar, wrought into every diversified form, according to the diversified style, plan, use, and appropriation.

Dr.—Precisely so. You may then conceive that if the chemical constituents of blood and food be the same (as they are admitted, indeed demonstrated to be), all that is necessary for the animal process of blood-making and tissue-constructing, is the solution, the dilution, the purification, precipitation, or straining, the intimate mixture of the *old blood* materials with the new, and the final vivifying touch to the whole, given by the inhaled atmospheric *oxygen and electricity*. You may well signalise and admire that infinite wisdom, which has established this fixed relation between the nutrient principles of all alimentary articles, and those of the living solids and fluids of the animal.

The same remark applies to the wonderful elaboration of the diversified vegetable products out of the few and simple inorganic elements contained in the soil, or floating in the air.

Experiments on artificial digestion throw much light on the nature of the stomach's operations. But independently of these, taking the case on *à priori* grounds, and in those of common sense alone, we shall inquire, what is the true function of the alimentary canal, and what changes the food there undergoes. The stomach is unquestionably, and simply, a provision for the reception, retention, and preparation of food, a receptacle wherein its contents are reduced to

a state fitting them easily to yield up their nutrient elements, to the absorbing and secerning apparatus, in order to become assimilated to the living solids and fluids. The specific function of a digestive tube is the *fluidification of nutriment*. For no nutriment can nourish or be absorbed unless in a fluid state. The agents by which this is accomplished are the juices and fluids of the intestinal cavities, the secretion of glands both large and small, isolated and clustered.

The transforming or vital elaborating process commences with the absorption of the food into the vital field of operations, that is, in the lacteal glands and absorbents; and is completed by the subsequent changes the blood undergoes in the lungs.

P.—The true idea and office, then, of a stomach or alimentary canal, is that of a receptacle for the nutrient soil of animals, so to say, that from which they derive their subsistence—the new materials of their ever-wasting forms—a medium in which to dissolve and dilute their alimentary matters, so as to separate the nutritious from the excrementitious portions.

Dr.—That is the simple truth of the matter. There is a perfect analogy between the absorption and elaboration of the *sap* of plants and those of the *nutrient juices* of animals. As the sap ascends from the roots it is a crude fluid at first, but gradually acquires sweetness, acidity, lime, potass, sugar, mucus, albumen, an azotised substance like gluten, &c. But it is only after they have been subjected to the oxygen and electricity of the air by means of the stomata (pores) of the leaf, that the nutrient fluids are perfectly elaborated, and fitted for the deposition of the characteristic products of vegetables.

These facts significantly point out to us—if we rightly read the analogy—what is the real function of the alimentary canal of animals, and what are the vital processes that subsequently take place in the absorbent and aerating apparatus. The alimentary matters contained in the stomach and bowels are tantamount to the nutrient soil of plants—to borrow your metaphor. The true idea of a digestive canal is that of a cavity wherein to contain this soil, to dissolve and dilute its nutritious parts, and to separate their impurities; a receptacle, in short, wherein the available alimentary principles may be prepared easily and safely, to pass into the vital system. Into this soil, the roots (the absorbents) of the animal, strike. Hence, in the course

of the passage of the absorbed fluid into the system, are elaborated (by the secreting apparatus) the materials that go to build up every structure, to renovate decay, to replenish exhaustion.

CONVERSATION XXXIX.—*The function of nutrition—The vital elaborating process commences in the lacteal glands and absorbents—Chyle, when truly chyle?—Mastication, insalivation and deglutition—Benevolent design—Process of digestion.*

DR.—THE function of NUTRITION in animals, in the most comprehensive sense of the term, implies the sum of those acts, and the complex agency, in consequence of which crude alimentary matters are broken up, dissolved, diluted, and strained—the organisable from the excrementitious—and so made fit for absorption, and the vital processes; and ultimately, being absorbed, are made part and parcel of the living solids and fluids.

P.—How would you arrange the natural series and sequence of these processes, from the preparation to the perfecting of the *pabulum vitæ?*

DR.—As follows:—1. *Mechanical reduction and trituration* by mastication, and the muscular movements of the stomach and bowels. The constant exposure of new surfaces to the solvent juices, on the one hand, and to the absorbent vessels on the other.

2. *Chemical solution and separation* by the salivary, gastric, biliary, pancreatic, and intestinal secretions.

P.—I should say, that these two processes, according to your views of the matter, are comparatively *subordinate*, at least, simply preparatory?

DR.—Do not mistake, however. If they be comparatively subordinate, they are nevertheless of the first and last importance. The object of the intestinal canal is *decomposition*—not in the sense of destruction—but the separation of the dietetic articles from their combination into their elementary principles. Here, as in the subsequent stages of the procedure, there is a sedulous care shown on the part of nature to delay and dilute the nutrient materials in their passage into the system, and to give time for due elaboration and straining; so that no untempered, unfit, or immature substances, may enter into the composition of the living fabric.

3. *A vital elaborating process.* This is the function of the lacteal and lymphatic absorbents and glands. In this apparatus a perceptible and gradually advancing approximation of the food to the nature of animal substance is made.

P.—This, then, is the first grand scene of really *vitalising* operations?

Dr.—It is. *Chyle* is first here truly *chyle*. It merits not that appellation in the alimentary canal. There it should be called *chyme* throughout. For there is no such distinction between the nature of the dissolved mass in the stomach and that in the intestines, as to warrant a new name for the latter, and the name especially that appertains to the nutrient fluid when in a different part of the apparatus, and much more advanced in its elaboration, more subtilised and refined in its endowments.

4. *Through admixture of the old and new blood* in the powerful apparatus of the heart, for this central organ of the circulation is a *churn* as well as a *pump*. This of itself is a step higher in the vitalising process.

5. The highest approximation to the nature of animal substance—the final vivification of the nutrient fluids—is effected in the lungs by contact with the oxygen and electricity of the atmosphere. Up to this point the new blood can scarcely be said to be *alive*, and the venous blood is for all vital purposes dead. The concluding process, therefore, is the completing, perfecting, crowning process of the whole.

P.—This arrangement, I think, is as satisfactory as it is clear. I should now like you to pass in review *seriatim* the various steps or stages of *digestion proper*, or the functions of the alimentary canal, as you have more precisely restricted it.

Dr.—Willingly. We shall commence then with *mastication*, *insalivation*, and *deglutition*.

The *solution* of the food commences in the mouth. The secretion of the salivary glands are *solvent fluids*. The teeth are expressly for *comminution*, for breaking up the mechanical cohesion of the particles of food, instruments to *tear*, to *cut*, to *grind*, as the nature of the food may require.

P.—The advantages of perfect mastication are, I conceive, neither few nor unimportant, and deserve to be placed in a strong point of view.

Dr.—The *duty* of mastication, &c., is one that people,

otherwise very observant of their duties, require constantly to be reminded of.

It complies with the first grand requisite to *perfect* digestion. *It places the alimentary bolus in the most advantageous conditions for being intimately penetrated and mixed with the solvent juices of the stomach, i. e.*, by *disintegrating, softening, and diluting its particles.* The great importance and necessity of this preliminary operation in the reducing process of the food, will be apparent by a reference to the first laws and processes of chemistry.

Not the least of the advantages of perfect mastication *is the regulation of the proper intervals of time for the admission of the successive portions of food into the stomach.* This is a more important consideration (as a means to perfect digestion) than is generally imagined, or than appears on the surface. The slow succession with which perfectly masticated morsels are necessarily swallowed is in remarkable harmony with a fact of gastric action discovered by Dr. Beaumont, that each morsel on being received into the stomach is made to undergo a series of revolutions round its walls, evidently for the purpose of saturating it with the gastric fluids. This operation lasted from 50 to 80 seconds; the precise time required for the thorough mastication of an ordinary bolus.

Slow mastication ensures the appeasing of hunger, before more food is taken than can be easily digested. The stomach is intended to receive only such an amount of food as can be easily mixed with the gastric solvents. These in the healthy person are poured out in proportion to the real assimilative need of the economy for the time being, not according to the voracity of the appetite, or quantity of food eaten. When this definite amount of gastric juice secreted by the stomach in measure adequate to meet the definite waste and wants of the moment; when this is saturated with food, then all feeling of hunger subsides. Having prompted the satisfaction of the corporeal wants, the end of this vegetative instinct (hunger) is accomplished; its voice is silenced, its craving appeased. Not only all further desire for food ceases, but even its relish diminishes, and if ingurgitation be pushed much further, eating becomes absolutely disgusting.

This is another of those salutary *checks* of provident nature, by which she guards the *organic* from the abuse of

the *animal* powers. Woe to the man who knows he has a stomach, and who habitually disregards the warnings of his stomach-conscience.

Another important result of careful mastication, is the mixing of a sufficient quantity of *saliva* with the food. Slops disagree with most people, in some measure from the want of this fluid.

The saliva is a frothy, watery, slightly alkaline fluid, largely secreted from the parotid, sublingual, and submaxilliary glands. The amount discharged and mixed with the food during a meal, varies from four to seven ounces. The latter may be considered an average in the adult. It has the property *of changing starch into sugar*. Here commence those chemical changes in the nutrient principles, that are completed in the alimentary canal. Acidulated saliva acts like gastric juice or azotized substances. The saliva guarantees one of the indispensable conditions of deglutition; it moistens, softens, and lubricates the morsel. The provisions for securing the abundant flow of the salivary fluids during mastication, remarkably exhibit that simplicity of design, yet efficiency of end, we have had so often occasion to notice, as characterising animal structure. 1st. The embedding of the glands among the muscles of the mouth. By the action of these muscles in chewing, an increased flow of blood is necessarily determined to them. Again, by the connexion of the salivary apparatus with *animal* nerves, their secretions are brought under subjection to mental influences. By this, you perceive how it happens that the sight, smell, or even the bare *idea* of food, provokes the activity of the salivary glands.

The tongue, the palate, the lips, the posterior curtain of the mouth (the soft palate), even the pharynx, are all largely supplied with nerves of *animal* life. The sentient papillæ on the surface of the tongue are visible. These are the immediate and especial seat of the sense of *taste*. This sense is diffused, but less intensely, over the internal surface of the mouth.

The great office of the sense of *smell* is that of a sentinel to the alimentary canal, and a coadjutor to the sense of taste. It is, therefore, placed in close relationship and contiguity to the mouth.

P.—I am curious to hear an explanation of the subject of deglutition. Although I but inadequately comprehend the

play of the parts concerned, yet from all I have heard, I believe no department of physiology is more replete with interesting details and curious contrivances.

Dr.—It is, as you affirm. But it is very difficult without good engravings, or dissections, to give you clear views of this admirable mechanism. Such as I can, however, I will impart.

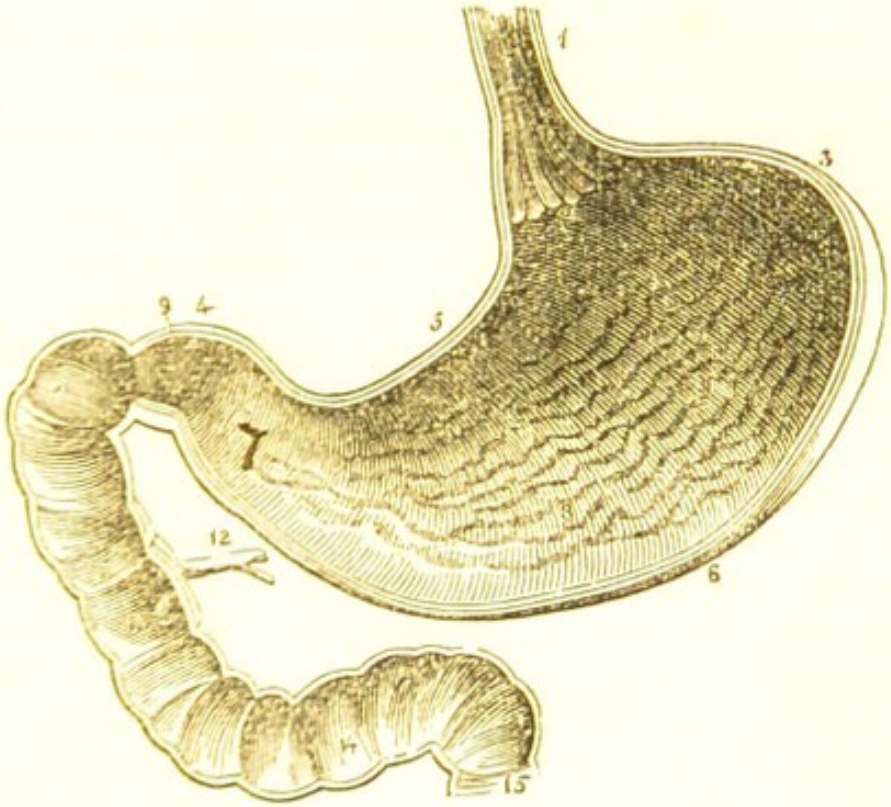
While mastication is going on, the mouth forms a perfectly close cavity, or chamber, from which the food cannot escape. Behind it is walled up by the soft palate, whose lower edge is in firm contact with the base of the tongue; in this way all communication is cut off between the mouth and the gullet. Up to this boundary-line, sensation, volition, consciousness, and thought, concur in the digestive function; here the ministrations cease, beyond this digestion is a pure organic process. Nature *cannot afford* to leave any subsequent stage of the proceedings to the control of the will, hardly even to render it a subject of consciousness, and never so in the state of health. This instance also, clearly establishes the doctrine of benevolent foresight for the well-being of the individual, removing from the government of *animal life*, the organs subservient to the grand *vital* functions.

In the whole of this introductory business to the grand solvent function of the alimentary canal, in the acts of eating and swallowing, we have an elaborate mechanism to deal with, that more than any other part of animal contrivances shows consummate design We have an apparatus most multifarious in its parts, and most concentrated in its space, yet there is no crowding withal. We have apparently antagonistic operations, and incompatible adjustments, all to go on, and secured at one and the same moment, and by structures the most easily deranged, yet is there no interference of one part with another; there is not even an approach to jar, collision, or embarrassment. We have coarse, tough, tearing, cutting, grinding organs, bodies as hard and insensible as shears or mill-stones, placed in the midst of structures the most soft and sensitive; yet we do not find the exquisite perceptions and intimations of the latter in the least blunted or impeded by the rough operations of the former. It is provided for, at the same time, that this solid machinery shall neither be a source of irritation, nor incapable of repair (nutrition). We have unfailing streams of fluid also supplying it, so that the operations of

the mash-tub are combined with those of the mill. In the perilous passage of the gullet, in a narrow thoroughfare, with a crowd of openings, leading to the most important organs, and this, perhaps, a hundred times a day with every individual—there is a risk of the morsel regurgitating back into the mouth, or deviating into the nostrils, the air passages, or the ear-tubes, an accident always annoying, sometimes fatal; yet is such an event the rarest possible occurrence. Last of all, and most wonderful of all, in the midst of combinations of mechanism so complex, and out of materials so heterogeneous and discordant, there is, nevertheless, devised, "*an instrument of divinest melody*"—the vehicle of utterance to man's lofty thoughts, the medium of his sweetest associations with earth,—the herald of his high and hallowed aspirations to heaven.

To describe the apparatus, and narrate the steps of the process of swallowing, would be tedious. The act itself is performed in an instant, almost with convulsive rapidity. The passage of the morsel must necessarily be rapid, as during the operation all access of air to the lungs is cut off. The whole is a beautiful illustration of *reflex movements*, movements performed independently of the will, and almost without consciousness.

LONGITUDINAL SECTION OF THE HUMAN STOMACH, AND DUODENUM, SHOWING THE TWO ORIFICES OF THE STOMACH.



1. The œsophagus; upon its internal surface the plicated arrangement of the cuticular epithelium is shewn. 2. The cardiac orifice of the stomach, around which the fringed border of the cuticular epithelium is seen. 3. The great end of the stomach. 4. Its lesser or pyloric end. 5. The lesser curve. 6. The greater curve. 7. The dilatation at the lesser end of the stomach, which has received from Willis the name of antrum of the pylorus. This may be regarded as the rudiment of a second stomach. 8. The rugæ of the stomach formed by the mucous membrane: their longitudinal direction is shewn. 9. The pylorus. 10. The oblique portion of the duodenum. 11. The descending portion. 12. The pancreatic duct and the ductus communis choledochus close to their termination. 13. The papilla upon which the ducts open. 14. The transverse portion of the duodenum. 15. The commencement of the jejunum. In the interior of the duodenum and jejunum, the valvulæ conniventes are seen.

CONVERSATION XL.—*Digestive organs, their structure and mode of action—Pylorus (gate-keeper), its functions not hitherto clearly understood—Omentum, a reservoir or safety-valve for superfluous fat—Digestive viscera—Organic or non-sentient system of nerves—Evidence of design—The alimentary canal—Liver—Series of preventive checks for the preservation of the individual.*

DR.—THE stomach of the adult is capable of containing from one to two quarts. It is placed transversely across the upper part, and filling the *epigastric region* of the abdomen. Like the œsophagus (the tube leading to the stomach), and whole intestinal canal, it is composed, 1st. of a MUCOUS MEMBRANE; this constitutes the inner lining of all the canals and cavities of the body, which communicate with the exterior. In the quiescent, or empty state of the healthy stomach, it is of a pale pink colour, soft, and velvet-like, and covered with a thin transparent viscid mucus. In the tissue beneath lie the *crypts* or *follicles*, small oval glands that secrete the mucus. This membrane being highly distensible, is necessarily disposed into folds, when the bowels are empty and their cavity contracted. These are technically called *rugæ* and *valvulæ conniventes*. The ends secured by this arrangement are, 1st. It increases the extent of absorbing surface. 2nd. It allows space for the expansion of the membrane. 3rd. It affords full protection to the blood-vessels, nerves, and absorbents, whose delicate tissues would otherwise be injured by the occasional distensions to which these viscera are subject. When it is distended they disappear. In the small intestines, the *valvulæ conniventes* are both more numerous and more permanent than in the others. Here their *final* cause is obvious—to increase the amount of absorbing surface.

The *villi* of the stomach and intestines may be likened to the *pile on velvet*. This is the best idea I can give you of this singular structure. Each shred or filament of the pile is a *villus*, containing its minute bundle or leash of blood-vessels, absorbents, and nerves. The villi of the small intestines are larger than those of the stomach. Four thousand are computed to a square inch! Their length is about one-fourth of a line. A lubricating and sheathing mucus is poured out along the whole intestinal track, to protect the delicate structures from the injurious action of irritant substances, and poisons, that are so often recklessly introduced

into it. In feverish states of the system arising from these ignorant abuses, the villi become red and dry, or pale and moist, and lose their smooth and healthy appearance. The secretion of the villi is diminished or suppressed. The mucous follicles are flat and flaccid. The gastric juice also fails to be secreted. In such case, additional food or physic will equally act as an irritant. Hence the necessity, in such states, for acting mercifully to the stomach. Nutritious drinks, as beef tea, which require no digestion, may be absorbed. But even here, the more solid constituents are not absorbed, and adhere to the stomach walls. Food remaining *undigested* will increase the irritation of the alimentary canal, and aggravate the disorder of the general health.

The tongue is a pretty sure index of these morbid states, and is generally to *match*. To understand the morbid indications of the tongue requires considerable attention to its appearance in a variety of persons in health and disease.

2. The second layer or coat of the digestive canal is the *muscular*. The muscular action required in the intestinal canal is *propulsion*. According to the demand for muscular effort in the various parts of the alimentary tube is the amount of muscular fibre attached to those several parts. The fibres run lengthwise and across. The muscular coat is thickest in the œsophagus and stomach; it diminishes in the small intestines; and is least of all in the large intestine, where the fibres are gathered into three separate bundles or longitudinal belts. In the rectum (the lowest portion of the bowel) they again become thick and strong, and continuous all round. I should remark that the stomach has an oblique layer of fibres in addition to its longitudinal and circular bundles. This is because of the greater variety of movement its function requires. The alternate contractions of these various fasciculi of fibres produce an infinite variety of movements, vermicular, peristaltic, &c. All acting simultaneously, they lessen the cavity of the stomach, and compress the alimentary mass, *compelling it, in fact, to make a circuit round the interior*. In this way the successive portions of the food are brought more entirely in contact with the solvent juices of the stomach.

In the case of the intestines, the effect of the combined contraction of the circular and longitudinal fibres is to shorten, yet dilate, the canal. These movements expose the dissolved alimentary mass in all directions to the orifice of

the absorbent vessels, yet the while, gently urging its onward course. In this extended intestinal track, the fluid portion of their contents gradually disappears, until, at the termination of the small bowels, it is nearly all taken up by the lacteals.

But I have not yet done with the muscular arrangements of the stomach. For about four inches from the pyloric extremity its fibres are gathered into a powerful, prominent, projecting belt, or ring, four times as thick as the muscular coat of the organ elsewhere. This is the point of *the hour-glass contraction* remarked by some writers, and the seat of those severe spasms of the stomach to which dyspeptic patients are occasionally subject; pains often refractory to all drug-medication. I am not aware of any book of practical medicine, even the latest, in which the *real* seat of this distressing malady is pointed out. A fold of this muscular ring, and a thickening of the mucous membrane at the lower orifice of the stomach, constitute what is falsely designated the *valve* of the pylorus. This whole subject has been hitherto too superficially regarded.

The outer coat of the alimentary canal is its *serous membrane*. The same lines the inner walls of the abdominal cavity, and is called the peritoneum. It also lines all the *shut* cavities of the body, as the joints, the cavity of the chest and outer surface of the lungs, the ventricles of the brain, &c. It is the investing membrane of the heart, within and without. It serves several important purposes. 1st. It forms a sort of curtain folded round the intestines, and extending to the back-bone; thus insulating each fold of the bowels, and keeping the whole in place. 2nd. It answers as a sort of web on which to convey the *immense number of vessels and nerves* that supply the alimentary canal. 3rd. By its moist lubricating surface it diminishes friction, and facilitates the movements of contiguous organs upon each other. The *omentum* is a fatty membrane we see in slaughtered animals spread over the bowels. It consists of two folds of the membrane we are speaking of, connected by areolar tissue, and often containing, as you have noticed, much fat. It hangs like an apron from the arch of the stomach to below the navel, thus curtaining a large portion of the interior surface of the abdominal viscera. Its use is that of a reservoir for superfluous fat; a waste spot, admitting of sufficient distension safely to stow away materials, of which it is necessary to relieve the circulation; and for

whose elimination the common sources of excretion fail. This is not an overstrained hypothesis of the abnormal deposition of fat everywhere.

The quantity of blood supplied to the stomach is greater than that to any other organ, save the *brain*. The vessels form two distinct layers—1st, an *external* one, that which is distributed on the peritoneum and muscular coats; 2nd, an *internal* layer, spread out on the areolar (cellular) tissue, and mucous tunics, forming a fine net-work on the *villi*. There is an intimate vascular connexion between the stomach and spleen, pancreas and liver. Their arteries spring from a common trunk.

The supply of nerves is equally abundant with the supply of blood to the digestive viscera. Most of them are from the *organic, ganglionic*, on non-sentient system. A few are from the *animal* or sentient system. The ganglionic nerves completely invest the great trunks of the arteries, and accompany them in all their ramifications. The office of these nerves is something more than merely harmonising and associating the animal and vegetative functions, the hypothesis of some physiologists. If this were all their end, a lesser distribution would suffice. They control secretion, excretion, sensibility, &c.

P.—I think you before remarked that they were not essential to impart secretory power, was sufficiently proved by the fact that plants, which have no nervous apparatus, elaborate secretions.

Dr.—True. The secretory process, therefore, is purely *organic*. But, in my view of the matter, it was necessary in the case of the animal to make the energy of the secretory efforts to rise or fall with the varying demands and conditions of the system. To intimate, therefore, to telegraph, if you like, these demands and conditions to the nervous centres and sources of power, and to fit the organic functions to work more slowly or quickly as the exigences of occasions require, is a sufficient reason for the introduction of *a regulating element* (organic nerves) in operations which in plants take place without any nerves at all. But organic nerves are not alone necessary for the *organic* operations. A certain intermingling of *animal* nerves is indispensable; and this in order to associate all parts of the body corporate into one grand whole, one confederation of allied interests—to establish one common centre of perception and inter-communication—which will register and notify

the general weal or woe. This intermingling of the two grand classes of nerves, is the source of the pleasurable consciousness of *health*—the feeling of physical joy and *bien etre*, the buoyancy, vigour, and exhilaration produced by the well-being of the entire economy. The same medium gives us the painful consciousness of disease.

P.—I suppose it is by the same distribution of opposite classes of nerves, that the stomach is brought into immediate connexion with the grand centres of animal life; thus explaining the *intimate sympathies* and important relations of this organ with every part of the system.

Dr.—Quite correct. Otherwise, for the *specific function* of the alimentary canal, it is wisely and mercifully ordained, that it be provided almost exclusively with *organic nerves*. Nevertheless, for the reasons specified, and for other reasons also, an intermingling of some *animal* nerves is requisite, in the apparatus ministering to the nutrition of the individual. For example, the control of the voluntary powers over the reception of food, and the exit of its refuse, imply intimate relations with the sentient nervous system, and necessitate the distribution of its nerves on the parts concerned.

The SMALL INTESTINES in man are about *four times* the length of the body. They are artificially divided into the *duodenum*, *jejunum*, and *ilium*. We have already referred to the *valvulæ conniventes*, the deep semilunar folds of the inner lining of the intestines. They are so numerous that each is laid upon the other like scales upon a fish, or tiles upon a roof. The small intestines as they descend gradually diminish in capacity, in thickness, in vascularity, in the size of the villi, and in the depth and number of the *valvulæ conniventes*. They contain a prodigious number of minute glandular follicles, with groups of glands of larger dimensions. The glands of *Brunner* in the end of the duodenum and the beginning of the jejunum, and the glands of *Peyer* in the ilium.

P.—From your account of the office of the *lacteals*, I am much interested in these vessels; will you describe them to me?

Dr.—They are delicate, pellucid, membranous tubes, the proper absorbent vessels of the alimentary canal, and elaborators of the *chyle*. They commence on the *villi* by cells too minute to be visible to the naked eye; they are most abundant in the small intestines, and are nourished by blood-

See Chambers's Encyclopaedia, Art. Organ

vessels and nerves, but the transit of their contents is not in consequence of inherent contractile power, or *vis a tergo*. They are spread out in a minute net-work on the mucous membrane; thence issue branches of a larger size, which pierce the intestinal tunics, and emerge upon the mesentery. Within the folds of the latter they coalesce and form a very complex web. Here the *lacteal glands*, little coils or knots of vessels and nerves, are thickly scattered, or rather arranged in two distinct rows; the outermost is the larger. From these the lacteals converge towards the spine, successively forming longer and larger branches, till at length they constitute two or three principal trunks, terminating in a small oval sac—the *receptaculum chyli*, which rests on the first or second lumbar vertebræ. In the reservoir also terminate the trunks of the *lymphatics*, which are the *special* absorbent vessels of the system, as the veins are the general absorbents. They convey back from all points of the body towards the heart, the lymph and serum exuded into the meshes of the areolar tissue from the skin and mucous membranes, from the internal cavities and vessels, and from the substance of all the organs. The glands of the lymphatic system are composed of an inextricable knot of vessels.

P.—Are they for the further elaboration of this matter, previous to its mingling with the chyle, and its being thence restored to the general current of the circulation?

Dr.—This, I think, can hardly be called in question. From the receptacle of the chyle proceeds the *thoracic duct*. This is a transparent tube of nearly the calibre of a crow-quill. It rests on the spinal column, and ascends into the chest on the right side of the aorta up to the fifth or sixth dorsal vertebra. It here crosses over to the left side, and proceeds as far as the sixth cervical vertebra, where it bends down to plunge into the angle formed by the junction of the internal jugular and left subclavian veins. It is thence sucked in by the venous torrent that is rushing to the heart. At the point of entrance two valves are placed which prevent the regurgitation of the chyle, or the inlet of the blood into the duct.

In matter of design, here are ample subjects for admiration. How minutely careful are the precautions of nature to guard the organism from damage at all points. I will now give you some account of the Liver. It is the largest and heaviest gland in the body. For the blood it is de-

signed to purify (that from the venous capillaries of the whole abdominal or digestive system) is often highly charged with foreign and noxious elements. It weighs about four pounds on an average. It lies chiefly in the right hypochondriac region (under the false ribs, where its margin is felt), and extends across the epigastric region (stomach pit), into the left hypochondrium. Its upper surface is in contact with the diaphragm; its under surface with the pyloric extremity of the stomach.

The veins arising from the stomach, spleen, pancreas, omentum, small and large intestines, run together to form a large venous trunk—the *vena portæ*—which plunges into the liver, where it gives off branches in the manner of an artery. The ultimate ramifications of these, terminate in the biliary ducts. This constitutes the famous PORTAL SYSTEM—a beautiful contrivance of nature to receive and purify the twice-tainted blood of the abdominal viscera, before it reaches the heart.

P.—How twice-tainted?

DR.—1st, in common with other venous blood, it is *spent* by the renovation of structure, and the pouring out of secretions and exhalations. 2nd, it is charged in addition with all those crude, impure, indigestible, or superfluous fluids absorbed from the alimentary canal, and which must not be permitted to pass into the vital commonwealth. Foreign substances so absorbed are readily detectable in the liver and spleen—and this, when even no traces of them can be found in the thoracic duct, or in the general circulation. The great object and office of the liver is to filter and strain off the impurities thus accumulated. The product of this operation, *bile*, which is primarily and essentially an excrementitious matter, nature thriftily turns to account in the process of digestion, before it is finally disposed of.

The *vena portæ* holds the same relation to the biliary ducts that an artery does to the excretory ducts of other glands, and forms by far the greatest part of the vascular substance of the liver The two hepatic arteries are small, and simply for the nourishment of its tissues. Their ultimate divisions terminate in the vena portæ. The innumerable branches of the biliary ducts, converging from all parts of the liver, at length form a single trunk, called the *hepatic duct*, which carries the bile partly to the *gall bladder* (by the cystic duct), and partly into the *duodenum* (by the choledoch duct). The choledoch is the common trunk of

the cystic and hepatic ducts. These points of the anatomy of the liver will be made apparent by a reference to a good engraving. So much for the generalities of the liver. The questions relative to the office of the bile will come in for discussion by-and-bye.

One purport of our discourse on the digestive organs so far, is this, that we have in the whole of the abdominal apparatus, an admirable *series of checks*, instituted to prevent the contamination of the general circulation and the vital centres, by the introduction of foreign or unassimilable matters.

The *first check* is the function of the bowels by which extraneous matters are strained off from the nutritious.

The *second check* is the filtering process of the liver, by which subtler impurities absorbed by the veins are eliminated before they can reach the grand head (or heart) quarters of the organism.

The *third check* is the function of the kidneys; organs evidently placed where they are as an adjunct to the digestive economy; a strainer of materials injurious to the system from their excessive amount or noxious qualities. Many facts show that the excess of fluids received into the stomach is let off by the kidneys, without the necessity of their making the whole circuit of the body.

Sound analogy, and *à priori* reasoning, support such a supposition. But, in point of fact, an anatomist (Lippi) has demonstrated a vascular connexion of the veins and lymphatics of the liver with the kidneys, by which superfluous dietetic matters, or injurious medicinal substances received into the system, are more summarily disposed of.

P.—Herein and hereby, I should think that the mischiefs of the three strong D's—strong diets, strong drinks, and strong drugs—are in some measure neutralised.

DR.—The *fourth check* is the lacteal elaborating apparatus. The best of the nutrient materials are only received and turned to account here.

The *fifth check* is the eliminating process of the lungs; the great drain of the superfluous *carbon* of the body.

But for such contrivances, the life of animals, especially of *man* (the *all*-eating and drinking animal), would be infinitely shorter and more uncertain than it is. The *victims of the belly*, numerous as they are, would be ten thousand for one.

Of the PANCREAS little need be said. It is a small organ,

closely resembling the salivary glands in structure and secretions. It lies behind the stomach and across the body. It is about six inches long, and one thick, and weighs from four to six ounces. Its secretion is poured into the intestine by a common mouth with the biliary duct.

P.—It is eaten as a *bon bouche*, under the name of *sweetbread*, and often given to invalids, but it is a mistake to suppose it so easy of digestion.

Dr.—The SPLEEN is situated in the upper and back part of the abdomen, on the left side, between the diaphragm and left kidney. It is connected with the diaphragm, the stomach, and the colon, by vessels and loose folds of the peritoneum. It is composed entirely of blood vessels, lymphatics, and cells, on a fabric or basis of areolar tissue. It is about four inches long, three broad, and one in thickness, and weighs about eight ounces. Of the specific function of the spleen this at least is established, that it serves as a diverticulum or reservoir for the excessive supplies of blood the *molimen digestivum* from time to time exacts for this part of the animal organism. When this *molimen* subsides, and the digestive function is accomplished, a vent, of course, is required, whereby to ease the gastric apparatus of an excess of blood now no longer necessary. This, at least, is the most feasible hypothesis of the spleen. This much will suffice for a glance at the apparatus concerned in digestion.

CONVERSATION XLI.—*Stomach—Its mucous lining—Process of digestion—Gastric juice, how and when secreted—Illustrations of reflex action—Progress of the swallowed morsel—Influence of mental emotions on digestion—Function of the pylorus.*

Dr.—THE stomach in the healthy state, when empty, is coated with a thin, transparent viscid mucus, nearly, if not entirely, destitute of acidity. On the introduction, however, of food or a foreign body (any simple mechanical irritant), myriads of bright translucent watery specs, distinctly acid, ooze through the transparent mucus, from the fine *villi*, or vasculo-nervous papillæ of the stomach walls. These collect in drops, which burst and diffuse themselves in limpid rills over the whole interior surface; yet the apertures of the vessels are invisible. This is the *gastric juice*. It is secreted from numberless vessels, distinct and separate

from the mucous follicles. When collected, it is transparent, inodorous, saltish, acidulous. It consists of water, containing free hydrochloric (muriatic) and acetic acids, with phosphates and muriates of potass, soda, magnesia and lime. The gastric juice coagulates albumen, and is eminently *antiseptic*, that is, corrective of putridity.

The gastric juice is secreted in great abundance the whole time digestion is going on. *It is* a *true chemical solvent*, and the principal agent of the reduction of the food in the stomach. It is a law of all chemical solvents that they can only combine with, or decompose, a fixed, definite amount of any given substance. The gastric juice is no exception to this law. With provident care for the well-being of the individual, it is ordered that this secretion is only yielded when needed, and in measure, according to the alimentary need of the economy for the time being. Whatever is beyond the saturating point of the gastric juice, is unoperated on, is undissolved; and, therefore, becomes subject to decomposition. Hence the generation of gases, acidity, and other symptoms of dyspepsia.

P.—In fact, you would consider all such excess of food above the disposable powers of the gastric juice, as so much foreign matter in the stomach and intestines, lying a load, producing discomfort, creating disease. How is such excess of food eventually disposed of?

Dr.—Part passes off by the bowels; a part of the oil passes into the lacteals, and so into the system, to be burnt off in the lungs, or stowed away as adipose tissue, and a part of the albumen and fibrine is absorbed by the veins, and is eliminated by the kidneys. *Waste*, that is, corporeal exertion, &c., by reproducing *demand* in the economy for the materials of sustentation, will originate fresh stores of gastric juice to meet the demand. In this is apparent the benefit of exercise in improving the digestive powers.

There is reason to believe that the amount of intestinal juices poured out on the reception of a meal, is much greater than is usually supposed. During a repast a great influx of blood takes place to the vessels of the stomach. Its colour alters from a pale pink to a deep red, its temperature is elevated, and its nervous power exalted. The *villi* enlarge, and the gastric juice, exuding in great drops, trickles down in limpid streams over the whole interior surface. The exudation of mucus is correspondingly active. These secre-

tions are favoured by a certain quietude of body after a meal; inasmuch as the powerful determination of blood to the digestive surface is not then interfered with.

An old opinion that digestion did not commence till after the completion of a meal, is quite erroneous. Digestion begins with the introduction into the stomach of the first mouthful of food, and its solution in the gastric juice.

The average time of a *moderate* meal lying in a healthy stomach, is from three to five hours. These movements of the stomach, the organic appreciation of its appropriate stimuli which they indicate, and the organic response to it, which is called forth in the corresponding actions of the organ, are beautiful illustrations of the *reflex or excitomotory function*. The *afferent* nerves report at the spinal centres what is needed, and the *efferent* nerves, on the instant obeying the summons, send forth the power to originate and maintain the requisite actions.

Mental emotion interferes with digestion, by suspending or deranging those gastric movements, and *alters the secretions*, as one prime element of the derangement in question. The facility of the stomach's functions, when the mind is happy, and the difficulty of its operations, when the mind is harassed, are familiar facts. On the other hand, the influence of unsound digestive actions over the mental states is reciprocal.

It is probable that by the time the last mouthful of a moderate meal is swallowed, if *mastication* has been long and perfect, and, therefore, the reception into the stomach at slow intervals, the whole quantity of gastric juice necessary for its complete solution has been secreted. The softened layers of the pulpy mass are in succession removed by the propulsive actions of the stomach and carried to the pyloric end, whence it passes into the duodenum. The harder, deeper-seated, less saturated, or undigested masses of food, by degrees come to the surface, to be exposed to the action of the solvent fluids. These are softened and dissolved in turn, and in like manner are removed to the pylorus. In this way the process goes on till digestion is completed.

I will now explain the function of the *pylorus*, or lower end of the stomach, and the true rise of the singular *muscular belt* around that part of the organ. This is a *terra incognita* to the unprofessional public, even by the profession it is very inadequately comprehended, if not en-

tirely misapprehended. This portion of the alimentary canal is replete with pathological interest, is often, in fact, "the head and front of the offending" in some of the wide-spread stomach maladies of the present day.

During the *later* stages of digestion especially, the stomach observed in the living animal is seen forcibly contracted a third of its length from the pylorus, making a clear division of the cardiac and pyloric portions of the organ. In the case of Dr. Beaumont's servant, before referred to,* the bulb of a long glass thermometer tube, being introduced through the aperture far down into the pyloric portion of the stomach (when the digestion of a meal was advanced), was always arrested at this point. Then a relaxation took place, in which the bulb *was forcibly sucked in* (swallowed?) three or four inches towards the pylorus. It was then relaxed and forced back, twirling the tube about. When the whole length of the tube was allowed to slip into the pylorus, it gave strong resistance in drawing back, precisely like pulling a piston out of an exhausted tube. This resistance ceased as soon as relaxation occurred, and the tube again rose spontaneously three or four inches, when the bulb was again caught in the grasp. If pulled up an inch or two out of this pyloric *gullet* or *rectum* (for such it is truly in structure and functions), the thermometer-tube once more moved about freely in all directions, but mostly inclined to the splenic extremity. Simultaneously with the contractions there was a general shortening of the gastric cavity, and a forcible compression of its contents. On the relaxation occurring, the *rugæ* are seen performing their vermicular motions, and the alimentary mass making its circuit of the walls as before.* The circular or transverse fibres contract progressively from left to right, propelling the chymous mass forward in the same direction. The transverse pyloric belt takes up this peristaltic movement, and contracts powerfully upon the mass brought forward to the small end of the stomach. In the strain and pressure of this true rectum or

* Alexis San Martin, a robust Canadian of eighteen, received, in 1822, a gun-shot wound, which carried away a portion of the walls of the abdomen, and left a fistulous opening into the stomach. He was engaged by Dr. Beaumont, of the United States' army, as a servant, at various periods between 1825 and 1833, chiefly with a view to the prosecuting a series of experiments on digestion. For the new facts Dr. Beaumont has contributed, science and society are equally indebted.

gullet-like action, the thinner chymified portion is rubbed off, and squeezed through the pyloric vent into the intestines. After a portion of the contents have thus been protruded through the pylorus, there is quiescence for a moment—the circular band and the transverse muscles relax. Then the contractions recommence from right to left, carrying the alimentary mass back to the splenic extremity. These peculiar contractions and relaxations succeed each other at intervals of two, three, four, and five minutes; but more rapidly as the process advances. Towards the end of digestion the volume of the ingesta diminishes with disproportionate rapidity. *It is the first and fundamental law of the stomach's action that it cannot be at rest, so long as food, physic, or any foreign matters are contained in the cavity.* The *dissolving, mixing, triturating, evacuating* process goes on, must needs go on, till the stomach be empty. Then all is quiescent again.

P.—I should think that the experiment with the thermometer being too frequently repeated, or the bulb being too long retained in the pylorus, would strain and injure the part?

Dr.—It did so; severe distress, cramp, or spasm, *with tenderness at the stomach pit*, were induced.

P.—But how do the proceedings in these experiments, and the facts of gastric movements now detailed, bear on the *real* function of the pyloric extremity of the stomach?

Dr.—These proceedings and facts, with certain familiar pathological cases, in my view of the matter, do not any longer involve the function of the pylorus in either doubt or darkness. *The pylorus is not a valve*, as it has so generally been regarded and called, even by the best and latest writers.

The office of a valve is to admit exit, but to bar entrance. This is not the case with the pylorus. In the mechanism required by this part of the structure, provision must be made to admit regurgitation from the duodenum into the stomach (as in the common case of vomiting), and the introduction of bile also (as when an excess of oily matters has been eaten). Here a valve would obviously have been out of place, would not have answered nature's purpose, would, in fact, have been subversive of her ends. No; the pylorus is truly a sphincter;—the broad transverse belt of muscle above it, is equivalent to the thick muscles of the rectum; and the function of the parts is analogous, that is,

a means, 1st, of forcible retention of the contents of the cavity till their preparation or accumulation is sufficient to require emptying; and, 2nd, of propelling the matter through the pyloric sphincters, when it yields, as the contraction of the rectum forces matters through the relaxed sphincter ani.

P.—The analogy, then, you make out, of these two parts, is complete; as regards, on the one hand, their physiological function, and, on the other, their mechanical action.

Dr.—Yes; and what is still more curious and significant, their diseased states. But to refer specifically to each point of the analogy of the organs in question, the pylorus and rectum;—

1st. As regards their *physiological function*. They are a means of retention of the contents of their respective cavities, till they undergo certain preparation, or increase to a certain amount, and then they become instruments of propulsion and expulsion.

2nd. Touching their *mechanical action*. In both cases—by that harmonious play of associated parts that we find everywhere in animal structures—the orifice relaxes as the muscular band above contracts, and quite in the measure the one of the other.

This consent of action between the pyloric *belt* and the pyloric *vent*—between the energy of contraction on the one hand, and the extent of dilatation on the other—makes very understandable some points of its pathology, on which popular, if not professional, ideas are very vague and confused. For example, the *malaise* complained of by certain dyspeptics some time after a meal, when it may be supposed to be leaving the stomach—that is, in process of *swallowing* by this pyloric throttle. These applications of abstract truths I shall advert to immediately.

3rd.—The *third* point of analogy between the pylorus and rectum refers to *their diseased states*. 1st. *Functionally*: the retentive or the expulsive power may be in excess or defect; the action of the parts may be too hasty or too halting; admitting premature exit of the contained matters (as in *bulemia*, the disease of gluttons), or unduly delaying exit and embarrassing operations, as in dyspepsia. These last cited functional derangements of the pylorus, have their precise analogues in the rectum. 2nd. *Organically*: these two compared parts coincide in being the situations wherein *structural alterations* of the alimentary canal so frequently

occur, from simple affections of the mucous membrane, to cancerous degeneration. The relaxed gastric mucous lining and turgid veins of some dyspeptics have their precise analogues and accompaniments in *piles*, *pains*, and the irritation and uneasiness they produce. The two exits are also united by great sympathy. Pyloric irritation is often the cause of sore throat—another sympathy.

Now you are in a condition to understand the *embarras* and *malaise* of the *molimen digestivum* in dyspeptics, and how they are so often felt in the *latter stages of the process*. The case is precisely that of a costive evacuation with a tender, congested, or abraded rectum—neither more nor less. Now only figure to yourself the pylorus being put through a cruel torture of the same kind—by a gormandising or indiscreet dyspeptic—if only for a few hours every day. In the state of health, and with a *moderate* and wholesome meal, there is, there should be, no consciousness of having a stomach. The gastric juice is poured out in sufficient quantity for the thorough solution of the food, either at the time of the first ingurgitation of the morsels, or during their subsequent detention in the stomach.

P.—In most cases of impaired digestive power, is the fault defective quality or quantity of the gastric juice?

Dr.—Generally both, that is, in cases simply *functional*, or before organic lesions have arisen. In acute cases, and in those of advanced visceral disorganisation, the symptoms of *malaise* commence with the first introduction of food. In the majority of cases of simple dyspepsia, where no excess has been committed, the *malaise* is principally felt in the *later* stages of digestion.

P.—From your whole statement of the case of the stomach's function, it is reasonable to suppose that what gastric juice is at the disposal of the economy *is poured out in the commencement of digestion*. Hence the solution of the *first* portion of a meal, at least, will be guaranteed.

Dr.—Your conclusions are quite reasonable, save in the cases of very disabled stomachs, or very intractable materials. Then subsequent doses of gastric juice may be requisite before a meal is finally discharged from the gastric cavity. Hence the advantage of *longer intervals* of meals for such patients, to allow time for perfect solvent operations. With this proviso, I think, your proposition holds good. Hence the first portions passed out of the stomach are the purest chyme the case affords, the most perfectly dissolved,

and its exit is *both easier and slower*. So far the dyspeptic makes little complaint, unless he has to reproach himself with excess in quantity, or imprudence as to the quality. But with these early and more favoured portions of the meal, the amount of gastric juice available for the dyspeptic stomach gets exhausted. Hence at a subsequent stage of the gastric solution crude undissolved masses are necessarily presented for passage. These are in themselves sufficient irritants; *but they provoke acid secretions, which make them doubly irritants*. Besides, as the process advances, all the stomach movements become more impetuous. The sphincter yields in proportion. The evacuation of the stomach is now rapid. Between the energetic contractions of an irritable muscle, and the morbid mucous lining constantly abraded or made tender by the forced exit of crude, lumpy, or undissolved masses,—no wonder that the last half of the digestive process with dyspeptics is sufficiently painful. And here the *local* pains are not always the worst. The sympathetic reverberations from this morbid centre to other parts of the nervous system is perhaps the greatest element of misery in the case.

P.—I suppose that the more or less stimulating qualities of the *ingesta* have an influence in determining the kind of intestinal secretions, as well as the degree of muscular contractions?

Dr.—Surely; this they do in consequence of their action on the ganglionic and reflex nerves distributed on the gastric surfaces. *Drugs*, even the mildest of them, are irritants of this sort. They act extremely ungenially and *injuriously* on the *sensitive tissues in question*, of all things else producing the most abnormal efforts of secretion and muscular action. Hence the *fluxes*, and *spasms*, and *intense pain* they often determine.

P.—With regard to digestion in dyspeptics, then, it seems that as the process advances, it is less perfect. The alimentary mass is more lumpy and undissolved; and the difficulty of its exit through the pyloric vent becomes the measure of the greater contractile efforts attempted, and of the greater relaxation of the orifice required. I think that is your doctrine?

Dr.—Exactly. These increased efforts, amounting in many cases to real spasms, this morbid haste to evacuate the stomach, renders the process of digestion imperfect in proportion as it makes it rapid. Hence large eaters have

actually what is *called* "rapid digestion," that is, the food rapidly makes its way into the intestines. *But in the same degree it is undigested.* The amount of nutrition it affords is proportionably diminished.

That is one reason why enormous eaters do not always fatten, as we might otherwise expect. It makes also the case of the moderate eaters clear. If, then, according to this showing, the process of digestion is slower, the food passes less rapidly out of the stomach, it is, therefore, better chymified, nourishes more, and at the same time *less fatigues the nervous system* (not to say the gastric apparatus).

These movements of the stomach are a beautiful illustration of *reflex action.* The alimentary canal is constituted to perform its operations, and to pour forth its secretions, *on the simple contact* of any extraneous substance, be it food or physic, a stone or a bullet. But as nothing but *food* was *contemplated* being received into the stomach, and as it was made for nothing else, we say that food is the appointed stimulus, &c. On the application of that stimulus, the *afferent nerves report* at the spinal centres what is needed (motor and secretory energy). The *efferent nerves*, on the instant obeying the summons, send forth the power to originate and maintain the requisite actions.

These reflex movements are under the influence of the animal nerves also. Mental emotion interferes with digestion, &c., by suspending or deranging reflex action, altering the muscular movements of the stomach, and also perverting its *secretory efforts*, thereby impairing the health and integrity of the whole system.

A common fit of hysterics, for example, well illustrates the point in question—the influence of the animal on the organic nerves. Here unpleasant mental excitement produces, in the way described, a great and sudden evolution (secretion) of flatus in the bowels, perceived by the rumbling, distension, and other unpleasant symptoms. The indigestion, headache, cold feet, &c., associated symptoms of the attack, prove the *disturbed equilibrium of the circulation*, in which originate the whole morbid phenomena.

In this way, through the same influence, the depressing passions especially, as fear, grief, anxiety, despondency, excesses of every kind, the abuse of purgatives, narcotics, stimulants, &c., tell most upon the stomach; that is, *by injuring its exquisite lining*, and *perverting its natural sen-*

sibilities, especially deranging the spinal nerves and visceral ganglionic systems, which are the prime regulators of the great central organ of supply. The sphincters of the rectum and bladder, I may mention, are kept tight by reflex action. Mental emotion, it is well known, will relax these instantly, by suspending reflex action. *All the involuntary muscles are kept in tone by reflex action*, that is, by the function of the spinal chord. But let mental emotion interfere with this, and the influence of the spinal nervous system is then weakened or withdrawn. In all these cases of emotion, the movements of the heart are simultaneously affected. This alters at once the circulation in the nervous centres, which most readily perceive and suffer from any loss of equilibrium between the great automatic actions of the machine. Hence the morbid *reaction* at the seats of power becomes more mischievous than the original action or emotion there. It, of course, intensifies the disturbance of the spinal nervous system. The heart is rendered irregular, rapid, weak. The muscular tone of the alimentary canal is simultaneously lowered. Digestion is stopped or languishes. The alteration of the secretions is very evident. In some cases immense volumes of gas are instantaneously disengaged, occasionally urine copiously secreted, on occasions of fear or anxiety, or in hysteric paroxysms.

P.—So the whole machine falters in its action, all through derangement of the play of the reflex function?

Dr.—Just so—or if, on the other hand, the emotion be pleasing, its energies are as much exalted. In fact, as before remarked, the influence of the mental states over the organic functions, and of the organic states over the mental functions are reciprocal. The mechanism is one grand whole—one copartnery for good or for evil. Every member (of the firm) sympathises in the weal or woe of another. There is no isolated play of parts. One wondrous bond of sympathy and interest binds them all together.

P.—You before remarked the facility of the stomach's functions, when the mind was at ease. That I have felt. I also know by painful experience the *malaise* and *decouragement* [redacted] when digestion labours, or when the safety-valves are clogged.

Dr.—The experience of most people will corroborate yours. Grateful mental stimulus gives firmness and regularity to the actions of the nervous, muscular, and circulat-

ing systems. In this way, no doubt, it contributes to digestion, imparting tone and augmenting secretions.

CONVERSATION XLIII.—*The function of the duodenum—Biliary and pancreatic fluids—Precipitants—Chylification—Oils and fats not intended to be digested—The question of fat bacon—Liver, bile—Process of fæcation—Purification of the blood—Recapitulation of the leading facts of the digestive process.*

DR.—THE *duodenum*, or first division of the small intestines, is a sort of second stomach. Into this part the secretions of the *liver* and *pancreas* are poured, at about four inches from the *pylorus*, as the chymous mass is slowly propelled along in successive waves from the stomach. In this part of the digestive apparatus new and important chemical changes are effected on the chymous mass, by the admixture of the secretions of the liver and pancreas. This process is ordinarily designated *chylification*. But we have already alluded to the error of supposing that *chyle*—a *semi-vital* fluid—is formed in the intestines. The real function of the whole alimentary canal is *chymification*, or the simple reduction, solution, and chemical modification, of the nutrient principals. *Chyle* is really a new substance, quite distinct from chyme, elaborated by the lacteals, from the perfectly chymified portions of the food.

P.—You described the action of the gastric juice out of the stomach—what is the operation of the biliary and pancreatic fluids under similar circumstances? This I presume will throw some light on the function of the duodenum.

DR.—A fair test. They act as *precipitants*. The alimentary mass so treated separates into *three* principal constituents. 1st, A creamy, oily pellicle, and a turbid, milky fluid, that floats on the top. 2nd, A central portion, a whey-like fluid, containing a solution of saccharine and saline matters, and proteine compounds (albumen, fibrine, &c.). 3rd, A flaky sediment, of insoluble, inconvertible, or undigested matters, with the refuse or excrementitious portion of the bile; that is, its fat, resin, colouring matter, mucus, and salts. These contain a large proportion of carbon and hydrogen, whose elimination from the system is the grand office of the liver, constituting a function auxiliary to that of the lungs and skin.

P.—Does the same precipitation, the same separation of parts take place in the duodenum?

Dr.—It does virtually, although the movements of the parts tends to confuse the relative position of the decomposed constituents of the alimentary mass—in other words, to keep them in a state of mechanical admixture till absorption has taken place.

By these secretions, also, important chemical changes are effected. The alkali of the bile and pancreatic juice neutralises the acid chyme, and it acquires, besides the alkaline properties, the colour and bitterness of the bile. The pancreatic juice converts starchy matters into sugar. This in its turn is converted into lactic acid. A portion of the sugar is also converted into oily matter; in which state it is absorbed. Even out of the body portions of animal membrane, kept for some time in contact with water, acquire the property of converting large quantities of sugar into lactic acid.

No sugar is found in the blood, unless in the state of disease. I was going to remark, that the peculiar principles of the bile have also the power of precipitating the proteine compounds from their acid solutions. The bile also acts as an alkali on the oily matters and acids contained in the chyme, producing a sort of soapy or milky emulsion, which reduces the size of the oil globules and favours their absorption into the system. It is this oily or fatty matter of the food that gives the creamy colour and consistence to the alimentary mass in the small intestines—qualities which are not essential; for if fat be absent it is more pellucid. It is thick, glutinous, adhesive, to enable the mass to attach itself with more tenacity to the folds of the mucous membrane. As it passes along the bowels, the lacteals absorb *first* the creamy constituents. The venous capillaries absorb *secondly* the whey-like azotised fluid. The *third*, or excrementitious portion, descends into the lower bowel, to be cast out of the system.

We hear much of the indigestibility of oily or fatty matters, but they are not intended to be digested. Oil, like water, passed unchanged into the system, is absorbed "neat." As a fundamental constituent of the blood and most of the solids and fluids of the body, oil is as extensively diffused as water, and quite as important in its uses. It is conveyed unmodified into the adipose tissues. It is found in the *frame* or meshes of network constituting the basis of all

animal tissues. For its production from alimentary articles and its introduction into the economy very large provision is made. The utility of fat as an element of respiration has been demonstrated by Liebig. It is not an improbable conjecture, that the foundation element of structure, the primitive form of all living matter, the vital vesicle, or cell, with its nucleus, is a minute oil-globule enveloped in a membrane consisting of a thin layer of albumen, or other proteine substance.

Milk injected into the blood disappears after a time. Its globules become covered with an albuminous layer like a bladder. In this state they are analogous (perhaps identical) with the white globules of the blood. Most probably, after exposure to the vivifying principles of the atmosphere, they are transformed into red globules.

A very remarkable circumstance with regard to the lacteals is, that in a fasting animal they are filled with an alkaline liquid very analogous to lymph. *This alkaline lymph has a great affinity for oily matter.* The milky emulsion produced by an alkali and an oil, takes place in these vessels. After a meal in which fat abounds the lacteals are seen gorged with this rich fluid. When an excess of fatty matters is taken, the irritation it excited, perhaps the impediment to the absorption of azotised principles, induces a flow of bile into the stomach. This is often followed by headache and heaviness. It is highly probable, that the chyliferous vessels are formed chiefly, if not exclusively, with a view to the absorption of fatty matters, as it is known that the venous capillaries of the intestinal walls absorb the azotised fluids. I mentioned that foreign substances were met with in the spleen, in the portal veins, and in the liver, when no trace of them appeared in the thoracic duct, or in the general circulation.

P.—*Apropos* of fat, can you explain the digestibility of a bit of fat bacon in the stomach of a dyspeptic—a thing which puzzled Dr. Combe so much?

Dr.—Oil in the stomach increases the acidity of the gastric juice, that is, it increases its intensity, and thereby will proportionably promote the muscular movement of the organ. On this showing, then, a moderate quantity of a fatty substance will facilitate digestion. Even with dyspeptics there is a strong instinct and relish for oily things *up to a certain point.* They must be used sparingly, however, for it is playing with edge tools.

The gases evolved in the stomach and intestines, are azote, carbonic acid, carburetted hydrogen, and occasionally sulphuretted hydrogen. A large quantity of atmospheric air is swallowed with the food.

THE LIVER, I have already explained, is a great filter, a contrivance to receive and purify the "twice-tainted" blood of the abdominal viscera before it reaches the heart.

Bile in the intestines is indispensable to the due performance of digestion. Obstruction of the biliary passages disorders the digestive actions, interferes with the peristaltic movements of the bowels, produces insufficient nourishment, and is always attended with clayey evacuations.

P.—Why is not the bile secreted only when needed, as in the case of the other secretions, as the saliva and gastric juice, tears, &c.

DR.—That the fact is the reverse, only proves that the liver is a great excreting, purifying organ, whose function may not cease for even a short time without compromising the health or life of the animal. But as man's alimentary wants are only occasionally, and at intervals supplied, a reservoir (a gall-bladder) became necessary, wherein to retain the product till it could most profitably be discharged into the alimentary canal, and so serve valuable collateral ends in the economy. The bile is till then wisely reserved. For the same reason it is arranged that the amount of blood in the portal system is greatest at the time precisely when the secretion of bile is most needed. This increased supply is derived from the augmented circulation of the visceral blood, and from the increased quantity of watery fluids absorbed.

The propulsion of the food along the bowels is a result in consequence of reflex action.

The stimulus of the ingesta, that is, the contact of the mass of the food, and the excitant secretions mingled with it, call into action the muscular coat of the bowels, and propel the mass along. The excessive contraction of the fibres from above downwards, determines the propulsion of the fluid mass in a series of wave-like movements. Its course is retarded by the projecting semilunar folds of the mucous membrane. In this course, the fluid nutritious portions of the food are gradually absorbed, and the mass in consequence assumes more and more consistence.

The phenomena of endosmose and exosmose operate in the intestinal canal, and explain venous absorption.

I have described the course of the *lacteals*, and referred to the vitalising function they perform. It is here evidently that the processes of animalisation commence, and probably higher depurating changes are effected. Crude or uncomformable elements, that had escaped the other guards, are probably strained off into the venous system, and made fit for discharge by the lungs or other outlets. The innumerable intercommunicating points of the lacteals, lymphatics, and veins, afford great facilities for the reception and discharge of such elements as may be unfit to circulate in the vital current. By the time the chyle reaches the thoracic duct its intrinsic vitality is shown in the organised globules which appear. But it is still pale, or slightly pink only in colour. All that it requires is thorough mixing in the heart with the old blood (for nature introduces no vivifying principles concentrated), and the final aërating and electrifying process of the lungs. The chyle enters the left subclavian vein near the heart, mingles with the venous blood, and flows into the right auricle. It thence passes into the right ventricle, whence it is propelled into the lungs, through the pulmonary artery. Here the last touch of vitality is imparted.

Thus the grand nutritive circle is completed, the blood-making process begun in the *mouth* being perfected in the *lungs*. There now remains the last function of the alimentary canal, the process of fæcation. Its object is to carry out of the body such parts of its *debris* (or used up particles) as are unfit or unable to pass by other outlets; to carry out such in the shape of elements separated from the blood in the intestines, in the excretions of its glands and follicles, in the unused residue of the bile, together with the innutritious, unabsorbed, or undigested parts of the food. The excrementitious portions of our diet, vegetable and animal, are the woody fibres of vegetables and the walls of vegetable cells, whose contents have been extracted; fragments of tendon, ligament, bone, various inorganic constituents; animal *debris*, or products of corporeal decomposition; the colouring matter of the bile, epithelium scales, and mucous corpuscles, with various saline particles directly excreted. For example, there is a copious deposit of the earthy phosphates (those of lime and magnesia), because these are insoluble. In the urine, on the other hand, the alkaline phosphates (those of potash and soda), being soluble in water, find their vent.

Alimentary matters become acid in the colon, as at the commencement of digestion. The gases also are altered. We find pure hydrogen in the small intestines, and in the larger the more potent carburetted and sulphuretted hydrogen. The feculent character is assumed only when the mass has passed out of the small intestines into the large bowel. Here the secretions of the thickly studded glands are quite *sui generis*, an elimination, as it were, of putrescible matters in the blood, by the only outlet nature could appropriate to the purpose with comfort and satisfaction to the individual.

The colon is still abundantly supplied with absorbents. As the alimentary matters advance, their fluid portion is gradually absorbed, so that it becomes more and more solid; when it reaches the *rectum* it is almost dry.

Here the provision I have alluded to is made for its accumulation, for its retention by the contraction of the sphincter. When this accumulation reaches a certain limit, the specific irritability of the bowel is called forth, and a *reflex action* results, which ends in its expulsion. The will can control this effort, either to avert or to second it. An effort of the will releases the sphincter muscles, and excites the consentaneous descent of the diaphragm and contractions of the abdominal muscles, by whose co-operation the bowel is emptied. So that the first and last acts of the digestive functions—the reception of the food into the economy, and the final expulsion of its non-nutrient portions—are attended with consciousness, and placed under the control of the will. The main and essential parts of alimentation being under the dominion of the organic system, alike removed from consciousness and volition.

PURIFICATION OF THE BLOOD. When explaining any matter, it is well to strike out its practical lessons, whether they be moral or material in their point of view. The circulation of the blood, by means of arteries and veins, the whole means and apparatus already described, of replenishing the exhaustion of the body, of replacing its waste, and of straining off its impurities, excels as a whole, for vital convenience and mechanical contrivance, all other simply *organic* apparatus. I will explain the grounds of this belief.

To answer the ends of the animal system, blood must either be renovated in its properties, or thrown out. The latter alternative would not answer in itself, nor if it could, would it comport with that economy of material and of

power, which seems the rule of all the Divine contrivance. Blood entirely new made, at each round of the circulation, could only be accomplished at a *ruinous expense* of apparatus, of material, and of labour, and would require, in fact, alimentary supplies quite out of the question, in short, would after all fail of its end, because too stimulating to the animal fabric. Such perpetually new blood, if it could be made, would be too stimulating to the animal structure. It would speedily exhaust and extinguish life altogether. The vital stimuli that sustain all organised fabrics are afforded in only *a largely diluted form*. Even the vitalising air, so momentarily necessary to existence, is yet *largely diluted before coming in contact with the vital structures*. *Six* parts of foul, or partly used air, remain in the lungs, for *one* part of fresh inhaled at each breath. In the same way, by the same law, the blood is not all appropriated each round of the circulation. The arterial capillaries, indeed, largely abstract its solid materials, and exhaust its vital properties, for the necessary purposes of nutrition, secretion, exhalation, &c. As the *waste*, then, is limited and gradual, so must the supply be. The other and only mode left to nature, is the economy by which venous blood is restored to its arterial character, its impurities eliminated, and its waste replaced. In this way the *old* blood is virtually *renovated* at each round of the circulation, and made fit for all the purposes of vital replenishment and structural rebuilding,

And so, it is clear, answers all the ends of blood, that could be each time made anew; that which has been *spent*, drained, and impoverished—which is unfitted to supply the waste of the system, and is loaded with the *debris*, and effete matters of the system, received at all points of the returning circuit—this blood, so spent, so loaded, so impure, comes to the grand central organs to receive the tribute of the new blood, which requires there to be intimately mixed with the old, and thence both to be exposed to the vivifying influences of the atmosphere in the lungs.

The heart is placed where it is for the purpose of *churning up and intimately mixing* the old blood with the new. The force-pump action of the heart is only part of its function—that for the other part of its work it must be considered a grand organ of admixture. It is quite an untenable, an unlikely hypothesis, that the thick walls of the *right* side of the heart are for the mere purpose of propelling the blood through the small circuit of the lungs. At this rate the

walls of the *left* side should be five or six times thicker than they are, as having five or six times the amount and distance of hydraulic apparatus to move. But so far as the propulsion of the blood *by the heart* through the lungs is concerned, it would be easy to show, on principles already explained, that the actions taking place between the air and the capillaries of the lungs, would of themselves insure, at least, the free course of the blood into the lungs. This last act is, perhaps, the most important of life's processes. Without it the vital actions would instantly languish, the circulation would come to a stand in a very few minutes—animal sensibility, consciousness, and voluntary power would be abolished; and shortly even the functions of organic or vegetative life would cease. The want of food produces the same effects, much more slowly indeed, but not less inevitably. Under such circumstances, the waste of the economy is drawn from its own tissues—a store that may last for days, weeks, or months, according to the kind, condition, and health of the animal. Thus you see clearly the necessity for constant renovation of venous blood, by constant supplies of food from within, and of air and electricity from without.

I will now recapitulate briefly the leading facts of the digestive process, so that you may have concentred the substance of our more discursive conversations.

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1. The alimentary canal, as it has been shown, in its true types, is a simple invertion of the exterior surface of the body. The lining of such passages must necessarily inclose all the vital viscera. Matters in this canal, therefore, are virtually *exterior* to the true vital seats and boundaries—to the great organising, transmuting, or assimilating apparatus—as much so as if they were laid simply in contact with the skin; as much so, in fact, as a train in a tunnel is, to all intents and purposes, *exterior* to the strata of rocks, the beds of earth, the veins of ore, and the organic remains through which that tunnel may be bored. Food in such a cavity, it is then clear, has not yet come within the sphere of the vitalising apparatus and operations. The change effected in this part of the economy is merely *preparatory*—simply *chemical*, not *vital*. Analogy, *a priori* arguments, and actual experiments on artificial digestion, all prove this. The change effected is no other, neither more nor less, than

a simple solution, and new combinations, of the nutrient principles of the food.

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2. *Digestion* can only be called a *vital* process in so far as its chief agents, the salivary, gastric, biliary, and pancreatic secretions, are products of the *living* tissues; and, inasmuch as the muscular movements and animal temperature that thereto contribute, are the result of vital properties and operations.

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3. The gastric juice acts on alimentary matters in a manner entirely and exactly conformable to the laws of chemical solution—that is, to the *extent to which it can saturate.* This saturation is aided by minute division of the matters to be dissolved; by thorough contact of the solvent fluid with its particles; and by elevation of temperature;—all which conditions are wonderfully secured by the apparatus nature has provided in her living laboratory.

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4. The solution of alimentary matters in gastric juice out of the stomach is as perfect as the natural digestion, only it requires a *longer* time. This is not surprising, when the disadvantages of the artificial experiment are considered—that is, the difficulty of combining several conditions that influence the chemical action of food in the living stomach, as the absence of the peculiar motions of the stomach, the failure of constant fresh additions of the solvent, and the want of the removal of the dissolved portions. In the natural process, the external layer of chyme is removed as fast as it is formed, which prepares the way for the action on the layer beneath. These drawbacks in the artificial process must, of course, materially interfere with both its speed and perfection. But when allowance is made for these defects, the results are identical.

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5. *Digestion*, then, properly and philosophically viewed, *is a purely physical function.* Its object is merely to modify the physical condition of the alimentary matters; to reduce, dissolve, and dilute them, to fit them for fresh chemical arrangements of their elements, and for ultimate absorption

into the living system, so that by the real vitalising and organising processes there taking place, it may become *assimilated*, make one with the living solids and fluids, and part and parcel of animal structure. *Digestion*, in this view of it, is then a beautiful and beneficent provision of animal existence to meet the requirements of the great law of general physiology, formerly laid down, viz., that no nutritious matters can nourish or be absorbed unless previously reduced to a fluid state.

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6. There is a perfect analogy between the absorption and elaboration of the sap of plants, and those of the nutrient juices of animals. As the sap *ascends* from the roots, it is a crude fluid at first, but gradually acquires sweetness, acidity, lime, potass, sugar, mucus, albumen, an azotised substance like gluten. But it is only after they have been subjected to the vivifying oxygen and electricity of the atmosphere, by means of the stomata (pores) of the leaf (lungs), that the nutrient fluids receive the crowning act of elaboration, the true vitalising influence, and become fit for *the deposition of the characteristic products of the vegetable kingdom*. These facts significantly point out to us, if we rightly read the analogy, what is the real function of the alimentary canal of animals, and what are the vital processes that subsequently take place in the absorbent and aërating apparatus.

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7. *The alimentary matters* contained in the stomach and intestines are tantamount to the nutrient soil of plants, and hold precisely the same relations to the absorbents of the animal, as *the fluids of the soil to the roots of the plant*. The true idea and office of an alimentary canal, then, is that of a cavity to contain this soil, wherein to dissolve, dilute, and modify the alimentary matters; to strain off their impurities, to separate the excrementitious from the nutritious portions; a receptacle, in short, in which the nutrient elements may be prepared easily to pass into the vital system, so as by the subsequent organising processes then undergone, it may be fitted for incorporation with the living structure. Into this soil, the roots (the absorbents) of the animal strike. Hence, in the course of its passage into the system are elaborated by the secretory apparatus, the mate-

rials that go to build up structure, to replenish exhaustion, to repair waste. In this way, the plant immovably fixed to the soil, and the animal moving about from place to place, have their suckers continually in contact with their nutrient juices.

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8. With the same provident care and beneficence, a fixed relation is constituted between the nutrient principles contained in the food, and those of the solids and fluids of animals. Their chemical elements and their proximate principles, are identically the same. As all the varieties of corporeal structure reduce themselves to a few primary forms or elements of matter, so all the varieties of food, vegetable and animal, how heterogeneous soever their constituents, their consistency and their conformation, are reducible on ultimate analysis into the same *organic* principles. These are albumen, fibrine, caseine, &c., with the inorganic substances, soda, potass, lime, magnesia, sulphur, iron, phosphorus, &c., and they are all found precisely in the same relative proportions, the latter ingredients to the former, as they occur in animal structures. The transmutation of these materials into the blood and tissues of the animal, constitutes the function of *nutrition or assimilation*.

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9. The special provisions of the animal economy, whereby the dead crude alimentary matters are gradually approximated to the nature, and finally converted into the substances of the living fabric, are as follows :—

1st.—*The solvent process*—digestion proper, or the mechanical and chemical function of the alimentary canal, the preparation of the materials for the ulterior stages of blood-making and structure-building. In short, the exclusive end, the real function of digestion is *decomposition*, not in the sense of destruction, but the separation of the dietetic articles from their combinations into their elementary principles.

2nd. *The filtering process* of the bowels, liver, kidneys, &c.

3rd. *The mixing process* of the old and new blood in the powerful *churn of the heart*. This, of itself, is a step higher in the vitalising of the aliment.

4th. The entire animalisation of the nutrient principles is effected in the lungs by contact with the vivifying oxygen

and electricity of the atmosphere. Up to this point the new blood can scarcely be said to be alive, and the venous blood is, for all active purposes in the economy dead, at least *wasted*, *spent*, and *mortally poisoned*. This concluding process, therefore, is the perfecting act of the vitalising series, the crown and completion of the whole.

5th. The act of *nutrition* or *assimilation*, in its largest sense, consists in the amalgamation of the materials so formed with the living structure, and the separation or deposition from the blood of those elementary constituents of each tissue which their growth or decay may require. By a peculiar vital endowment of each, by a primary law of its constitution, each appropriates from the common pabulum or store-house (*the blood*) those ingredients, and those only, which its composition requires. In consequence of this vital affinity of each tissue for its own constituents, and for none other, it is brought about that the same nutrient source is made to yield with undeviating accuracy, and just at the time needed, and in the measure needed—here brain, there bone; here marrow, there muscle; here membrane, there mucus; here hair, there horn; here nerve, there nail; here tear, there tendon. *This is the wondrous self-reparative power of living organisms*, and the secret and the source of their continued existence, during a definite period, in the midst of disintegrating agencies, so powerful and so incessant in operation, that were these counteracting processes suspended but for a few hours, the death of the structure would be inevitable. Thus, by a mechanism the simplest in its parts, yet the most consummate in contrivance, the development of animal structures is provided for, their waste renewed, their exhaustion replenished, the relaxed spring of vital properties or functional powers wound up, and all *ab intra*, all silently, unconsciously, involuntarily, a daily, hourly, momentary process, till "the silver cord of life is loosened," and "the golden bowl broken at the fountain."

THE SCIENTIFIC PRINCIPLES OF DIET AND REGIMEN:

EMBRACING THE APPLICATIONS

OF MODERN PHYSIOLOGY AND ANIMAL CHEMISTRY

TO HUMAN NUTRITION.

CONVERSATION XLIV.—*The chemical elements of alimentary substances the same as those entering into the structures of the body—Carbon, hydrogen, oxygen, nitrogen, phosphorus, sulphur, iron, chlorine, soda, lime, magnesia, potash—The (simple) chemical elements of food—Alimentary principles—Compound dietetic substances.*

DR.—In this new department of our discussions, I am about to unfold to you the nature and effects of those modifying influences of the external world, that are continually operating upon the living organism, and calling forth its reactionary powers for good or for evil, according as they are well or ill regulated, and according as they are normal or abnormal, in the kind and degree of the organic stimulus they afford. On this is founded the science of HYGIENE, that whose object is to teach us how to regulate this corporeal reaction by laying down fixed principles or certain rules for the employment of each "modificateur." For the present we shall chiefly confine our conversation to some of the facts and questions that I think will be most interesting to you, arising out of that comprehensive and fertile field of inquiry. And to begin at the beginning here, as it is proper to do in all scientific expositions, I shall treat, in the first place, of the *chemical elements* of foods.

P.—Has the living body the power of forming its own elements, or constructing its tissues, its component parts, by the conversion of one elementary substance into another?

DR.—A very pertinent question. I reply unequivocally, that it has not this power. No transmutation of elements is possible by animal organisms. The elements of which the body of an animal is composed must be derived, *ab externo*; they exist in the elements of its foods, wrapped up (if you like the phrase) in the alimentary principles.

The chemical elements of dietetic substances are our old familiar friends, carbon, hydrogen, oxygen, nitrogen, phosphorus, sulphur, iron, chlorine, soda, lime, magnesia, potass. The *diamond* is an instance of pure carbon. Carbon is an essential constituent of every organised structure, animal or vegetable, and therefore is a universal ingredient in food, remarkably provided by Nature for nascent organisms, in seeds, yoke of eggs, and milk.

The average quantity of carbon daily taken into the system, in the shape of food, Liebig estimates at a trifle above fifteen ounces, nearly one pound daily, for a robust, active, well-fed adult. Ten ounces, I should think, nearer the mark.

P.—How is this quantity of carbon consumed?

DR.—It is thrown out of the system by the lungs and the skin, in the form of carbonic acid. In other words, it is *oxidised*. This union of oxygen and carbon evolves heat, wherever effected. These chemical changes are the sources of animal temperature, as I before explained.

P.—But supposing that carbon is deficient in the food, or that food altogether is withheld, how is the animal heat maintained?

DR.—Not well of course. In that case, the fat of the body is consumed for fuel. The heat of the body and blood is uniform in all climates, 96°. But in cold climates, this is only maintained at a great expenditure of combustible matter. Hence the keener appetite and the grosser fare under these circumstances, that is, food replete with carbon and hydrogen, oils and fats, which contains from 66 to 80 per cent. of carbon. Twenty pounds of whale's blubber per day is not too great a consumption for an Esquimaux. OXYGEN is largely received into the system, and is the great vital stimulant, and the chief agent of all the changes that occur in natural bodies.

HYDROGEN forms a large element in alimentary principles. In many it is united with oxygen in the same proportions as in water. Thus sugar, starch, gum, &c., are hydrates of carbon. In others it is united with oxygen in a greater

ratio than is necessary to form water, as in citric and tartaric acids (dry). In a third class of alimentary principles, the hydrogen is in excess beyond the proportions in which it exists with oxygen in water. Of these the proteine compounds, fat, alcohol, &c., are instances. The oxidation of hydrogen, or its conversion into water, is one subsidiary source of animal heat.

NITROGEN, or AZOTE, is the alimentary element *par excellence*. It is an essential constituent of animal fabrics, and consequently of those nutrient materials Nature has provided for their development and nutrition, as in the albumen of the yolk of egg, and the caseine of milk. In short, whatever exacts the process of digestion, in order to its conversion into materials of assimilation, that is, into the respective *tissues* or kind of structure, whatever is so changed by the operations of the digestive apparatus is an azotised ingredient. Whatever is not so changed, whatever the gastric and other digestive juices (salivary and pancreatic) fail to act on otherwise than by way of forming an emulsion, as fatty and oily substances, whatever is absorbed *neat*, as water—these constituents of food are non-nitrogenous. They are let in among the organic apparatus, they everywhere pervade it, even an infinitessimal fat globule is supposed to constitute the nucleus of the primitive cell organism; but neither oil nor water are strictly capable of organisation—although constituting necessary materials and conditions of organic operations, and even contributing to the formation of adipose or fatty tissue. A large number of animal and vegetable substances used as food, contain no nitrogen. These constitute the *materials of respiration*, *the fuel for keeping up animal* heat, for feeding the living furnace. In contradistinction to these, Liebig calls the *azotised* substances, the *sanguineous* or *plastic* elements, those exclusively ministering to *nutrition*. With what limitations Liebig's doctrine is true, that nitrogenised foods alone nourish the tissues, I shall afterwards inquire. Many facts regarding the use of oily starchy foods, by natives of hot climates, who undergo great fatigue, and whose bodies must be proportionably wasted and renovated, as for example, Hindoo runners and palanquin bearers, are hardly reconcilable with this doctrine.

To proceed in our exposition of the chemical elements of food, as being identical with those of the body. SULPHUR is another of these. All the proteine compounds contain it.

It is sulphur which discolours the silver spoon in eating eggs. The evolution of sulphuretted hydrogen by decomposing organic substances proves its presence. The urine eliminates sulphates from the system. There is an alkaline sulphocyanide in the saliva. Hence the gold plates supporting artificial teeth become incrusted with a coating of metallic sulphuret. Sulphur is in the cereal grains, in peas, beans, almonds, nuts, turnips, cabbage, potatoes, mustard, &c.

PHOSPHORUS enters into animal tissues, and is an essential constituent of blood, flesh (albumen and fibrine), and bones. In all these it is combined with oxygen and lime. It is found in eggs and milk. It is a constituent of the brain and nervous matter, and of the sexual apparatus and fluids. Phosphorus abounds in fishes. Ammoniacal phosphate of magnesia is contained in the bran of flour. Raw sugar contains an earthy phosphate.

P.—IRON seems to me a curious ingredient of organised beings.

DR.—It is an essential constituent of our food. It is contained in small quantity in the ashes of both animals and vegetables, in yolk of eggs, in milk, and the blood corpuscles. The proper colour of the blood depends upon it. Traces of it are found in most vegetable foods.

CHLORINE is found in the blood and in some of the excretions, in combination with sodium (common salt); in the gastric juice it is combined with hydrogen, forming hydrochloric acid. In these shapes there is great consumption of chlorine. To meet the demand thus set up, perhaps, the instinct for salt in most animals exists. Salt contains sixty per cent. of chlorine. Of the alkaline and earthy constituents of animals and of foods, soda and potass, magnesia and lime, I need make no remarks. Subphosphate of lime is the chief basis of the bones. The same exists in muscle, nervous matter, the liver, &c.

Alimentary principles—Two grand divisions, azotised and non-azotised; or nutritive and respiratory elements.

P.—How do you define an alimentary principle?

DR.—It is the union of a given number of the chemical elements I have already told you of, and which forms a dietetic compound. Thus sugar and fat are composed of

three elements each. Water is composed of two: fibrine and albumen, of six elements each.

These alimentary principles have been variously arranged by medical writers. Dr. Prout, taking milk as nature's model food, as containing water, sugar, butter, and caseine (an albuminous substance), classed alimentary principles into four great groups,—the *aqueous*, the *saccharine*, the *oleaginous*, and the *albuminous*. But such arrangements are open to great objections. In the first place, they are inexact and unscientific. To arrange foods according to any predominant element in their composition, is to overlook, or to exclude from view, other elements of proportionate importance. Bread is something more than starchy food, meat something more than albuminous food, and nuts something more than oleaginous food. In the next place, they are of little utility in a practical work. Liebig's simple division of food into *azotised* and *non-azotised*, or those furnishing respectively the materials of nutrition and of respiration, will answer every practical and scientific end.

P.—I hear much of proteine and proteine compounds. What are they?

Dr.—Proteine is the common nutrient substance, or plastic element, constituting the common basis of fibrine, albumen, and caseine. I will now enumerate what are reckoned alimentary principles. First, then, the *azotised*, or what Liebig calls the sanguineous or plastic elements of nutrition. 1. Fibrine. 2. Albumen. 3. Caseine. These are identically the same, whether derived from the vegetable or animal kingdoms. 4. Gluten of wheat. 5. Gelatine. The three former of these are otherwise called *proteine compounds*, because one chemical principle is the basis of them. This was named *proteine* by its discoverer, Mulder. Any of these, dissolved in caustic potash, and then treated with acetic acid, precipitates proteine. These proteine compounds contain, besides small quantities of sulphur, phosphorus and salts.

The *non-azotised* or respiratory principles are: 1. Starch. 2. Sugar. 3. Oil and fatty matters 4. Gum. 5. Pectine, or vegetable jelly. 6. Acids. 7. Salts. Among the doubtful alimentary principles I place, 8. Woody matter. It belongs to this non-azotised list, rather as excrementitious than as respiratory material. 9. Alcohol.

P.—The identity of animal and vegetable fibrine, albumen, and caseine seems to me very wonderful.

Dr.—This is one of the facts we owe to the school of Liebig. Clearly the animal derives it from the vegetable. The animal does not *create* it, but *converts* it into its own organism. I shall enumerate these three grand nutrient principles as derived respectively from the animal and the vegetable kingdoms. They are simply modifications of each other.

Fibrine. 1. *Animal.* This is the basis of muscular fibre—the lean of meat—flesh. Divest the clot of blood of its colouring matter, and you have pure fibrine. Alone it is incapable of supporting life. 2. *Vegetable.* Fibrine most abounds in the cereal grains, wheat, rye, barley, oats, maize, rice, and in the juice of grapes. It exists in carrots, turnips, and beet root.

Albumen. 1. Animal, instanced in the white of egg and serum of blood. It exists solid in flesh. It is the chief constituent of the blood corpuscles. Albumen, although the basis of all animal tissues, will not alone nourish. Animals will die rather than take it beyond a few days. 2. *Vegetable albumen* is an ingredient of the farinaceous seeds. It abounds in oily seeds, as almonds, nuts, and in most vegetable juices. Vegetable albumen differs from vegetable fibrine in being soluble in water. Gastric juice coagulates liquid albumen, and then dissolves the coagula.

Caseine. 1. Animal. This is the curd of milk. You might call it the cheesy principle. It is highly nutritious. It is the basis of the tissues of the young mammal. It contains, in the most soluble form, a much larger proportion of the earth of bones than blood. 2. *Vegetable* caseine has been named *legumine*, as chiefly found in leguminous seeds, as peas, beans, lentils. It exists with albumen in oily nuts. It is soluble in water.

P.—Will you explain to me the nature of GLUTEN?

Dr.—By washing the *dough* of wheat with a stream of water, you remove the vegetable albumen, sugar, starch, and gum—the stickey grey mass left is gluten. This is a highly nutritious substance, and alone, of immediate organic principles, suffices for the perfect nutrition of animals. To this principle is owing the highly nutritious power of wheat flour. The predominance of this viscid principle in the wheats of the South and of Egypt, renders them peculiarly fitted for the manufacture of *macaroni* and other pastes.

To the same is owing the lightness of wheaten bread, whose tenacious dough is puffed up into vesicles by the carbonic acid in the process of *panary fermentation*. The digestibility of bread depends much on the lightness or *sponginess* thus imparted—the gastric juice more readily entering and acting on substances of loosened texture.

P.—Do you call GELATINE an alimentary principle?

DR.—I am afraid a very slight one, although it contains nitrogen. It differs essentially in its chemical properties and composition from the proteine principles. The latter are identical with the flesh and blood of animals. Not so the gelatinous tissues. Their nutritive qualities differ as widely. The former become hard by boiling; the latter yields a jelly, which forms with water a tremulous mass—*gelatine*. *Collin* and *chondrine* are modifications of gelatine. *Glue*, *size*, and isinglass jelly are examples of the former. Skins, tendons, gristle, cellular tissue, serous membranes, and isinglass, are the sources of gelatine. These qualities, you will perceive, are closely allied to those characterising the proteine compounds, but there is one essential point of difference, and to which I attribute the worthlessness of gelatine as a nutritive substance, that is, the absence of sulphur, phosphorus, and the salts; without the *inorganic* constituents of animals, and the materials contained in their ashes, no substance is really and permanently nutrient.

P.—Well; you have exhausted the list of the azotised alimentary principles, will you give me a similar *aperçu* of the nature of the non-azotised?

DR.—Of these we named starch, or the *farinaceous* principle as holding the first rank. Sometimes it is called *fecula*: otherwise *amylum*. It exists very generally in plants, being found in seeds, fruits, roots, stems, tubercles, &c., &c., and is organised, consisting of small grains of various shapes. These grains are laminated, forming a series of concentric layers. Starch is a hydrate of carbon. To be rendered digestible the grains must be burst by cooking. Starch is a mild, easily digestible food. It is an essential article of food; to me it seems as a *diluent* or reducer of the more concentrated forms of nourishment. Thus there is an *instinct* to consume it in connexion with animal food, or with oily matters. In the process of digestion it is transformed into gum and sugar. Liebig holds that it is incapable of conversion into organised structure. It is a simple

element of respiration. This opinion requires some qualifying. Sago, arrowroot, tapioca, cassava, tous-les-mois, are varieties of starch.

SUGAR is as extensively diffused in vegetables as starch, but not so abundantly. It holds a subordinate place in the constituents of plants proportioned to its small amount in the sum total of other alimentary principles that constitute our daily nourishment. Sugar, like starch, is a *hydrate* of *carbon*. In its due proportion it is a most wholesome article of diet.

P.—So that its prohibition to children, who have a natural instinct for it, is more a motive of economy than a dictate of science?

DR.—Quite so. It is an article readily digested. The assertion of its injuring the teeth was the *ruse* of some economical housewife, thrown out *in terrorem*. The slaves fatten on it in the sugar season.

P.—But you will admit its too free use may be injurious in dyspepsia?

DR.—Of course, the *abuse* of any alimentary article will injure even the sound. In such case, it may form lactic acid in the stomach, or even oxalic acid, leading in time, under favouring circumstances to an oxalate of lime calculus.

P.—I shall be particularly interested in what you have to say of fat and oils, employed as foods.

DR.—Perhaps oleaginous dishes have for you a peculiar piquancy? They therefore excite your interest, and your alimentativeness.

Well, to the healthy man, whether it be instinct, or sophisticated appetite, the dishes in question are always savoury, and in moderation wholesome, if the *air* and *exercise* are such as to render them expedient. To thousands farinaceous matters are absolutely uneatable, unless with the seasoning of oil. I fully admit, however, that oils and fats are difficult of digestion, in the *popular* sense. Strictly oil, no more than water, is digested, or requires to be digested. Like water, oily matters, when sufficiently reduced and saponified by the pancreatic juice especially, are absorbent. As fat or oil is never organised, it needs no digestion. Its presence is necessary everywhere in the economy. Its use and its diffusion is co extensive with water; and, like water, it enters into the system unchanged. After it has performed its part the carbon from that source

alone forms a very valuable respiratory material. Hence, when it is received in superfluity above the present demands of the body, it is stored up (in the cells of the areolar tissue) as a reserve and resource when carbon is deficient in the food. The refractoriness of an excess of fat in the stomach is such as always to bring a flow of bile into that organ. This fact Dr. Beaumont substantiates in the case of San Martin. Hence the headachiness, or the positive bilious attacks supervening on the undue use of fat food. *I* attributed "the superior digestibility" of a bit of fat bacon (if such be the fact), which so much puzzled Dr. Combe and others, to the superior digestive efforts, both in the way of secretory and muscular action of the stomach, called forth by the presence of an amount of fat just refractory enough for that end, but not so refractory as to bring in a flux of bile. The process of *curing* does, however, alter the nature of fats, rendering them easier of transit than fresh fats. Few men, I contend, can have headache, or an approach to it, without at least a small portion of bile in the stomach. This phenomenon is very apt to take place under mental emotion, from the sympathy of the digestive apparatus with the brain. Ninety headaches in a hundred, I believe, are of this nature. These evils are increased by the acrid and irritating fatty acids, the indigestions from these matters evolve in the stomach. The neutralisation, or rather the absorption of the oil in starchy matters, such as potatoes or bread, is what alone renders the stomach at all tolerant of them in crowds of cases. Of course the more rancid oily matters are previously, the more likely are they to become noxious in the stomach. The reason why foods fried in fat or oil usually prove so refractory to weak stomachs, is that the high temperature alters the chemical constitution of the oils, developing acrid volatile acids. The very names of some of these, *hircic* and *caproic acids*, are enough. The *wise dyspeptic* will always avoid fat, under whatever disguises of cookery, whether in the shape of herrings, hashes, salmon or suet-dumplings, sprats or stews, melted butter or marrow puddings, chocolate, cocoa-milk, or cod-oil.

P.—But are not fats said to be nutritious?

Dr.—They are commonly regarded as such—if the deposition of fat in the system, and not the development of flesh, be the criterion of nourishment. The former object, however, is often a correct one, if there be a great deficiency or undue consumption of the fatty particles of the body, as in

tubercular diseases. It then becomes in fact, an important indication of treatment, and a valuable agent of cure. I need not here advert to Liebig's doctrine, that oils are incapable of transformation into organised textures—that they merely serve for respiration. The diet of the frozen regions well countenances this opinion.

P.—Is fat found in the blood, which I think it must be, from your statement of its going unchanged into the system?

Dr.—It does not exist certainly in the free state, yet we see globules of oil floating in the chyle of the lacteals. The nervous and adipose tissues receive their supplies of fat from the blood, and it must exist there—how combined is the point to be ascertained. Physiology or animal chemistry gives us nothing very precise on the subject, save the detection in the blood of *cholesterine*, *oleic*, and *margaric acids*, *seroline*, and *cerebrote* (cerebric acid)—all fatty substances.

P.—Well; what have you to say of the gummy principle of food?

Dr.—As a nutritive principle, not much. Like sugar and starch gum is a hydrate of carbon. It exists almost universally in plants. In some it exudes spontaneously, concreting on the stem its "tears." Its greatest use is as a demulcent in irritations of the mucous membranes.

Analogous in dietetic power is pectine or vegetable jelly. It is contained in most pulpy fruits, in currants, cherries, and berries of all sorts, plums, apples, pears, quinces, apricots, melons, oranges, lemons, tamarinds, &c.—and in greater abundance the riper the fruit is. Pectic acid is identical with pectine. Sugar promotes the solidification of both—a property the confectioner takes advantage of. Pectine is also a hydrate of carbon, with a surplus of oxygen. Acids require a word of comment; vegetable acid has been from time immemorial an ingredient in human diet, in the shape of vinegar, which is obtained from the acetous fermentation of wine. The acid contained in fruits and succulent herbs, is absolutely necessary for the preservation of health. The deprivation of these in long sea voyages was the cause of scurvy. Vinegar, however, let me guard you here, is no preservative against scurvy, and is very mischievous when habitually taken—if in excess, ruining the digestive apparatus. It is an approved receipt whereby to produce tuberculosis or consumption.

P.—In what sense is SALT an alimentary principle?

DR.—The saline components of our food are all essential to health and even life itself. Deprive beef or bread of their saline or inorganic constituents, and they would fail to support life. Common salt and earthy phosphates, salts of iron and of potash, are as indispensable ingredients in our daily diet as fibrine or albumen. Salt is more than a seasoning. The appetite for it is more than a habit—an instinct. Salt has undoubtedly much to do in keeping up the due constitution of the blood. From the salt of the blood the gastric juice derives its hydrochloric acid, and the bile its soda. Earthy phosphates are necessary in the food as the inorganic constituents of the bones. The excess of these matters above the wants of the economy is eliminated in the secretions.

P.—WOODY FIBRE you reckoned among the questionable alimentary principles.

DR.—It is a *negative* one at least—if there can be such a thing. There are certain *wood-breads*. The Laplanders use bark-bröd. It probably owes its nutritive power to starch contained in it. The woody fibre of our ordinary vegetables is indigestible in itself; but no doubt a cause or aid of digestion to the matters with which they are associated. They keep up a salutary stimulation of the alimentary tubes, and by their bulk contribute to the due distension of their coats, which is one condition of their efficient muscular action, probably also of their secretions. Thus the external covering of the farinaceous seeds, particularly the bran of wheat, the green matter of the leaves of plants, although all unassimilable matter, are valuable for excremental purposes. These present no small resource in cases of otherwise intractable dyspepsia. But the taste of mankind dictates in a reverse direction. Art is compelled to separate what nature has joined. And the *usual* consequences of consulting caprice or fashion rather than reason, are apparent in the stomachal discomforts now so unfortunately prevalent in society.

CONVERSATION XLV.—*Condiments and Seasonings—pepper, spices, salt, vinegar, and vegetable acids.*

P.—WILL you be so good as to explain your views of the nature and action of condiments, or the seasonings we take

with our food—how far they are necessary, how far they may be dispensed with?

Dr.—There is an intimate sympathetic relation between the gustatory impressions and the salivary and gastric secretions. A condition essential to the due digestion of any food is *that it be relished*. That which increases the agreeable flavour of foods, while it gratifies the palate, promotes assimilation. What is repugnant to taste, or smell, or sight, proves equally repugnant to the powers of the stomach, and fails to call forth the nutritive energies of the system. Now the virtue of condiments lies in their sapid, aromatic, or *tasty* principles. They are dynamic agents, if you like. Many of them contain pungent volatile oils. These stimulate the organs of smell and of taste, as well as the glands, nerves, and blood-vessels of the mouth and stomach, augmenting the digestive secretions, circulation, and movements, promoting assimilation, and accomplishing at the same time a general physiological stimulation, as shown in the feeling of *bien être* of ease, and exhilaration they diffuse over the economy. They often also correct injurious qualities of the food with which they are taken. Whether in consequence of their stimulating the nervous centres, or by being absorbed into the circulation (not so probable), condiments often call up a powerful re-action from the centre to the surface.

P.—It would seem, then, that the dietetic habits of peoples and nations are not the result of mere accident, or senseless fashion, but lie deeper, originate, in fact, in grand laws of the living organism. They are adopted because found innately suitable to certain felt wants, or instincts of our bodies.

Dr.—How happy should we be, could we always listen, attend to, and duly interpret this corporeal voice—the expressed wants of our organisms.

P.—It is not, then, for any elements of nourishment they contain in themselves, that condiments are valuable, but that they contribute to nourishment.

Dr.—No. They are a sort of *tipples* in their way, means of acting especially on the nervous life, and enabling us to intensify this at pleasure, to rouse up depressed corporeal power. But recollect, that their true use is always in connexion with food, that is, with the full and active state of the stomach, and only when such aid is necessary to be invoked, when digestion perhaps requires a *fillip*, or to be flogged up to due action. Otherwise, *on the empty stomach*,

in its passive state, they irritate rather than produce any healthy secretory efforts.

P.—Do not some physiologists condemn the *use* of common salt?

Dr.—I never heard of but one that did, and he on insufficient grounds.

P.—The universal relish and desire for salt amounts to an instinct.

Dr.—It does, and is an unperverted instinct too. Salt may be called an essential of life, and is in universal use. It is, in fact, a true alimentary substance, as requisite to the composition of the solids and fluids as albumen, fibrine, fat, sulphur, or phosphorus. Salt furnishes the hydrochloric acid, and the soda of our secretions and tissues, in which they exist free, or combined with various bases. The alkaline constitution of the blood and bile depends upon its soda. Salt even plays a part in the phenomena of respiration. According to Liebig, it converts into phosphate of soda, a part of the phosphate of potash, which exists in the blood, either directly introduced by the food or resorbed from the tissues. Now, of all other salts, the phosphate of soda is the best fitted for the absorption and elimination of carbonic acid. A French physiologist asserts that salt forms in the alimentary canal soluble compounds with certain dietetic substances, thus facilitating the absorption of the latter.

P.—According to your *dynamic* doctrine of the action of condiments, this much is clear at least, that the stimulation of the mucous and salivary secretions of the mouth are propagated to the stomach, whose capillary circulation, gastric juices, and muscular movements are all thereby increased.

Dr.—Precisely so. There is more perfect digestion, and consequently a greater amount of nutritive materials elaborated from the same quantity of food. In this way, the use of salt has been clearly proved to conduce to the fattening of cattle.

P.—What is the action of vinegar and vegetable acids?

Dr.—Introduced in small quantities they have evidently an antiseptic tendency, they maintain the due constitution of the blood. They excite the mucous and glandular secretions, provoke the appetite, appease thirst, aid the solvent power of the gastric juice, and quicken the peristaltic movements of the bowels. They have an attenuating effect on viscid or mucilaginous substances, and therefore aid their digestibility.

P.—But condiments, I suppose, like everything else, are liable to abuse, and must be guarded from abuse to be salutary, to earn a good name, and to shield themselves from the assaults of the philanthropic knight-errants, the would-be scientific Quixotes who can tilt against all *abuses*.

Dr.—Of course. Too concentrated, or in excessive dose, they appear to dry up the gastric secretions. Their abuse weakens the digestion, deranges their sensibility, and perverts nutrition. Hence the general emaciation the excessive use of vinegar especially will produce.

P.—*Sugar*, as a seasoning, is now become almost as indispensable a necessary of life as *salt*.

Dr.—It is as universally agreeable, although of savour quite opposite, and it is suitable to every age, constitution, and climate. By exciting abundant secretions and stimulating the stomach, it facilitates digestion. It furnishes a copious chyle, and favours the formation of fat and bile.

P.—*Apropos* of fat, or oily matter, is not that a great condiment?

Dr.—This is independent of its utility and action as an element of respiration. Hence, as used in southern climates, where oil is not demanded as an animal fuel, it serves to correct the pungent qualities of the spices and acids abounding in the diet, as well as to give the necessary smoothness, softness, and pliability to the internal textures generally, and mucous surfaces in particular, which would otherwise acquire a harshness and dryness from the excessive waste of the frame in perspirations.

P.—Will you specify the cases wherein the use of condiments is expedient.

Dr.—Their use is relative; it depends on circumstances. 1st. In the case of insipid food, in tasteless farinaceous or mucilaginous vegetables, in white flesh, they are calculated often to double both their reparative power and digestibility. 2nd. Climates and localities decide their use. The native of the tropics excites his languid digestive functions by stimulating spices and condiments. In fact, he could not live without them, so much is the energy of the vital centres exhausted by the excessive activity of his cutaneous functions. I admit that the great abuse of these and other stimulants in hot climates, and the general disregard of physiological laws, the fast living of "the burning children of passion," as they are called, to a great extent abridges the natural term of their existence. In cold humid regions,

and in the frozen north, oils, and fats, and alcohol, are the stimulants chiefly craved for. *Hot* tea and coffee are, in such circumstances, truly condimentary stimulants to the digestive mucous engorged from languid cutaneous action. In the 3rd place, the use of condiments is relative to individual conditions, to age, sex, constitution, health, habits. As a general rule, high seasonings are improper for the bilious and the nervous, but are sometimes suitable for lymphatic subjects, and for old men. In giving you my parting advice on this subject, I should say, be sparing of condiments. dispense with them as much as possible, only use them when really required. They must be avoided in anything but the most minim doses by the delicate and the valetudinarian. To the *dyspeptic* they are particularly injurious.

The digestibility of Foods.

P.—How do you explain the contradiction and disagreements of authors as to the digestibility of food.

Dr.—This is referrible, in the first place, to the term or thing, digestibility, being ill-defined in their minds. In the next place, to faulty experiments; and, in the third place, to not duly taking into account the circumstances which hasten or retard digestion.

We must proceed by the way of *exclusion*, to show what digestion is *not*. Some writers understand by digestibility *the time the food remains in the stomach*, which is a very fallacious test. For substances naturally indigestible, and whatever contains little nutriment are by a sort of instinct of the stomach first evacuated. For example, Dr. Beaumont infers that gelatine is easily digestible, because that after an hour it had disappeared from the stomach. The experiments of Tiedemann and Gmelin, as well as of Blondlet, are opposed to Dr Beaumont's inference. In fact, the stomach made speed to get quit of it, as a thing useless for vital purposes, and therefore its presence in the vital laboratory an act of intrusion. Others understand by digestibility *the facility with which food dissolves in the gastric juice*. *Fat* is on this account considered very indigestible. But, in fact, the gastric juice has no action on oily matters at all. They remain long in the stomach and are long in being absorbed. They are not intended to be digested, for they are not digestible. They do not need digestion. (Oil and water, I have before shown, are of large requisition in the corporeal struc-

tures; in fact, constitute their greater proportion; but they can scarcely be said to be *vitalised.*) Another contends that digestibility *is the relation that exists between the nature of the food and that of the gastric juice, and therefore the property which any specific alimentary article has of yielding most rapidly and easily the sum of its chylifiable elements.* This is Trousseau's idea: and I believe it comes as near the truth as any other. It expresses the relation that exists between the properties of an aliment and the actual condition of the organism, of which the index in this case will be the power of the stomach's secretions and actions.

P.—A varying relation of course in man's present artificial state?

Dr.—Yes, and it is the object of dietetic courses of regimen, of physic, and physicians, to prevent or diminish this variation, so that the body's relation to the food shall be as uniform as possible. Thus what agrees to-day will not disagree to-morrow—the same food always exciting the same assimilative power.

P.—I should think the experimentation on animals as well as on man, with a view to elicit the relative digestibility of various kinds of food, to be one of the most difficult of researches?

Dr.—Yes. There is the different natures of the brutes, as well as their habits and natural dietetic repugnances, must be taken into account; in man, regard must be had to temper, disposition, &c.; and in both reference must be made to age, idiosyncrasy, the sound or morbid state of the digestive functions, the general health, the corporeal conditions, whether of exercise or rest, the amount of excretory waste, the duration of the previous fast, the greater or lesser nutrient character of the diet the man or animal had been accustomed to, climate, heat, and hygrometric state of the atmosphere. It is the want of the accurate precision of all these circumstances, in fact, the entire absence of accurate information on any of these heads, that greatly detract from the value and conclusiveness of Dr. Beaumont's experiments on San Martin. Besides, most experimenters labour under the difficulty of experimenting on animals placed more or less in unnatural conditions.

P.—Well, what circumstances most affect the digestibility of foods?

Dr.—They may be divided into two classes. Those relating to the alimentary substances themselves, and those re-

lating to the individual. With respect to the first class, DIGESTIBILITY is essentially connected with the following conditions:—

1st. The preservation, as far as possible, of the natural form or primitive constitution of the food. 2nd. A certain quantity of excrementitious or unassimilable matter—at once as a diluent, divider, and vehicle of the nutrient portions. 3rd. An aromatic, piquant, or stimulating principle, which excites the stomach-lining, the digestion, sensibilities, actions, and secretions, either by direct impression, or by sympathy with taste and smell. This imponderable, unweighable, and evanescent element is distributed in a great variety of foods. The flesh of beasts, and birds, and fishes, and of every different kind has each its own aroma: so of vegetable products. Upon the *ozmazome*, or aromatic principle developed in cooked animal foods, much of their nutritiveness and digestibility depends. The bran contains what may well be called the *ozmazome* of flour. White bread is deprived of this. Some foods are naturally more difficult of digestion than others. Vegetables are slower of digestion than flesh and farinaceæ. It may be laid down as a law that the less digestible any food is, or the smaller the quantity eaten, the more rapidly it makes its way out of the stomach. Crude vegetables rapidly make their way out of the healthy stomach, while other richer food remains. (*b*) Tenderness of fibre or minuteness of division, of solids whatever lessens the force of cohesion, which opposes itself to molecular changes. Violent exertion before death, for example, or incipient decomposition imparts tenderness to flesh. But lessened cohesion is not all. Young animals are more tender and soluble than the adult: yet the latter are more digestible. Liquid foods are less cohesive, but more indigestible, than solid foods. In this view thorough mastication and insalivation, promote digestibility. (*c*) Whatever is most grateful to the palate is, *cæteris paribus*, most manageable by the stomach. Hence the advantage of good cookery, it changes the organisation of the food: but does not alter its ultimate composition, and it lends flavours where they are absent, or heightens those that are defective. The circumstances in the individual which affect the digestibility of food are the states of mind and body—states of the passions—constitutional peculiarities—keenness of appetite—length of fast—the amount of waste produced by exercise, or by evacuations—the *heaviness* of the meal as respects both quantity and

quality—moderate exercise after a light meal, and repose after a full meal. The necessity, or non-necessity of calorification is a very modifying element.

P.—The *absolute* digestibility of foods, is then, indeterminable—is a chimera?

Dr.—So is the *relative* digestibility, because of the diversities of individual conditions, indeterminable also, save by an immense number of experiments. The personal experiments and experience of the physician must guide to a certain extent: but this to be qualified and corrected by the experience of others, universal experience, and the facts elicited by the researches of scientific investigators.

P.—What saith Dr. Beaumont's table on that subject?

Dr.—To that I refer you. But the statements cannot be fully relied on. They are not philosophically accurate, the modifying conditions of digestibility are not calculated in the experimental result. I give you Dr. Beaumont's results, as M. Trousseau has well summed them up: 1. The flesh of beasts is somewhat more difficult of digestion than that of birds; and fish easier of digestion than either: roasted meats are more digestible than fried or boiled. Beef is a little more digestible than mutton, and the latter than pork. Yet many persons with weak digestion can eat mutton with comfort, who suffer if they eat as much beef. 2. Common poultry is more digestible than game. 3. Fresh fish is more digestible than salted fish. 4. Milk food is more easily digested than any of the preceding, except fresh fish: boiled milk more easily than raw milk; cream than butter or cheese. 5. Broth or soup made from beef is as difficult of digestion as any of the meats under the first head. 6. The farinaceæ are as digestible as milk and fish. Bread is less easily digested than boiled rice (blanc mange) potatoes, &c. 7. Fresh (green) vegetables rank equal in digestibility with the flesh of birds. 8. Fruits are the most easily digestible of all.*

M. Blondlet followed Dr. Beaumont in experiments on dogs, with artificial gastric fistulæ. He studied the action of the gastric juice first on simple alimentary principles, and then on compound aliments, by two simultaneous methods, 1st, the natural stomach action itself; 2nd, with the same substances in gastric juice taken from the stomach of a dog, and placed in a bath of the temperature of the body. His results may be thus summed up:—

* "Thése du Concours d'Hygiène," p. 24. Paris, 1837.

I. The azotised proximate principles.—1st. *Fibrine:* natural digestion, one hour and a half; artificial, from two to three hours. 2nd. *Albumen*, white of egg, raw one hour and a half; coagulated from five to six hours: its artificial digestion lasted from three to twenty-four hours, according as the degree of division or compactness of the mass. 3rd. *Gluten* (from wheat), five hours and a half. 4th. *Caseine*, coagulated, three hours and a half, hardened by boiling, seven hours. 5th. *Gelatine is not coagulated by the gastric juice.* 7th. *Mucus*, in any form, is incapable of being acted on by the gastric juice.

II. The non-azotised proximate principles.—1st. *Fatty matters* pass the stomach without alteration: nor are they altered by the action of the gastric juice out of the stomach. The pancreatic juice forms an emulsion with them which facilitates their absorption. 3rd. *Pectine* (vegetable jelly) is simply dissolved. 4th. *Gum*, the same. 5th. *Sugar* is subject to the alcoholic and lactic fermentation. According to Blondlet it is not acted on by the gastric juice neither in the stomach nor out of it. It is apt to induce an influx of bile into the stomach; sugar favours the formation of bile and fat. 6th. *Fecula*, or *farinaceous matters*, crude, uncooked, and mixed with cold water, is simply suspended in the secretions of the stomach, its grains rest intact. 7th. *Lignine* (woody matter) and the envelopes of seeds and fruits, are totally unaffected by gastric juice. 8th. Resins, the same.

III. Compound aliments. 1st. *Cellular tissue* (areolar), that is, concreted albumen with gelatine, enclosed in a muslin bag, digested in the stomach of a dog in an hour and a half. 2nd. *Muscle* (flesh), (raw) digested in from four to five hours. Roasted meat, as well as raw meat, was attacked only on the surface layer by layer: while boiled meat, and veal, and chicken, and fish, being more spongy and permeable to the gastric juice, were more rapidly chymified. 3rd. *Fibrous tissue* is very refractory to the gastric juice, requiring *ten* hours to digest. 4th. *Cartilage* is more easily digested. 5th. Bones are easily digestible in the stomachs of the carnivora. Its organised part is dissolved like fibrous tissue. The calcareous matter simply falls away as powder, and constitutes the bulk of the excrement. 6th. *Parenchymatous tissues:* liver and lungs remained four hours in the stomach of dog; brain only two hours.

Milk is instantly coagulated in the stomach. The caseine

is precipitated involving a portion of butter with it. Another portion of the butter floats on the surface of the mass. The sugar remains dissolved in the serum. The caseine is slow and hard of digestion. Milk alone is not an aliment very easy to digest. It is only digested as a solid substance. The more compact and bulky the morsels of curd, the more difficult it is to digest. Therefore, milk is most digestible when associated with other food (as bread or potatoes,) which breaks up the curd into small masses by its interposition, and multiplies the surfaces of contact.

P.—You intimated that experimenters were apt to confound the quickness of the digestion of an aliment with the rapidity of its ejection from the stomach. Do you not think that such a mistake has often been committed by Dr. Beaumont? All praise to him for what he has taught us of new and useful on the subject of diet and digestion.

Dr.—Undoubtedly. You may solve many of the anomalies of his table by this consideration. In proportion as aliments are deficient in nutritive principles, they early discharge themselves from the stomach. This may be said of all fresh vegetables and fruits. The more highly nutritious substances, as beef and bread, remain in the stomach, until their entire elaboration. Much depends, as regards the early emptying of the stomach, on the quantity of food taken, as well as its quality. But it is a grand fallacy to consider the whole act of digestion accomplished in the stomach. I am quite convinced that a vital elaboration of what portions of the food has reached the cæcum unchanged, or nearly so, there undergoes further assimilative changes, so as to extract all the *pith* of the food that the wants of the economy demand. This is especially the case with succulent vegetables, as green peas, haricots, cauliflowers, cabbage, turnips, carrots, parsnips, salads, &c.

P.—Your doctrine, then, is, that the more nutrient matter any food contains, the more labour it exacts of the stomach, the longer it will remain there, and, if the patient be dyspeptic, the heavier it will feel, and *per contra*, the lighter a diet is, the less nutritive it is, the shorter time it remains in the stomach, and the less uneasiness it will produce to the dyspeptic. Hence I infer the *theory* of your practice in the treatment of stomach complaints is, tasking little the stomach, and less the energies of the system, so as to save the stomach elaborating unnecessary supplies; in fact, giving the organ as much rest as possible, compatible with intro-

ducing sufficient nourishment to enable the machine to work easily and comfortably.

Dr.—You have caught my idea. If we could nourish a man through his skin for a month, and give the poor jaded stomach, pylorus, and duodenum, *entire* rest during that time, it would suffice to cure maladies that will otherwise take a long time to remove. So, many incurable heart and lung diseases would get well soon, if we could find a substitute for the labour of these organs. The *brain* we can spare. Hence the imperative law in hygienic establishments such as these, to avoid any mental effort that excites.

P.—Does the body ever digest more than its real wants demand?

Dr.—I believe not as a general rule. I think Dr. Beaumont is quite right in his assertion that the amount of gastric juice secreted is the measure of the corporeal wants. *A priori*, I should infer such an arrangement, for the protection of the organism from the effects of excess, as we find placed other checks to excesses of other sorts. I think it will be found a sound principle, that the healthy body only appropriates that which is necessary for the reparation of its waste. The superfluity is a burden till eliminated *per vias naturales*. People who get gross, fat, and unwieldy, do not do so from excess of bone or muscle, but from excess of adipose tissue, that is, from the superfluity of *non-azotised* materials in their diets; fat, and oils, matters which once in the stomach, find their way into the circulation by simple absorption, without any digestive transformations. The excess of sugar and starch in the food is drained off in the shape of water, as any one may convince himself by living on rice, and drinking no fluid for twenty-four hours. In fact an excess of starch is not acted on by the digestive organs. It passes unchanged, or nearly so through the bowels. This explains the frequent and copious evacuations of vegetarians with great appetites. The carbon of the excess of sugar and starch is eliminated in the shape of bile.

P.—You hold then, that the albuminous or proteine compounds are alone chymified?

Dr.—I do. Mucus, resin, woody matter, oil, fat, even starch (crude), sugar, and liquid albumen, undergo no chymical changes by the gastric juice, but form with it a simple solution or emulsion, the same as in water; sugar is subject to the alcoholic and lactic fermentation.

The nutritive power of Foods. P.—I suppose the nutri-

tive power of an alimentary substance is represented by the amount of assimilable materials it contains?

Dr.—Yes; the more or less azotised (or nitrogenised) nature of its ingredients, is the sign and measure of its nutritive power. Azotized matter is the substratum of the organism; it, as it were, makes up its *weft and woof*. It also constitutes the essentially assimilable part of foods. Man's continued existence depends on the daily reception of as much nitrogenised matter as the wear and tear of his system daily expends or loses. It is an assumption, as yet uncontradicted by any positive fact, that man does *not* appropriate the atmospheric nitrogen, but only in the minutest proportion, and perhaps in exceptional cases. The Creator has appointed this element to be supplied in his diet. Plants elaborate the carbon, the oxygen, the hydrogen, the salts, &c., which enter into the diet of animals, so they also elaborate his nitrogen. The atmospheric nitrogen exists free as it does, not for man's direct use, but *for the direct appropriation of plants*. The substances, therefore, most replete with nitrogen, will be the nutrient aliments *par excellence*, provided they contain the due proportion of *salts* or *ashes;* so the proteine compounds (fibrine, albumen, caseine, gluten, legumine, vitelline, &c.) in which the nitrogenous element predominates, constitutes the bases of human nutrition. One of these nutritive principles abounds in all the aliments of men or higher animals. The relative amount, therefore, of neutral azotized matter in any article determines its suitability for repairing the waste or providing for the growth of the fabrics. There is thus, as you will perceive, an entire analogy or identity between the food necessary and destined for man, and the manures applicable to land under culture, manures whose value is in proportion to the amount of nitrogen and salts they contain.

P.—The existence, then, of nitrogen in an alimentary substance being the essential condition of its nutritive power, to ascertain the amount of immediate azotised principle is to determine its dietetic value?

Dr.—Mark, however, that the nutritive value of a food does not, in all cases, depend on the absolute amount of nitrogen it contains, *but on the quantity it yields to assimilation*. A highly albuminous substance may be hard of digestion, and not yield all its nutritive elements; a much less azotised product may be easy of digestion, and yield all its

azote, &c., hence be more nutritive than the other. You must then distinguish the fundamental elements of nutritive power in foods from the conditions which regulate its development in any individual.

P.—What may these conditions be explicitly?

Dr.—They are essentially the same as those which promote the digestibility of foods. 1st. Azotised food nourishes well and long only on condition of being, as much as possible, in its natural state, the original union and elaboration of its elements unchanged. Hence separate alimentary principles will not suffice for nourishment. Bad cookery often perverts good food in this and other ways. To present the living system with *chemical products* for substantial aliments, is giving it a stone for bread. Mutton, and the *proximate principles* which represent it, or make it up, are very different things. 2nd. Perfect digestion, the due extraction of nutrient matter, depends on a certain amount of bulk in the food. A certain proportion of non-azotised and non-nutritious matter is necessary to perfect nutrition and facile digestion, concentrated food is indigestible and innutritious. An innutritious or excrementitious portion of the food serves to break up the cohesion of the azotised and nutrient matters, or to develope their latent activity, and to expose a greater amount of their surface to contact with the absorbents of the intestinal track. A subordinate, but not less essential function of the woody or excrementitious part, is to maintain the peristaltic movements of the stomach and bowels. 3rd. Diversity and mixture of foods is a law of man and some animals. A rabbit fed exclusively with either wheat, barley, carrots, &c., will not live so long. If they be given together, or alternated, they answer perfectly. The mixture of meat augments not only the digestibility, but the nutritive power of bread. Animals fed exclusively on bread, presented starch throughout the whole length of the intestinal canal. When meat was added to it, the starch was only found at the end of the small intestines. 4thly. The sapid, odorous, or aromatic principles of the food. These, although infinitely minute and evanescent, determine a flow of blood and secretions, a vital orgasm and turgescence, which enables the stomach to react upon the food ingested, and to extract their assimilable principles.

P.—What are nutritive equivalents?

Dr.—They are numbers representing the comparative

nutritive power of dietetic substances, numbers expressing the quantities of each aliment that suffice to afford the same amount of reparative materials.

The foundation of varieties of regimen, or dietetic observances.

Dr.—All circumstances, bodily and mental, which modify the living organism, age, constitution, temperament, habits, exercise, or rest, diseased conditions, &c. &c.—All these infinitely modify the kind and amount of corporeal waste, as well as the effects of the food taken. Nutrition has its laws, as we have endeavoured to show, and their scientific application to the diversified circumstances of man, constitutes regimen. One person, for example, will draw more nourishment from a vegetable diet than from meat, which would over excite the digestive organs, and heat the system generally. Another cannot live without his allowance of animal food; his flesh wastes, his blood becomes watery, and there is no strength or spirit in him. One man cannot exceed his usual quantum of food without seriously deranging his health; another man lives by no rule, and commits all sorts of excesses with *apparent*, or comparative impunity.

P.—Well, what would you call a normal ration for a man?

Dr.—That is very hard to determine, so diverse is the condition, exercise or labour, habits and constitution of men. A Russian soldier's allowance is a pound of black bread per diem, with some oil. Our sailor's ration is about two pounds, bread and beef, and et ceteras. Cheyne assigns to a man of average stature, in good health, and taking moderate exercise, eight ounces of meat, and twelve ounces of bread or other vegetable nourishment; with sixteen ounces of fermented liquor. This is very near the mark. Sir John Sinclair reckons sixteen ounces of solid food, and thirty-six of liquid for sedentary people. The quality of the food determines greatly the quantity necessary. One pound of bread will nourish a man under light labour, who would otherwise eat five pounds of potatoes. A person living on apples would perhaps require ten pounds per diem. A ration of beef would permit an immense reduction of the farinaceous element in the diet. The principle is clear, that the corporeal *income* should be proportionate to the expenditure. The latter, of course, presents great fluctuations, according to causes acting on the organism, and modifying the vital functions. An instinctive feeling, emanating from the sto-

mach, suggests, both to man and beast, the fitting conduct relative to their food, although in the case of man these instincts are wofully perverted and de-naturalised. The sound man will find his surest dietetic guide in his sensations. Temperance is the grand rule. The just measure of food once obtained and pursued will be confirmed by habit. Nature suffices with little. Most people consume much more than the support of life demands; and infinite, unknown, are the mischiefs that arise from overcharged stomachs. The more one eats, the more one *would* eat, the more gluttonous one becomes. The high refinements of cookery, in this way, are particularly injurious; they overstimulate jaded organs of taste and smell, producing a factitious appetite, and overstretching the capacity of the stomach.

P.—What is the *body-conscience* doing all this time?

Dr.—That instinct of organic preservation cannot be entirely silenced, or seared. When its warnings are not heard or heeded, derangement of the health ensues, sooner or later, and more or less serious. The habit of excessive nourishment degenerates at length into a real need of the economy, and gives an undue preponderance both in size and activity to the digestive viscera.

P.—What are the morbid effects of a too profuse diet?

Dr.—They vary, of course. It does not create the sanguine temperament; but in such a temperament it produces venous plethora, piles, a disposition to active hæmorrhages and to cerebral congestions. The urine, the principal outlet of the azote of the system, evacuates an excessive proportion of solid materials: and all this is an unnecessary strain upon the kidneys, superinducing disease in structure so overworked. But, *at the best*, it becomes insufficient for eliminating all the azote received into the body through an excess of nourishment. This superfluity it allows to deposit itself in the shape of uric acid, the *materies morbi* of *gout, rheumatism, stone, and gravel.*

P.—How is it that many noted gormandisers do not get fat?

Dr.—Leanness is a frequent associate of gluttony. When the alimentary mass is greatly disproportional to the digestive ability, only so much as the actual wants of the economy demand is appropriated. The excess is eliminated in various ways, it makes exit usually by diarrhœa, or vomiting, after a painful stay in the stomach. Infants, by their facility of

vomiting easily, get rid of their excess of nourishment. Adults undergo the painful crisis of indigestion, announced by nasuea, hiccup, fetid eructations, headache, vomiting, with troubled respiration and general pallor, with fatigue and weariness of the limbs. Sometimes the pylorus yields, and allows passage—but not without *protest*—to the undigested mass, which irritates the intestinal mucous membrane, as it courses along, producing diarrhœa. The apoplectic, and those with tendency to inflammation, frequently go through this process once too often.

Obesity, or fatty or oily infiltration, is slow to exhibit itself in persons of the sanguine and nervous temperament, who eat to excess. But it quickly gains upon the lymphatic, in whom all the excess of food turns to fat: the belly first becomes prominent, then it extends to the face and neck, the limbs often retaining their original slenderness. The weight of the body increases, while its moving power diminishes, by the atrophy of its muscular fibres. The mental powers diminish by the excessive stimulation of an excessive nutrition, working at high pressure the powers of plastic life.

P.—So often is found true Shakespeare's remark—

> "Fat paunches make lean pates, and dainty bits
> Make fat the sides, but banker out the wits."

What is the influence of indigestion in the production of disease?

Dr.—Great; provoked often, and especially when accompanied with the abuse of alcoholic liquors. There is no end to that subject. I will develope this at full length, and in some novel points of view to you another day.

P.—Leaving for the meantime the discussion of the dietetic character, or adaptation of man—that is, the relation that exists between the quality of his food and his digestive capabilities, will you be pleased to give me some general views of regimen, of the effects and applications of vegetable diet exclusively; of its modification, a milk diet, and then of what is more properly termed a mixed diet?

Dr.—The nourishment of the healthy human being varies with the circumstances and epochs of life. A well appointed diet, especially in disease, is of infinite importance—indeed it cannot be over-rated or over-stated. But the diet, either of the healthy or the sick, cannot be determined by any absolute rule or prescription; it is entirely a matter of relation

to particular cases and particular occasions. By varying the nature of the food, and its mode of preparation, and its times of taking, we can meet many wants of the diseased organism. By regimen, it is in our power to supply the defects of many other hygienic conditions, to correct defective constitutions, and even to eradicate perhaps, or neutralise, hereditary taints and other faults of organisation. Next to air and climate, or I should rather say before either of these, it is the most powerful modifier of man's condition, moral as well as physical. Regimen is omnipotent to save or to kill, according as it is well or ill directed.

P.—I should like now to hear the results of your experience on the subject of the *times of eating*.

Dr.—The number and periods of meals are proportioned to the wants of the system, and are regulated by the circumstances of each individual case. The feeble and the robust, the young and the old, the active and the sedentary, the inhabitants of cold and those of hot climates, of moist and of dry climates, are all placed in conditions that demand corresponding variations of diet. So far as the habits are natural, and the health good, the returns as to the times of eating, as well as the dictates of appetite in regard to quantity and quality of food, may be safely relied on. But an imperative rule is, that there be always clear ground for a meal—*that the last be duly disposed of, and out of the way*—the stomach empty before a fresh meal is indulged in. If food is ingested while the stomach is at work upon an undigested previous meal, disturbance is sure to occur, although in strong constitutions many things may mask that disturbance, and they *appear* to escape with impunity. But no violation of an organic law, any more than of a moral or material law, can be without its fitting check or penalty sooner or later. Much food is eaten that is not digested. The bowels are merely put to the trouble of releasing the system of a load that should never have been introduced to it, and this gratuitous evacuation, though the saving of the individual for the moment, is the ruin of the organism in the long run. It is like playing tricks with a steam engine, risking the bursting of the boiler, on the strength of the efficient action of the safety valves. But some fine day the valve has got a hitch, it *won't* work, and there is a blow up!

P.—What circumstances affect the length of interval between each meal?

Dr.—The amount of the food ingested, the amount of

waste of tissues, or of exercise undergone, experienced in the rapidity of the vital actions, and the coldness of climate. On account of growth, children require food oftener than adults; and adults, on account of their activity, oftener than the aged. Where great cold is to be endured, great quantities of carbon and hydrogen are consumed in keeping up the animal heat, and therefore frequent proportionate supplies are necessary.

P.—What do you say of very frequent meals the four or five per diem of many people?

Dr.—I believe them very wrong—very unphysiological, and therefore very injurious. The more the stomach can be spared, the less frequently the *molimen digestivum* is called up, consistently with the due supply of reparative materials, the better for immediate health and comfort, *as well as ultimate longevity*. One bad effect of frequent meals, independent of the surplusage of nourishment they are apt to introduce, is tho sluggishness, the disinclination to exercise they determine. Whether two or three meals per diem are better for any healthy individual, depends on peculiarities of the circumstances or of the constitution. But make it an invariable rule to eat at fixed periods, eat regularly. Breakfast should always be *earned* by some exercise or other, unless in the case of weakly children, confirmed invalids, or travellers commencing a journey early. A comfortable breakfast, whose digestion is well ensured, is a good beginning of the whole day, a foundation for its labour, a means to the success of its plans. Luncheon, so called, *is* dinner (or should be), at an interval of five hours after breakfast, followed by supper (dinner fashionably), at an interval of either five or six hours. This ensures generally an empty stomach before each meal. But with those whose breakfast is so copious, or whose digestion is so slow, that breakfast is not disposed of evidently at the end of six hours, then two meals per diem must suffice for them, if they are wise. The last meal for those who take three meals, should be at least three hours before bed-time—the dinner of those who take two meals, should leave four or five clear hours *at least* for its digestion, before going to bed.

I have known many large eaters who have lived to a good old age, but invariably I found they had rare digestive organs, and splendid constitutions. But they would have lived longer had they been more moderate. The same re-

mark applies to intoxicating drinks, for *one* that lives through excesses, thousands die prematurely and miserably.

P.—I quite believe that man's physical organisation, his moral dispositions, and his mental powers, are much influenced by the food he eats. The vegetarians hint, if they do not assert broadly, that all this influence is for *good* on their side, and for *bad* on the side of those who use animal food as a portion of their diet.

Dr.—This is a mistake, however, of the vegetarians. I have had ample opportunity afforded me of forming an experienced judgment in the matter. Some time ago I had the worthy President of the Vegetarian Society under my care; a gentleman, whose life, talents, and affluent means, are devoted to works of benevolence. His family, also, and many of the Society, of the highest and lowest orders, have been my patients—and the conclusion I have come to, is this, that the *good* or the *bad* depends on the *quantity* and quality of such food as is used, whether it be purely vegetarian or mixed. Moderate quantities of well apportioned mixed diet, suited to the kind of life, climate, constitution, &c., will produce all the happy effects on mind and body that it is possible for any combination of vegetables, fruits, and farinaceæ to effect. We see an instance of this in Count Cornaro, whose diet consisted of fourteen ounces of solid food, composed of the flesh of animals, soups, eggs, and bread, with fourteen ounces of wine. I should tell you *en passant* that Count Cornaro, at the age of forty, or thereabouts was in so deplorable a state of health, that his life was despaired of by his friends and medical attendants. In this dilemma he commenced and *persevered* in a better system of management of his own. He lived in consequence over the age of 105, and then died, or rather seemed to doze off for good, sitting in his arm-chair by the fire-side—having blessed his *great* grand-children. Few men, if any, ever enjoyed such health and happiness during the last half century of so long a span of existence, as did this highly estimable and amiable man. You should read his life. When you go to Venice you will see a fine portrait of him by Titian, when he was in his 105th year. Many times and oft have I looked on the face with admiration. You will not fail to observe the large *benevolence* and *firmness*, and the smallness of the lower organs of destructiveness, combativeness. You will perceive that in the case of Cornaro, there was an exclusion of fruits

and vegetables; but their elements, the acids, salts, alkalies, and earths, the latter contain, were made up in the constituents of his wine. His wine was the juice of the grape, mind you, not such a fiery, entrail consuming mixture as modern port and sherry. In fact, wine, or *tea*, or coffee, by a true instinct of mankind, are indispensable associates of animal food, *where green food is absent;* and this, because they contain those fine acids, salts, and inorganic constituents found in garden produce.

P.—Tea (or coffee), then, is an equivalent to wine, or a substitute for it? This is a new idea to me.

Dr.—Both for its exhilarating effects on the frame and for the *quality* it imparts to our food, which the developed nervous system of man makes far more desirable than *quantity;* also for those minute but necessary constituents referred to, tea and coffee exactly replace wine, are the wine of the masses everywhere in modern times, where wine does not abound.

There is much truth in vegetarianism most assuredly, up to a given point, and within proper limits, and in proper cases. It is a valuable or rather *an invaluable curative agency*, in the hands of a judicious medical practitioner, in certain forms and phases of chronic disease. But, let me observe, it has a great leaven of error mixed with its truth. It is a good thing much abused. There is much zeal without knowledge in its prevailing advocacy, and much gratuitous injury inflicted by its indiscriminate adoption. In fact, so far as I have seen vegetarianism, as practised by many of its partizans, the right use of it is the exception, the abuse is the rule; the rich err by excess in one direction, the poor vegetarians by excess in an opposite direction, both equally failing to hit that *juste milieu* of proportions and ingredients, wherein lies the whole secret and virtue of a *sound physiological diet.*

P.—The vegetarians object to animal food that it is a stimulating diet. How far is this well-founded?

Dr.—It has no foundation but in the *abuse* of animal food. This objection as much applies to vegetable food. For pray what constitutes a *stimulant food?* That which is taken in proportions and quantities beyond the wants of the economy at the time. A hearty breakfast of tea, bread, and beefsteaks, would be highly stimulant to a man just risen from bed, and who had had little or no exercise for several days. But if the same man had been walking thirty miles a day for a week, or had been at hard work for four or five hours pre-

viously, then the breakfast in question would not prove at all stimulating; for in that case it would be in relation to the wants of his organism, and contain the fitting materials of its repair.

P.—I see now clearly, what constitutes a stimulant diet—that is, a diet which proves to be injuriously or morbidly stimulant—in short, that which contains an excess of materials which the system cannot duly dispose of, and which, therefore, must be a load and an oppression to nature.

Dr.—Yes; animal food, or even bread, and peas, and beans, being highly azotised, largely contain the elements of corporeal repair, and are, therefore, only proper in any considerable quantities, where great corporeal waste has taken place, and where the reparative powers are not interfered with by disease or exhaustion. It is for this reason that the diluted form in which nitrogen exists in fruits, roots, and farinaceæ is more appropriate for genial climes where the labour is moderate, or the life indolent, but where the perspiration is profuse. In such circumstances little respiratory element is wanted, therefore, the portion of it that enters into the diet, is simply for maintaining the due lubricity of the tissues, and for its other structural uses, but it is not wanted as fuel. The comparatively slight corporeal waste, is amply repaired by the small proportion of nitrogen in these substances, but the excessive waste of watery fluids or perspiration, is compensated in the largely starchy element that forms the bulk of their food. The starch (a hydrate of carbon) is resolved into water; the carbon that remains is either eliminated without being burnt, as by the liver, lungs, or skin, or it can be appropriated to respiratory uses, if need be. The starch of the potatoe-feeding Irishman is so got quit of, in the former way, in the broiling dog days; in cold weather it is burnt as fuel to keep him warm. In like manner, rich oily food (or respiratory material) taken under circumstances where there exist no means of burning it off, as in warm rooms or climates, is highly stimulant and injurious; but not so under due exposure to cold.

After all, what is the real and pertinent question to be discussed?—the diet most suitable for human health, happiness, and longevity. Now it is evident as the sunshine of day, that no considerations touching simply the source of this food, will settle the question. But an exclusive reference must be made to its *relative composition*, and to the suitability of the ingredients of the food to meet the specific

wants of the body, for the time being. And these wants are infinitely modified and varied by circumstances. Food is for the purpose of supplying the waste. 1st. Of the solid structures of the mechanism. 2nd. Of the water required for the sound condition of the tissues and for the performance of the vital functions. And 3rdly. Of the animal heat. For these the nitrogenised and non-nitrogenised elements of the foods are demanded in very varying proportions. Under severe labour the albuminous element is the prime requirement for the repair of the tissues disintegrated. Under no exertion, but with exposure to intense cold, the fatty or oily element is almost alone in demand; with great fatigue and great cold both to sustain, then, a diet equally rich in fibrine and in fat is that which is desirable. In a burning clime, and with an indolent life, a diet deficient in fat and fibrine, but abounding in starch, sugar, acids, &c., is that which is most proper.

P.—So that he who asks what is the best food of man is like the traveller, who asked which was the most favourable wind for a ship, without reference to its *destination*. It is thus precisely with the diet question, it would appear.

Dr.—The best and most appropriate diet is entirely a question of circumstances, of *the destination of the food;* of the object for which it is given; the specific purposes it has to accomplish in the organism, and the substantial waste it has to supply. It is in *the due proportion of its constituents*, according to the varying requirements of circumstances, wherein consist the virtue and the value of any dietetic scale, and its suitability for maintaining the physical and mental powers in their state of highest healthy energy. Pure fat or blubber is thus the instinctive craving of the frozen, indolent, Esquimaux; flesh and fat, or oily maize bread, the requirements of the active "voyageur" in the same regions; and fruits and farinaceæ for the warm south; and all intermixtures, of vegetable and animal diet, for the intermediate latitudes. The degrees of latitude, indeed, form a sort of diet scale. Beginning at the torrid zone, we have their delicious fruits, the staple support of the natives, as they were, no doubt, of primitive, unsophisticated man in the same luxurious climates. In the temperate zone, the farinaceous grains and roots become a predominant element of the diet. By degrees ascending, as the sky becomes less cheering, and the soil less prolific, the devices of art become more and more in demand, to aid the backwardness of nature, or to compensate

her defects. Here man seems truly omnivorous, his dishes culled equally and advantageously, too, from the animal and the vegetable kingdoms. As we get into the sterner hyperborean regions, the animal element in the diet increases, and the vegetable element diminishes, till, at the extreme north, we find man entirely *carnivorous*.

A universal diet will do for a universal climate, and for a universal condition of mankind. If all climates and all conditions were equalised, then it might be propounded.

Quality of Food.

DR.—I have a few general views to offer on the subjects of vegetable and animal foods respectively. These, though nominally apart, virtually merge into each other by very insensible gradations. Vegetable nutriment approaches animal diet in fruits, roots, and farinaceous grains. Animal food approaches the mildness of vegetable products in cold-blooded animals.

P.—What is the peculiar effect of vegetable as compared with animal food?

DR.—It tends to slacken the speed of all the vital functions, their digestion increases less the rate of the pulse, and the amount of animal heat. They nourish without exciting, or hastening the organic acts. But there are great gradations in their nutritive power. The farinaceous seeds supply the system with an abundance of nutritive materials, next to flesh meat. The farinaceous grain passes out of the stomach more quickly than flesh. Our ordinary class of fruits but mildly excite the gastric powers, and yield but scanty nourishing material. In southern countries the fig or the dried grape, and other common vegetables, with bread, suffice for subsistence of the masses; but it is not so with us. The briefer the period of their stay in the stomach, as before remarked, the more are they unfit for substantial support. From their leaving a more copious and less altered residue, they are excellent adjuvants to richer diet, when constipation is an object to combat. From their power of quickening some intestinal operation, from their abundance of excrementitious matter, from its effects on the intestinal movements, and from the diluent action on the blood, fruits are admirably suited for a portion of the diet of the plethoric and the apoplectic. Indeed, they are, *judiciously taken*, an immense resource both for the invalid and the healthy.

They are agreeable to every stomach, and the more agreeable the more the stomach is *unsophisticated*. They are only hurtful from being unripe, or used in excess.

P.—In what cases would you prescribe a diet of fruits?

Dr.—From their leaving a more copious and less altered residue, and from the quickening effect of this excrementitious matter on the intestinal actions, they are admirably fitted to constitute part of the diet of the habitually constipated. From the same aperient effects, and from their manifestly diluent action on the blood, and from the little carbonaceous or inflammable matter they introduce, they are pre-eminently appropriate to the sanguineous and the plethoric, and wherever there is a tendency to congestion of the brain or lungs, and in the decidedly bilious, and the nervously irritable. Fruits are less advisable for old people, and the inhabitants of cold and humid regions.

P.—Do you reckon milk diet intermediate in digestibility and nutritive power between vegetable and animal foods?

Dr.—Milk diet is less digestible than is generally supposed. To most adults it is heavy, heating, and stimulating, especially if taken with much solid. It is too much of a perfect aliment in itself to be taken as a simple diluent to other food, save in the case of light farinaceous food. It will seldom answer as a substitute for tea or coffee, and be freely indulged in with an animal diet. *Per se*, or combined with fruits, roots, and farinaceæ, it is a soothing diet, determining only a moderate stimulation. Its digestion and sanguification do not occasion any increase of temperature or acceleration of any function, except the kidneys. It is my opinion that as it forms man's first aliment, so it is best fitted, when judiciously taken, to form his last aliment. In age and feebleness extreme, for the wasted and decaying powers of the fabric, if that fabric has in due season and by slow degrees been again accustomed to draw its nourishment from its primitive source, each meal of milk will be permanently more reviving and sustaining than any other form of food. First and last, in the shape of cheese, cream, and butter, man draws an unfailing source of "creature comforts" he could ill forego.

For the adult, the value and efficacy of a milk diet depends on circumstances. In the dietetic treatment of disease, diseased tendencies, or simply delicate constitution, the philosophical practitioner will always have respect in the regimen he prescribes to the climate wherein the patient lives.

The air and the aliment must be made to compensate each other. A humid, heavy, ungenial atmosphere as that of great part of Britain and Holland for many months of the year, or the still more depressing sky of malarious districts, need a stimulating element in the diet, which tea and coffee, and light stimulants, are almost indispensable to meet. On the other hand, in elevated regions, where the atmosphere is rarified, dry, bracing, breezy, and the light is abundant—in short, where all the elements conspire to precipitate the organic movements—here the milk diet becomes an appropriate counteractive to all these stimulating influences.

P.—I suppose, therefore, you would recommend a milk diet to neutralise excessive morbid sensibility?

Dr.—I do not know anything better, with its concomitants, for persons of that temperament, if they will only have patience and perseverance to break themselves into a diet *at first* usually as refractory to their stomachs as it is repugnant to their prejudices. There is another class that will be much benefited by milk diet, I mean *blasé* people, for all those prematurely *used up* by the use of stimulants, and the abuse of the passions, a course of *water-cure* training, in combination with a good measure of this diet, which it will enable them to take easily, will restore freshness of feeling, and force of frame, that recalls once more the days of buoyant youth. But this cannot be accomplished in large towns. Its wearied, worried, blanched inhabitants, must leave their factitious life, its social agitations, and the alternate organic excitement and depression of its destructive tear and wear.

P.—Will you give me your estimate of the comparative effects of a vegetable and animal diet?

Dr—The organism experiences very different modifications under diet exclusively of vegetable or of animal substances. Animal diet accelerates the pulse and respiratory movements, augments the animal heat, diminishes the quantity of carbonic acid exhaled from the lungs, and gives more work for the liver to do. It promotes the secretion of the bile, but diminishes the activity of the kidneys; it also augments the solid materials of the urine. *Animal substances* determine a greater vital *molimen* and turgescence of the stomach, and less copious secretions. They are nutritive under a much smaller volume, occasion less flatulence, distend less the stomach, remain a longer time in it, and are more altered by its action; in short, chylify more thoroughly and rapidly. They furnish a homogeneous and white milky

chyle, and produce scantier, but more odorous evacuations, and clear amber-coloured acid urine. They yield an acid chyme in the small intestines. They stimulate the action of the brain, and furnish to the muscles the means of speedy and direct repair. Vegetable substances, on the contrary, less excite the pulse and respiration, and less increase the animal heat, but increase the amount of carbonic acid exhaled from the lungs, and, therefore, little or no vicarious work falls on the liver. They determine less vital *molimen*, and less blood, and less secretion in the stomach; their nutriment is contained in much larger bulk, they distend more the stomach, and occasion more flatulence, but remain less time in it, and are altered less; they chylify less perfectly, and less rapidly; they yield an alkaline chyme in the small intestines; they afford a clear chyle-like lymph; they furnish by the abundance of their residue, more copious and frequent evacuations. The mucous secretions are greater, so also is the urine, but the urea is less.

Animal food is possessed of great reparative properties; it presents nutritive matter in its highest degree of physiological or normal concentration. Used discreetly, and qualified, diluted with a sufficient intermixture of vegetable food, and suitable exercise accompanying the regimen, it remarkably developes muscle, that is, lean flesh, and muscular power.

Vegetable diet never attains to the reparative power of animal substances, although it presents a gradual increase of nutritive power in the series of vegetables. Persons of strong constitutions and with stomachs capacious enough to make quantity compensate quality, who work hard, or take much exercise, *suffice*, with the best and richest form of vegetarian diet. Still it stands an unimpregnable truth, that in most people, in our climate at least, an exclusively vegetable diet is far inferior to animal food in getting up muscle and muscular power. Most pure and real vegetarians, in this country have a pale, puffy look. The few who do really present superior looks and condition, owe it to the good bread, and plenty of it, with the eggs, butter, figs, raisins, milk, chocolate, and other nitrogenous food with which their diet abounds.

P.—So that you make out an intimate relation between the development of muscle and muscular power and flesh diet, and between pale, fat, flabby tissue, muscular weakness, and pure vegetable food?

Dr.—I think that may be established as a *general* proposition, of course subject to exceptions in the case of first-rate constitutions, and in those favourably placed for corporeal development. I contend for the mean or mixed diet, as obviating all the disadvantages of either used exclusively and best maintaining the balance of the corporeal functions. But I would not contend for an animal diet to the exclusion of vegetables. Here would be as grand an error in its way, for an exclusive or excessive animal diet is quite as pernicious in its way, for it produces *plethora*, disposes to *inflammation*, *congestions*, and *abnormal secretions* from *kidneys* and *skin*. In the happy *mean* lies the truth—*medio tutissimus*. The mixed diet obviates all the disadvantages of either used exclusively, and best maintains the balance of the corporeal functions.

Tea and Coffee—Aromatic "tipples."

P.—Do you not consider a well-prepared infusion of tea or coffee a most delectable beverage?

Dr.—Unquestionably it is; one as it is exquisite in its flavour, so it is cheering and genial in its stimulus, that is, when taken at the proper time, and in the proper circumstances; a genuine, and often recommendable tipple, one renowned in all climates, and among all classes, as a refreshment creating the most amiable moods and innocent feelings of human nature; the drink *par excellence*, of sensibility and refinement, the source of vigour to the weary, of buoyancy to the depressed, of mental power, and ease, and happiness to all.

P.—Is there much difference in the chemical nature and physiological action of tea and coffee "tipples" as you call them?

Dr.—Not much. Their most active and beneficial constituents, *theine* and *caffeine* are identical in composition. This seems to me, the more I think of it, a very remarkable fact in the history of man, that two plants belonging to different natural orders, and growing in different regions of the earth, should be analogous in their constituents, should contain the same, especially one identical and pre-eminent substance, and be for that substance universally prized, praised, and patronised.

P.—Is not this because it meets a necessary want of human

life? Have not in these matters the instincts of nations preceded the discoveries of science?

DR.—This is another of those remarkable facts in human history I have just alluded to. *The habits of communities, supposed to be accidental, and often accused as sensual or sinful, are proved to be in accordance with the teachings of philosophy, are based, in fact, on attention to the laws of nature.* I shall show you bye-and-bye, more instances of such anticipation of scientific truth in the dietetic *instincts*, habits, manners, and customs of peoples. Another fact, full of dietetic significance, as connected with this subject, is this, that tea and coffee were the original indispensable tipples of nations whose food was chiefly vegetables.

P.—But what is the fascinating element in these tipples, that makes them so popular with all, but especially most popular with the wisest, most refined, and most amiable.

DR.—The secret is *their action on the nervous life of man.* This action by some stimulating agent of whatever nature, is an indispensable necessity for most people, for the savage as for the civilized; and the necessity is greater, just in proportion as the nervous system is cultivated into a preponderating activity over the muscular system. Nervous exhaustion is then greater than mere muscular waste; for nervous life is *intense* life, the most enjoyed life: but the most wasteful of life's mechanism and of life's supporters. The means of replenishing that nervous waste are found to exist more in the *quality* than in the *quantity* of the ingesta. In the absence of a peculiar *quality* in the diet, a blank is felt. Hence the craving to supply that undefined vacuity. Among other things, the products of fermentation and distillation, and opium, are found to impart to the sustainers of organic life that *quality* of support, that *stimulus* that is craved and needed for animal or intellectual life. But a very slight experience suffices to prove, the almost indiscernible line that separates *use* from *abuse*, in these *dangerous stimulants;* and how fraught with calamity to the individual, is the passing of that fatal boundary line. These, therefore, with the wise and the good, have had always rather a restricted patronage, knowing how difficult it was to extract the honey without receiving the sting. But with tea and coffee tipples it has been, as a general rule, far otherwise All the knowing who have turned a deaf ear to the sirens, ALCOHOL and OPIUM, have nevertheless, willingly embraced the blandishments of tea and coffee, no small proof of their

harmlessness. Depend upon it, *the constituents of men's food determine to a greater extent than is supposed, the direction of their mental activity. That they find out. That which modifies the vital processes, modifies to a great extent the thoughts, views, purposes, will, appetites, and passions.*

That which gives the universal prevalence to tea and coffee, as modifiers of the nervous life, is their freedom from the objections attaching to the alcoholic or *intoxicating* drink, or the opiate, and from their analogy to soups in their action, as in their constituents. They equally with the latter, vivify, cheer, and excite for the time. But soups are comparatively long and difficult to make, and are not always relished when they are made, and are besides fitter for replenishing or ministering to muscular, than nervous exhaustion or weariness. Alcoholic tipples intoxicate, over excite, congest the brain, and end with producing *stupor* or *brutality*. But contrary to these, tea and coffee tipples are *quick* and *easy to make*, create no mess, and are always relished at their proper seasons, they never depress or obliterate the intellect, but elevate its exercise, expand and ennoble the being. In fact these aromatic tipples are well known to be the best neutralisers of the after effects of alcohol and opium, and best dissipate the cerebral congestion they leave behind. Another essential difference between tea and coffee, and alcohol and opium, as actors on the nervous life, is this, that the latter require in a multitude of unfortunates, to produce their effects, a continually *augmenting dose*. The dose of tea and coffee tipples are one standard and permanent.

P.—In all this, I see, then, that tea and coffee drinking are necessary elements and phases of man's moral and physical being; that if these tipples did not exist, the instinct of human nature they aim to gratify, would seek their substitutes or equivalents elsewhere; that particular dietetic habitudes, apparently the offspring of fashion, have, in reality, an origin and foundation in reason or human wants; and that praise or blame of these "diet drinks," without computing such necessary elements of the calculation, is nothing better than simple partiality on the one hand, or pure prejudice on the other. Will you now describe to me, the peculiar principles or specific ingredients of tea and coffee?

Dr.—Tea consists, 1st, of a woody matter which constitutes about half of the leaf; 2nd, tannin; 3rd, gum; 4th, an essential oil, on which its aroma depends; 5th, the highly-

azotised crystalisable substance already referred to, *theine;* 6th, another azotised matter, identical with caseine; 7th, various salts, sulphur, lime, magnesia, iron, constituting the *ashes* of the leaf. *These principles are soluble in boiling water.* The rest are insoluble, viz., 8th, albumen; 9th, chlorophylle or colouring matter; 10th, extractive matters; 11th, resin; 12th, wax. The constituents of coffee are analogous.

P.—In all these ingredients, *certes*, there is wherewithal for a very potent action on the animal economy! What is the proportion of nitrogen in tea?

Dr.—Greater than in any other vegetable. A perfect infusion of tea, on evaporation, leaves a dry residue, which contains about four and a half per cent. of nitrogen. Theine exists in the proportion of from 6 to 7 per cent. in tea. Theine contains about 29 per cent of nitrogen.

P.—I wish to know the specific physiological action of aromatic tipples on the system.

Dr.—This is exceedingly difficult to appreciate, simple as the investigation may seem. Their effects are modified by the temperature and strength of the infusion, the amount of milk, cream, or sugar in it, the fulness or emptiness of the stomach, the constitution, temperament, health, habits, age, and climate. Then we must ascertain in what dose its use (or physiological action) consists; and where *abuse* (or its pathological action) commences. On account of the difficulty of fixing the value, and eliminating the effects of each of these elements, of the action of tea and coffee nothing is more unsettled among scientific men, than their specific operation on the human body.

The ingestion of these tipples, determines *immediate* and *secondary* phenomena. The first set are due to the action of heat, and are the same as those of the ingestion of warm water simply, that is quickening of the pulse, with a sense of agreeable warmth, and gentle stimulation all over the system, increased energy of the vital movements, and, if the quantity drunk has been great, a sort of fever, terminating in a sweating crisis. Taken cold, these tipples by no means develope the same excitement. Caloric is an essentially diffusible stimulus, but in this way its influence is very evanescent, and is followed by weakness. One grand virtue in the action of tea and coffee, one important service they render (*hygienically*, if not *therapeutically*), is that *they enhance and prolong this excitant influence*, making that effect last

for hours, which would otherwise be dissipated in a few minutes, *and this without the drawback of subsequent depression.*

P.—How different is alcoholic stimulation from this. If it exalts you now to the third heavens, by-and-bye it lets you down into the deepest —— blues, not the etherial.

Dr.—Besides, alcoholic stimulants are *pure* stimulants, have in themselves no restorative constituents, no real elements of strength. They hasten the vital processes unduly, and with very little equivalent. This unnatural activity as regards the digestive and plastic processes, generally has the effect of deteriorating their results. This is only the case in *gross abuse* of tea and coffee tipples; with the alcoholic beverages, these effects can *scarcely be separated* from what may be considered as their use.

P.—In other words you would say that the stimulation of alcoholic drinks is like that of opium, *pathological;* the stimulus of tea and coffee salubrious, *physiological.*

Dr.—It is so with the *majority.* Tea and coffee, I was going to observe, act primarily on the extremities of the gastric nerves, and on the vascular system. In those accustomed to them, they do not materially quicken either respiration or circulation; but they very perceptibly impart force and firmness to the pulse. They have a decidedly tonic action on the heart and blood vessels generally. The difference in their tissues before and after these tipples, is that of a loose cord and a tense cord. At the same time, they both tend to increase the vigour of the circulation on the surface, and to strike out vigour from the vital centres to the extremities. But the nervous system is the great scene of the vital impulse and excitation; they produce a gentle mental intoxication of its kind, which I admit it is possible to *abuse* and *over do.* For such, if in excess, a sure sign is a hurrying on of the vital processes most frequently pernicious in the end, sometimes admissible in the aged, but never permissible for the young. Besides, the lucid, quiet, intellectual condition, tea and coffee produces their specific action on the brain, is demonstrated by their power to ward off sleep.

P.—You will admit, that the influence of tea and coffee diminishes by habit?

Dr.—To a certain extent, and in a certain sense, that is true. For example, the *after effects* diminish. With some, tea and coffee cease to produce any inconvenient wakefulness. *But habit never blunts the individual when tolerably*

well, to the cheering, domestic usefulness of their qualities. In this they vindicate their claim to be taken into the lists of real alimentary substances, which always nourish and cherish, and the *better*, the more the system is accustomed to them.

P.—Does not the popular remedy of strong tea and coffee for headaches, confirm your view of their specific action on the brain? or what *is* the *modus operandi* of this curative effect?

Dr.—In headaches dependent on, or connected with, slight cerebral congestion, the fact is as you state. How the remedy operates, whether it be by a simply *general*, or a specific *local*, action, it is difficult to affirm. For my part, I am inclined to believe, that it is partly in both ways that tea or coffee dissipates the cerebral neuralgia and congestions referred to; and this on the one hand, in consequence of its stimulant action on the general circulation, in which of course the brain participates; and on the other hand, by the peculiar modification it impresses on the circulation of the head *and gastric centre*. If it were not so, if tea and coffee had not a specific *local* action, why not employ other *general* stimulants, as ether, ammonia, ginger, anise, nutmeg, balm, sage, peppermint, &c. These, however, do not exercise the same influence upon the brain and *other* ganglionic centres; they are null and void for the effect needed in the case you quote. Tea and coffee excite the dullest intellects to work; but especially, do they stir up the thought and power of the intellectual and refined. In saying this, I do not mean that they will *create* brain or heart qualities, that they will give sense to fools, *sentiment* to rogues, or excite sparks where no fire is *latent*.

P.—I suppose you consider also, that tea and coffee relieve headaches, by removing those digestive embarrassments that, according to your pathology, lie at the foundation of most headaches.

Dr.—You have hit near the mark. In the one way or the other, we may establish *some* of the pretensions of this remedy for headaches. It often fails, however, *adding* to the acidity of stomach which often prevails in many cases of nervous and bilious headaches.

P.—What is the effect of tea or coffee taken upon a heavy or hearty dinner?

Dr.—It excites the system less, and less directly; and the stomach more, and more directly, than under other circum-

stances. One would say its *constitutional* effects were extinguished in its *local* action. But whether that local action be hurtful, or salutary, depends upon whether the individual be of feeble or of strong digestive powers. In the former case, a strong cup of tea or coffee will infallibly embarrass digestion, as I, formerly a dyspeptic, know by experience. Coffee has the disturbing effect still more than tea, in consequence of its empyreumatic qualities, which tea has not. It is the nature of empyreumatic substances to check the processes of solution and decomposition. Smoked flesh by reason of this resistance to change, is difficult of digestion. In this way, that is by interrupting the molecular changes, a *cup* of *strong* coffee after dinner will *check digestion* in dyspeptics. In them, when digestion is over, and the stomach jaded with its work, then a cup of coffee or tea affords relief. But the case is quite different in strong stomachs, actively excited by stimulant viands, spices, sauces, and liquors. Coffee is then found to act beneficially, to be craved for, and well borne. It checks the fermentative commotion of which the stomach is then the scene. Tea does not in the same way impede digestion; its effect is to quicken the intestinal actions, to accelerate the process of digestion. Both these tipples neutralise the stupifying fumes of wine, and they ward off intoxication.

P.—What is the effect of taking tea or coffee fasting; that is, as a substitute for food, or as a put-off to appetite?

Dr.—A more palpable, in some a more distinctly morbid excitement of the nervous system, a feeling of dragging and emptiness at the stomach, with an uneasiness simulating hunger. These effects are, of course, modified considerably, if there be much milk, cream, or sugar present; then the tipple, if not too strong, is a most refreshing cordial—a genuine solace from fatigue, worry, or care. But all puts-off of this sort, inasmuch as they are defrauding nature of her rights, must, if frequently repeated, be injurious. When the stomach wants and asks for building materials, *mortar* alone, however good in itself, will not suffice. This is not the *use* of these beverages, but clearly the *abuse*.

P.—I find the fault of most dietetic writers I have read, to be, the denunciation of this and that article of food or drink, from arguments founded on their *abuse*. Suppose after a hearty dinner, too many strawberries are eaten, the result very probably will be, colic in the evening, and bowel complaint at night. In the morning the cry will be, that

raw fruit is a very bad thing, *especially* strawberries, and never to be eaten again. No consideration is made for having transgressed the conditions on which their wholesomeness depends—no acknowledgment made that they are very good things when eaten in due season and measure.

Dr.—The *use* of a thing must be carefully separated from its *abuse*. If the latter is to be a valid ground of their repudiation all the best things would be swept away from man's enjoyment at this rate. For what boon of heaven is not abused? The *tea*-totallers often run into excess in their tipples, as the wine, beer, or spirit-drinkers in theirs, the beef-eater in his meat, and the vegetarians in their vegetables. To my knowledge, tea and coffee tippling is quite as much abused in their way by the *soi-disant* temperate, as stronger potations were erst by many. I am very far from contending that even the abuse of the mild aromatic tipples is without peril, or that they are suitable for every kind of constitution, life, and labour. In many chronic diseases I prohibit them.

P.—It is alleged against tea and coffee that they emaciate, destroy the appetite, congest the brain, &c. Are these allegations true?

Dr.—Don't believe a word of them. Before we condemn these tipples as causes of ill health to those who are accustomed to them, and who use them discreetly, we must first carefully examine what other conditions of corporeal derangement attach to their modes of existence, *whether there be not a systematic violation of the organic laws in other particulars*, and the fault covertly, disingenuously, or ignorantly saddled on the tea or coffee. In the cases of ill health alleged, it will be discovered that the dietetic habits in other respects, the mental labours or troubles, the confinement, close air, and sedentariness of in-door occupations, badly-planned hours of diet, bad articles of diet, and bad cookery, late sitting-up and later rising, the pernicious indulgence in drams and drugs, the one making the other necessary;—all these, and a thousand other equally potent but less palpable sources of ill health, never enter into the calculations of many who denounce tea and coffee.*

* Mrs. Heskeseth Nicholson, keeping a school in New York, a widow, and full of trouble, neglecting exercise, and violating every dietetic rule, falls into ill health—"*a low nervous way.*" She has strong tea or coffee brought to her almost every hour of the day "to keep up her spirits," to "sustain her under her labours and trials"—

P.—Thanks. Now, to return, you admit that *green* tea is not considered pernicious without cause. Will you explain how this is, also the morbid effects its produces?

Dr.—Green tea has a poison in its pellicle, a coating of prussiate of potash; and its dose is far from infinitesimal. The symptoms of the veritable poisoning with green tea are —high nervous irritability, yawnings, pinching and pain in the stomach-pit, palpitations of the heart, tremblings of the limbs, constriction of the head, sleeplessness, low spirits or despondency. These symptoms subsiding, leave behind them a sense of weariness, weakness, and oppression—and all this in persons who take with impunity black tea. The extreme symptoms I have described are of rare occurrence; and I should mention, at the same time, that I have known many notable exceptions to the disagreeable effects of green tea, in both young and old. During a summer passed in the Tyrol, when an invalid, I drank two large cups, night and morning, of tolerable strong green tea; there being no black tea to be found. I could not detect any ill effects, and in the evening I always found it a speedy and unfailing soporific.

P.—What are the effects of the excessive use of coffee or black tea?

Dr.—Nervous excitement, agitation, want of rest, convulsive twitching of the limbs occasionally, and always a species of intoxication, with a feeling of faintness, feebleness, and failure all over the body; a tremulous weakness and sense of sinking at the stomach-pit; and a craving for nourishment a few hours after a meal, and before hunger should have returned. Great tea tipplers are often great dyspeptics, meagre, sallow, sickly, and weak. There is great difference in individuals as to the *tolerance* of these effects, and of the influence of habit in parrying them. The robust suffer much less than the weak.

P.—How do you explain these morbid symptoms?

Dr.—Very easily. 'Stimulants, in undue dose or too oft

but finds out at length that this strong tea and coffee are slow poison to her. So they might well be. She abandons her tipples, regulates her diet, takes such simple farinaceous food as is suitable for a *chronic gastritis*, alters her mode of life, courts the country, takes ample exercise, and recovers her health. Henceforth she has *a mission* to perform—to denounce flesh eating and tea drinking, as the greatest evil of society, the most fertile sources of disease, and the root of all mortal woe.

repeated, impart an unnatural activity to the vital actions and apparatus. Digestion and assimilation, the plastic processes generally, of which I have told you so much, participate in this morbid speed; *but they are imperfect in the same proportion. Hence defective materials of repair are elaborated and laid down.* Waste, also, is preternatural and unhealthy. Between the two the nutrition of the body is perverted. The due balance between waste and supply, both as regards *quantity* and *quality*, is upset. The result is derangement of the health. The returns of artificial appetite, or faintness and craving for food, I attribute to morbid secretions in the stomach, called on to the redoubled exercise of its functions, to make up in *quantity* of product for the badness of *quality*. Repair must be accomplished any how, and at any expense—if materials are faulty, so much the worse for the body. Hence this process is a rapid *ageing* of the body. Such people look prematurely old, broken up, and *wizzened*.

P.—I do not wonder at all this. Even simple hot water, too copiously and too frequently received into the stomach, must end, I should suppose, in debilitating its coats, perverting its secretion, and impairing nutrition. If the "*père de famille*" be knocked up, how will the children, depending on his daily, nay hourly, exertions, thrive? Well now, give me something of your experience and judgment on the philosophy of these tipples, of the justifiable and physiological uses of tea and coffee; of the part they may innocently, if not salutarily, play as meals, or, rather I should say, as parts of meals, vehicles for them, relishes and seasonings to them?

Dr.—*The danger or the benefit of any article of diet lies in the relation of its action to the state of the organism at the time of its reception.* To estimate the good or the evil that is in tea or coffee, *when* they are good or evil in any given case, this sound test or canon must be applied: the modifying conditions of the body must enter into the calculation. Whole nations are found to use these tipples *generally* with impunity (individual exceptions are of no account)—whole nations, in fact, to whom they are a necessary element of existence. Now let us interrogate the circumstances of those peoples—let us discover, if we can, the philosophy of those dietetic habitudes, whether they are not the guidance of true *instincts*, whether they have not an origin and basis in sound reason, and whether they are not real wants of civilization,

the elements of progress. What you remarked of *instinct going before scientific discovery*, holds here pre-eminently.

Tea, and coffee tipplers may be divided into two great classes according to the quarters of the globe they inhabit. The first exists in hot climates. The other class belongs to cold, moist, variable, or malarious climates. Although the outward or climatorial influences, the habits and customs, of these two classes of people are so opposite, yet the effects on the organism are very nearly identical, at least equivalent. In the one case, the skin is over-excited; in the other, it is not excited enough. The result in either case is *a want of equilibrium* between the internal and external surfaces, and the vital actions taking place in them. In the hot climate, the organic powers are unduly tasked to supply the constantly exhausting drain from the surface. Of course the extravagant waste of one organ can only be kept up by robbing the rest of their due share. Hence the upsetting of the physiological balance of the body, and the creation of factitious wants. On the other hand, the effect of bleak, variable, moist, or malarious climates is to check or repel the cutaneous circulation and exhalation, and thus unduly to congest the interior viscera. *Now the functions of an organ are equally impeded by an excess of blood or by its deficiency.* Hence the Dutchman or the Englishman, in their dense loaded atmospheres, have to fight against the same sluggishness and inertia of their vital viscera, that prompt the Turk or the Chinese to resort to the stimulus of coffee or tea.

P.—It is not to me at all wonderful, then, that when chance (or Providence) threw in the way of the former the genial beverages of the latter, that they should grapple them to their souls as great treasures found. In fact, it only wants the test of experience, the experience of their exact adaptation to a felt want of society, to produce the increasing popularity they have enjoyed from their first introduction until now.

Dr.—In this way the dietetic habits and instincts of people anticipate the march of scientific truth. In this way, they are justified by the teachings of philosophy. But I was going to remark, in the case of the Hollander and the Englishman, and the American, if you like, there is an additional disturbing element called into play—an element that powerfully drafts off to remote quarters the vital energy that should be reserved for the purely vital or organic pro-

cesses. *They are a commercial people. They live in their brains. Mental excitement*, partly the result of diet, and partly the result of temperament, and partly the result of the success that always attends energy and industry, is the congenial element of all, from the merchant-prince at the Bank or Mansion House to the anxious seller of oysters and oranges in the bustling streets. This is only maintained at the expense of the organs of supply. Hence these organs, compelled to work at disadvantage, crave artificial help. "Go ahead," is the universal cry, and maxim, and effort. The head is truly the *boiler*, and the stomach the furnace. "To keep the steam up" at high-pressure rate, *fuel* is heaped on in proportion, often even to the *bursting* point.

P.—I see it all. It must needs be, that organs of which so much is exacted, and which are compelled to work at so great disadvantages, *should crave artificial help*. The social influences come to complete the measure of the evils of climate.

Dr.—You perceive then, clearly, how indispensably necessary a counteractive is to this loss of equilibrium in the living organs. How instinctively men crave it, although not knowing its why or wherefore. In hot climates, for the stomachs enervated by drenching perspirations, strong condiments, spices, tea, and coffee, are necessary to bring them up to the *par* of proper action and its consequent comfortable feeling. Among the more northern peoples, and with more complex influences at work, in their case, to destroy the organic equilibrium, a co-equal want exists, and equivalent counteractives are demanded. The skin soliciting means to react against the repercussive influences of climate, the central powers sluggishly performing their functions, the pressure of the repelled fluids of the surface, and under the disadvantage of over-work of brain and under-work of limb, or the reverse, exact imperiously a stimulus something greater than simple food or simple water confers. *Quantity* is much less in the question of the ingesta than *quality*, and necessarily so by all the rules of physiology and philosophy. Here again the *instincts* of the people, unfailing, suggest the remedy, and *drive them to it*. In lieu of the aromatic stimulants their soil and climate refuse them, and which serve the purpose of the Southerns and Orientals, they have excogitated and elaborated their own indigenous drinks, ale, beer, cyder, spirits, wine, and brandy. In these, I know, much deplorable *abuse* takes place, great excesses

are committed, much brutality and disease engendered. But this abuse does not affect my argument, which is to show the sort of thing, this *stimulating quality in the ingesta*, which the uncontrollable necessity of circumstances forces them to crave, and to solace themselves withal. But, as I before showed, as in the "flowing bowl" lurks a *fatal fascination*, continually tempting to transgress the *salutary limit*, those who have broken free of the enchanter's spell, and who wish by their example to save the liquor-bewitched, magnanimously agree to renounce the dangerous potations altogether, and substitute for them the more refined and civilising tipples of tea and coffee.

P.—All this is highly interesting. You present to me clearly, and in a new point of view, the philosophy of tipples. Exhilarating beverages are integral parts of our civilisation. In every step of his progress from barbarism, man taxes his ingenuity to meet the wants of this instinct of his nature. It was a matter of course that he should commit sad blunders, and entail on himself sadder disasters, by evoking a *spirit* which he could not lay, creating *fire* which he knew not how to handle without burning himself. No wonder that tea and coffee are such popular tipples, for *their* cup is privileged against the pestiferous breath of the "foul fiend." Long may they flourish, as a real blessing to mothers, fathers, and generations to come.

Dr.—Yes; tea tipple or coffee tipple is the *desideratum* of a refined and regenerate, or *regenerating* society. It is "a cup that cheers but not inebriates." Its excess may indeed develope nervous sensibility; but it never brutalises, never sacrifices individuals, never desolates homes, as alcoholic excesses so frequently do. If in some tea and coffee tipplers, the muscular system is not predominant, the fault is to be laid, not to the potation, but to the want of exercise, to the undue cultivation of the mental, to the neglect of the physical powers. *Without tea*, the same *regime* of life would produce the same results. There are tea and coffee bibbers who are well developed muscularly. To the labouring man, the sportsman, the trained fighter and runner, the soldier, their daily ration of tea and coffee, morning and evening, is indispensable. Tea and coffee tipples never produce gastritis, or liver disease, granular kidney, gravel, or stone. Hazlitt was assuredly the slave of his tea-pot. But other things killed him. Had Franklin taken tea or coffee every morning for breakfast, instead of his heating nitrogenous

mess of greasy gruel, he might have lived, perhaps, fifteen or twenty years longer. It would, in all probability, have prevented the formation of the fatal calculus that embittered and prematurely closed his otherwise green old age. If it would not have prevented the lithic deposit, *it would at least have washed it away while in the state of gravel.* Coffee tippling did not certainly shorten the days of Fontenelle, Voltaire, Delisle, and other notabilities, who even went to excess in it.

P.—You said a little ago, that tea and coffee tipples were not advisable for every case and constitution.

Dr.—I am not a "thick and thin partizan" of tea and coffee, or of anything particularly. I do not indiscriminately recommend tea and coffee as suitable for all people. Very far from it. Though I contend for the *principle* of these tipples *for the masses*, as meeting a want of civilisation, as a necessary element and phase of man's moral and physical being, yet the *practice* of them is a different matter when we descend *to individual cases, and these cases made singular and exceptional by idiosyncrasy, by disease, or by tendencies to disease.*

P.—For whom then would you *pre*scribe, and to whom would you *pro*scribe these tipples?

Dr.—I would advise them to those of languid, lymphatic, cachectic, or inert constitutions; to the chlorotic and thin-blooded; to the catarrhal and the rheumatic; to the old and the infirm; to pregnant women often; to the constipated and to the flatulent; to those whose digestion is slow and laborious; and to those who live much on fat, oily, farinaceous, mucilaginous food; after the abuse of spirituous liquors; during periods of watching; whenever drenching perspirations exhaust the skin and enervate the stomach, and, finally, wherever fogs or miasms, prevailing in the atmosphere, operate in a different way to destroy the tone of skin and stomach.

P.—Who are those to whom you would proscribe tea and coffee?

Dr.—To all abnormally sensitive persons, to the irritable, the nervous, the bilious, the hypochondriac, the hæmorrhoidal, the gouty, the plethoric, the apoplectic—to all, in short, the subjects of chronic *gastritis*, which is often the real and the greatest source of the evil, in that immense multitude constituting the victims of the maladies. This you will admit is eliminating a very large class from the

privilege of tea and coffee tippling, *some* will think me too *generous* in awarding. They cannot say, however, that I am indiscriminate in my award. A sound medical practitioner should have no *partizanship, nor should cherish any party passions.* For myself, I must be neither teetotaller, nor vegetarian, nor anything *exclusive;* for then I must often sacrifice my patient to these miscalled principles, to be consistent being inhumane. *A bas* your isms at this price. There is incalculable good in tee-totalism, and there is virtue in moderation; there is immense advantage for some constitutions in vegetarian diet at intervals; and there is health and vigour for many ailing and weakly in prime beef and mutton. Extreme opinions ill become the practitioner who should be able to sift the chaff which the one-sided or overzealous advocates of new opinions, or partial truths, are sure to mix so copiously with their wheat.

P.—But will not some of your *simple and pure dietarians* object that tea and coffee tipples makes a man's pulse beat a little quicker than twice a day?

Dr.—What if they do, and if that be the fact? I know it to be *a counter fact*, that a stomachful of *pure* vegetable food accelerates the pulse *a great deal more and for a much longer time*, than a tea or coffee repast. But fully admitting this to be the fact, that these tipples *slightly* accelerate the circulation (for this is really much less than is usually believed), what is this when weighed in the scale against all their physical, social, and intellectual benefits?

P.—To finish this long conversation, please to give me your final estimate of the dietetic virtue and value of tea and coffee.

Dr.—A light sweetened infusion of tea or coffee can scarcely be called an aliment, although not destitute of nutritive materials. Tea or coffee is not taken *per se* to appease hunger, although for a time it may blunt or silence its cravings. Even the richest soups in this way will only nourish very partially, and for a very short time. A meal, with a view to nourishment, must contain materials in more or less solid form. Something for the stomach to seize hold on, to distend its coats, to provoke its contractions and its secretions withal. Again, many alimentary principles are not nutritive in themselves, which, nevertheless, are causes of nourishment in other things; they fulfil conditions essential to digestion. Whatever makes a food savoury and relishable, may by a clear title be called nutri-

tive. For relished food, *cæteris paribus*, is better digested. That which is not relished, that which is repugnant to any sense, is not so easily digested; and this by a sure law, of which the instinct that has been violated is the exponent and representative. Ozmazome in meat is not *per se* nutritive; but as communicating an intense relish to what otherwise would be insipid, it is an evident cause of nourishment to the body. Tea and coffee, if you like it, are the ozmazome of farinaceous meals. Butter and bread are at all times delicious to the healthy man; but it is doubly so with the condiment of tea or coffee. In this way contributing an exquisite relish to what is eaten with them, they unquestionably contribute to the digestion and assimilation of the meal. This, you will admit, is to put in a high plea for their use. If bread and beef, or mutton, are, as I consider them, the two true *staves of life*, a cup of good tea and coffee with them is the *ne plus ultra* of diet to sustain a mortal in his labours, whether they be those of the head or of the limbs.

The tea-vase and coffee-pot are equally elegant and companionable culinary utensils: they are, in their way, a sort of *lares* and *penates*, at whose shrines we offer our morning and evening orisons, and under whose cheering auspices we enjoy some of our most delectable hours. They are great qualifiers of dry, indigestible, insipid, or salted food; diluting the one, and seasoning the other. For the soldier in camp or on the march, in barrack or in battle; for the sailor at sea, or the traveller by land; for the father with his wife and chicks, the moping student in his cell, or the lonely "single man" in his "apartments;" for the merchant at his desk, or the trader at his counter; for the *man of thoughts*—the philosopher, the poet, the artist—in the quiet seclusion of his study; and for the *man of words*, in the hot arena of public contention,—tea and coffee are tipples indispensable—to the one to give a relish to cheerless solitary meals—to all to prepare them for their labours, or to solace after them. These friendly beverages make most men oblivious, for the time being, of the worry and bother, the disappointments and vexations, the headaches and heartaches, that mark life's experience, and constitute life's discipline. If at any meal, it is at the tea-meal, that the heart is warmed, the affections expanded, the disposition softened, that the purest reciprocities of friendship are interchanged, and the confidences of woman to woman, and friendly conversations of man with man, are poured forth. Under the fragrant steam

of the tea-pot or coffee-jug, who ever cares for the east wind howling without, who ever complains of cheerless days or dreary nights? With all classes, and in all places, however heavy time may hang, however dismal external nature, however ruinous public affairs, whenever tea or coffee is introduced, if a man has any sentiment, then a truce is given to all sombre and diabolical thoughts, for the time being at least, the dull space of time is accelerated, the gloom of nature is enlivened, and the confusion of the political or commercial world less confounded.

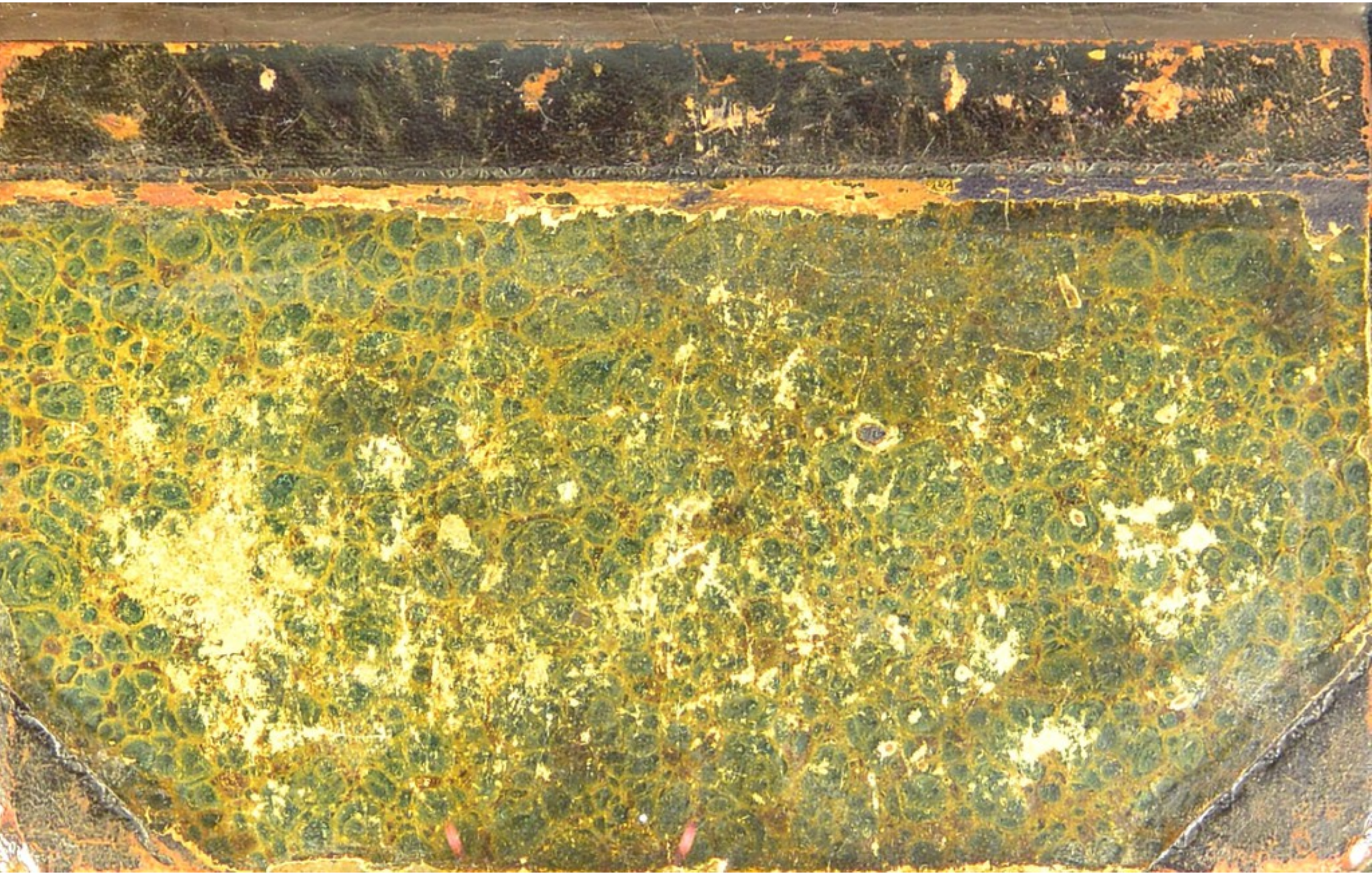
For the old, these tipples are the *cordials par excellence*. Their stimulus suits exactly the declining energy of their functions. If they be little nutritive in themselves, the demand for nourishment at that age is little. At all events, they serve temporarily to invigorate and enliven, to wind up the falling weight of their mechanism. They awaken their drowsy sensibilities; they rouse their torpid sympathies; they bind tighter for the time the gradually loosening ties of connexion between the organic and animal powers. They recall for the occasion the pleasant consciousness of young life, and spread a spontaneous sunshine on the gloom of nature's decay.

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THE END.



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